DRAINAGE REPORT
RED ROCK VILLAGE
WICHITA, SEDGWICK COUNTY, KANSAS

MARCH 6th, 2009

RED ROCK VILLAGE
DRAINAGE ANALYSIS
MARCH 6th, 2009

INTRODUCTION

This report contains supporting documentation and calculations for the proposed Red Rock Village development. The site is an undeveloped 10.9 acre parcel of land located in the NE ¼ of Section 1, T28S, R2W on the south side of Pawnee Street and between 119th Street West and 135th Street West. The area is currently farm ground and the soil types located on site are Vanoss (51%) and Elandco (32%) and Milan (17%). Vanoss and Elandco are silty loams and Milan is a loam, all of which are hydrologic group B soils.

The existing drainage patterns of the site direct the stormwater runoff to the east and south into a tributary of Calfskin Creek. The tributary is located within FEMA Zone A as shown on FIRM 20173C0340E. The floodplain was modified with Case #08-07-0442P which was approved on April 9th, 2008. A copy of the approved LOMR is enclosed in this report.

The boundaries of the plat are located clear of the shaded floodplain. The project is going to be developed as a single family residential subdivision. The homes on the perimeter of the subdivision will drain into existing street ditches, swales or stream basins. The lots in the interior of the subdivision will be developed as patio homes with rear yard drainage being conveyed in paved alleys with inverted crowns. That drainage will be conveyed into the existing swale on the west property line that was constructed as part of SW Passage Addition.

A detention pond was constructed with the Southwest Passage Addition development and channel improvements were made to the channel on the south side of Red Rock Village Addition at the same time. An expansion of those channel improvements will be implemented to provide the material to grade the proposed lots as indicated in the grading plan. This expansion will also provide a small amount of inline detention as well. The

HYDROLOGY

The rational method was used to determine peak flow rates for the basins located within the plat. The attached Drainage Plan shows the on-site drainage calculations. The storm sewer layout shown on the attached drainage plan is conceptual in nature. The final storm water sewer design shall be performed during preparation of construction drawings. Minimum Pads are set with information from the Calfskin Creek basin study by HNTB.

Lots	Min. Pad
Lot 1-14, Block 1	1335

The tributary on the east side of the project has a drainage basin area of approximately 6.1 square miles. The Stormwater Technical Manual policy paper on detention is currently under

development by the Technical Advisory Committee. The policy paper states that downstream runoff shall be evaluated at a point at the in the conveyance where the project site is equal to or less than 10% of the total drainage area. The site area is 11 acres of the 3904 acre tributary area, or less than one percent. The policy paper requires channel protection for developments larger than 5% of the watershed area upstream of the development area. As shown above the site area is less than 1% of the total tributary area and the site is exempt from the channel protection requirement. However, any work done in the channel that disturbs natural ground will be protected by rip-rap or other appropriate stabilization measures.

DETENTION ANALYSIS

A HEC-HMS model was created to determine the effects of detention on the flows at the bridge over Calfskin Creek at Pawnee. The drainage plan for Girrens addition demonstrated that offline detention in this area would have a negative impact on the channel and would actually increase flow rates. As a result, expansion of the existing channel is proposed. This expansion has been previously approved by both DWR and the Army Corps of Engineers as part of the Southwest Passage Addition project. The parameters and results of the 100 year model are shown in the table below.

	Existing			Proposed		
Node or Junc.	Tc	CN	Q (cfs)	Tc	CN	Q (cfs)
North Offsite	225	85	2011	225	85	2011
South Offsite	157	80	1590	157	80	1590
Red Rock Village	30	69	20.1	15	78	36.2
East Pond	-	-	-	-	-	1785
Red Rock Undetained	30	69	7.9	15	74	9.7
SW Passage	15	83	66.1	15	83	66.1
Pawnee (Junction 3)	--	-	3441	--	--	3141

The proposed pond excavation in the tributary of Calfskin Creek will lower the 100 year outflow at the bridge at Pawnee as proposed. The pond may be reduced in size from the proposed 3.5 acres of static pool if final grading would allow for a smaller size at the time of final plan preparation. Supplemental calculations will be submitted to the stormwater department for approval prior to construction.

Low Flow Design Storm Detention & Stormwater Treatment

The storm water management criteria for the city of Wichita are currently in the process of being revised and updated. The final design criteria are likely to include criteria for stormwater treatment. The proposed detention pond will provide water quality treatment for lower design storms. In addition to the water quality treatment that the detention pond will provide, all stormwater runoff from this site will run through grass swales prior to entering any streams or ponds. The minimum contact distance will be 187 feet at the southwest

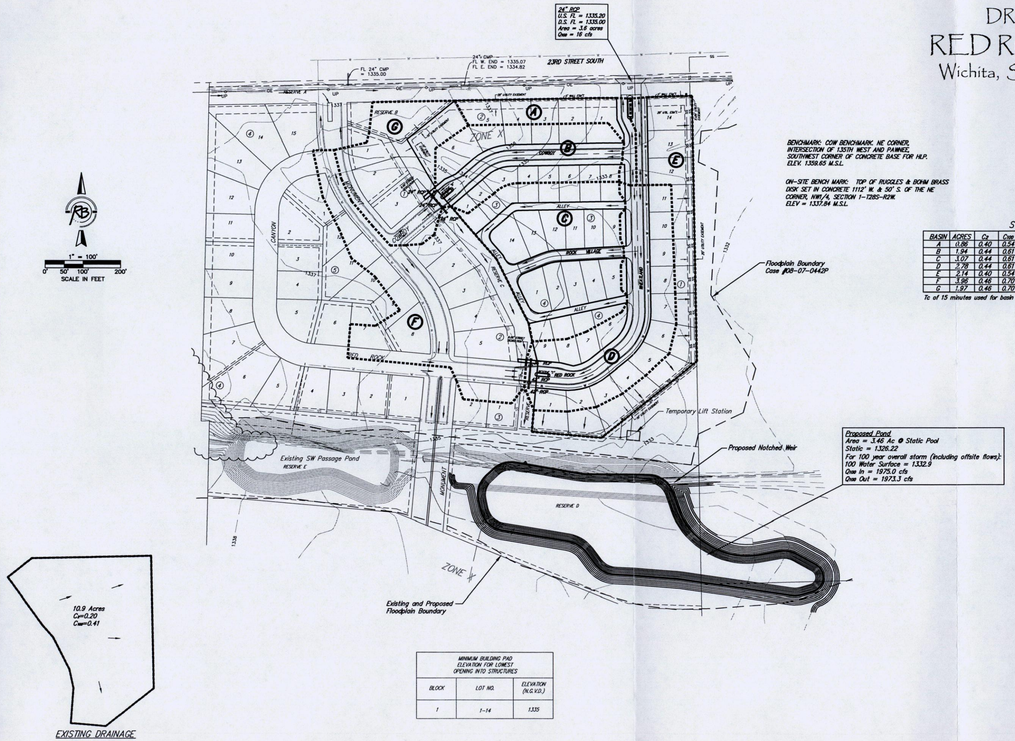
corner of the plat. The maximum length of grass contact is approximately 780 feet along the west line of the plat.

Conclusions

The proposed Red Rock Village project will be designed to produce no negative impacts on downstream channels. Proposed swales and detention ponds will provide stormwater treatment for developed runoff. Although stabilization is not required, any portions of the channel that are disturbed by construction activities will be stabilized as part of this project.

DRAINAGE PLAN

DRAINAGE PLAN
RED ROCK VILLAGE
Wichita, Sedgwick County, Kansas



BENCHMARK: COW BENCHMARK NE CORNER, INTERSECTION OF 135TH WEST AND PAWNEE, SOUTHWEST CORNER OF CONCRETE BASE FOR HLP. ELEV. 1338.63 M.S.L.

ON-SITE BENCH MARK: TOP OF RUGGLES & BOHM BRASS DISK SET IN CONCRETE 1112' W. & 50' S. OF THE NE CORNER, NW1/4, SECTION 1-T28S-R2W. ELEV = 1337.84 M.S.L.

SWS BASIN INFORMATION

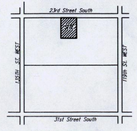
BASIN	ACRES	Cv	Cwo	Ti	tso	Qo cfs	Qwo cfs	Comments
A	1.86	0.40	0.54	3.73	7.37	1.3	3.4	drains into Pawnee south street ditch
B	1.94	0.44	0.61	3.73	7.37	3.2	6.7	split evenly at inlets
C	3.07	0.44	0.61	3.73	7.37	5.1	13.6	flumes will carry water into swale
D	3.78	0.44	0.61	3.73	7.37	6.6	17.5	split evenly at inlets
E	2.14	0.40	0.54	3.73	7.37	3.5	6.5	drains into tributary basin
F	3.86	0.46	0.70	3.73	7.37	6.8	20.4	offsite from SW Passage
G	1.87	0.46	0.70	3.73	7.37	3.4	10.2	offsite from SW Passage

To of 15 minutes used for basin calculations

Proposed Pond
Area = 3.46 Ac @ Static Pool
Static = 1326.22
For 100 year overall storm (including offsite flows):
100 Water Surface = 1332.9
Qwo In = 1975.0 cfs
Qwo Out = 1973.3 cfs

EXISTING DRAINAGE

MINIMUM BUILDING PAD ELEVATION FOR LOWEST OPENING INTO STRUCTURES		
BLOCK	LOT NO.	ELEVATION (N.G.V.D.)
1	1-14	1335



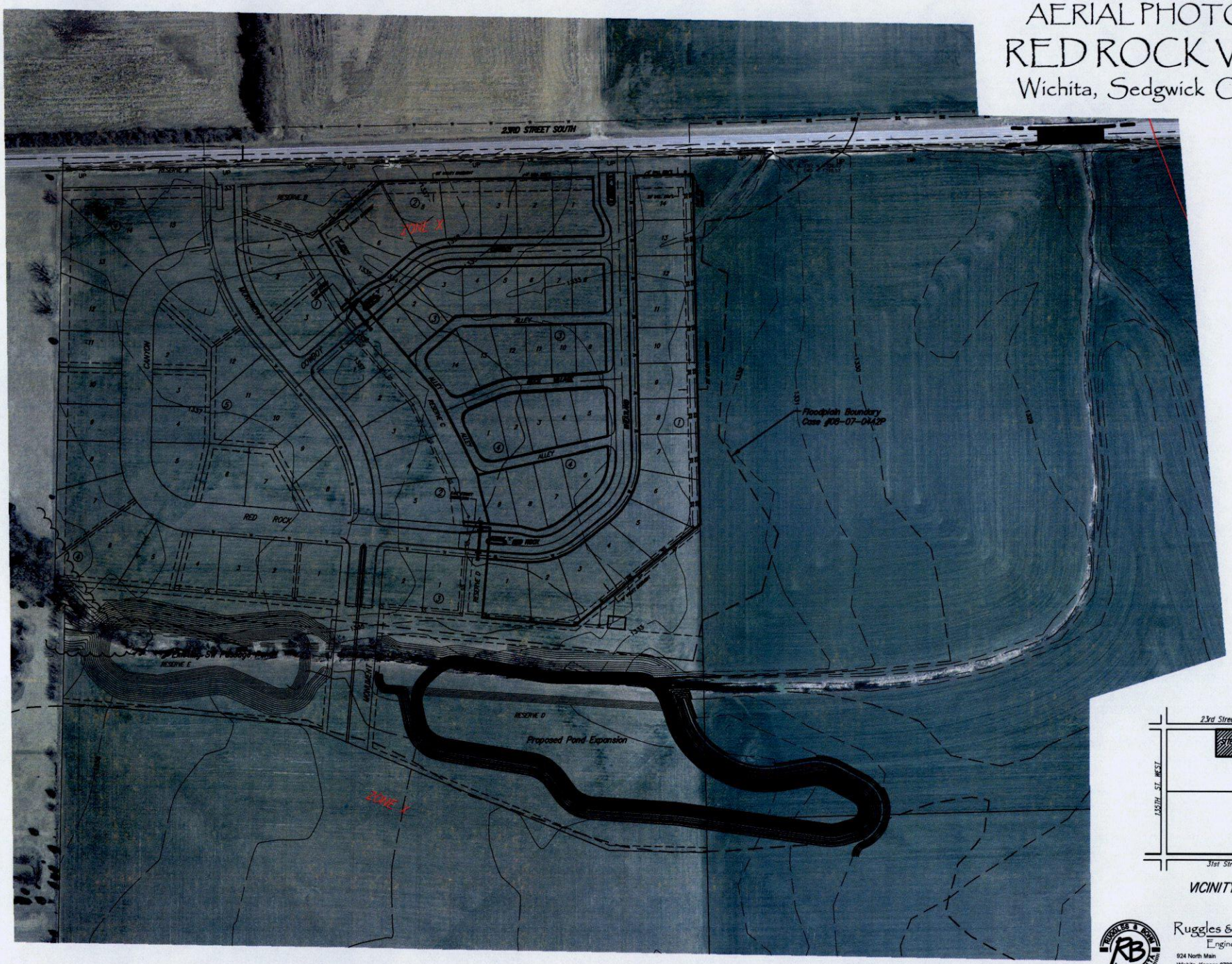
VICINITY MAP

Ruggles & Bohm, P.A.
Engineering, Surveying, Land Planning
324 North Main
Wichita, Kansas 67203
www.rbkansas.com
(316) 264-6006
(316) 264-4521 fax
E-mail: info@rbkansas.com

AERIAL PHOTO EXHIBIT

RED ROCK VILLAGE

Wichita, Sedgwick County, Kansas



VICINITY MAP

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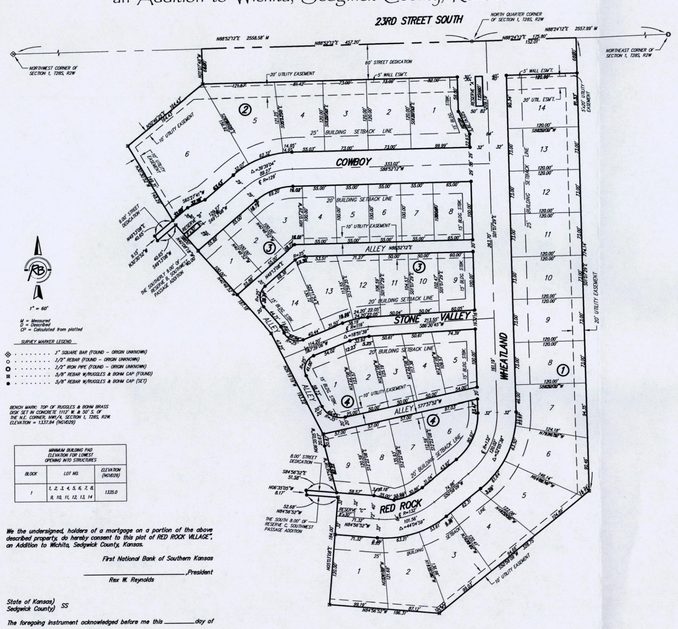
RED ROCK VILLAGE

an Addition to Wichita, Sedgwick County, Kansas



FEMA FIRM

Federal Emergency Management Agency

Washington, D.C. 20472

APR 09 2008

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Carl Brewer
Mayor, City of Wichita
455 North Main Street
Wichita, KS 67202

IN REPLY REFER TO:
Case No.: 08-07-0442P
Community Name: City of Wichita, KS
Community No.: 200328
Effective Date of This Revision: APR 09 2008

Dear Mayor Brewer:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Kansas City, Missouri, at (816) 283-7003, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Patrick F. Sacbibit, P.E., CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

For: William R. Blanton Jr., CFM, Chief
Engineering Management Branch
Mitigation Directorate

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: The Honorable David Unruh
Chairman, Sedgwick County
Board of Commissioners

Mr. Scott Lindebak
Stormwater Manager
City of Wichita

[redacted]
Ruggles & Bohm, P.A.

[redacted]
Development Partnership

 | Issue Date: APR 09 2008 | Effective Date: APR 09 2008 | Case No.: 08-07-0442P | LOMR-APP

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Wichita Sedgwick County Kansas	CHANNELIZATION CULVERT DETENTION BASIN	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 200328		
IDENTIFIER	Southwest Passage Addition	APPROXIMATE LATITUDE & LONGITUDE: 37.648, -97.489 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 20173C0340 E DATE: February 2, 2007	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Tributary to Calfskin Creek - from the confluence with Calfskin Creek to approximately 3,000 feet upstream

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Tributary to Calfskin Creek	Zone A	Zone A	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

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Mitigation Directorate

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact the specialist for your State at:

Mitigation Division
Federal Emergency Management Agency, Region VII
9221 Ward Parkway, Suite 300
Kansas City, MO 64114
(816) 283-7003

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

According to the submitted information, the corporate limits for the City of Wichita have changed because of annexations. Although the area of revision is shown on the above-referenced FIRM panel to be within the unincorporated areas of Sedgwick County, the City of Wichita has annexed the area. We have not reflected the corporate limit changes in this LOMR.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

This revision is effective as of the date of this letter. Any requests to review or alter this determination should be made within 30 days and must be based on scientific or technical data.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

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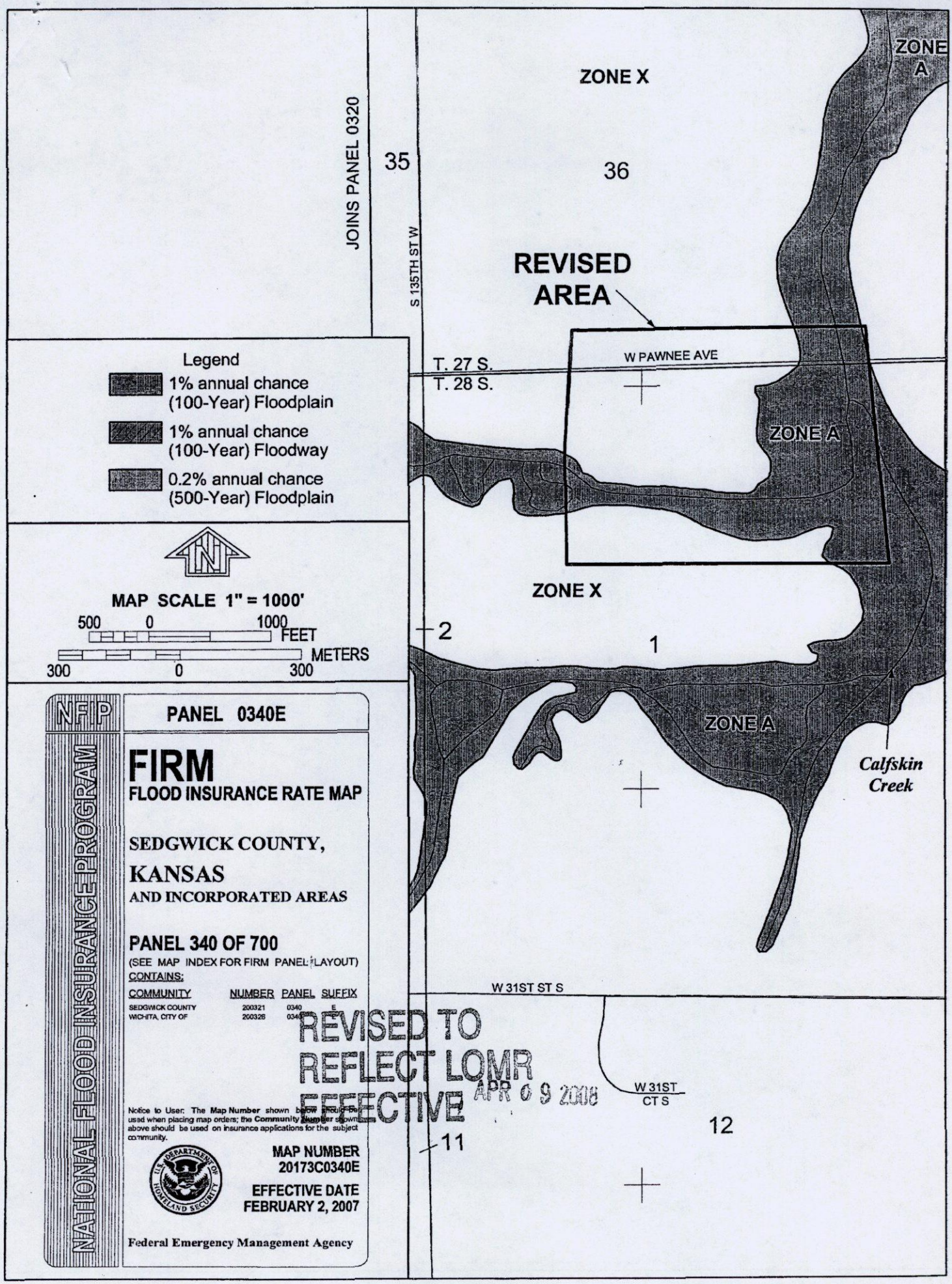
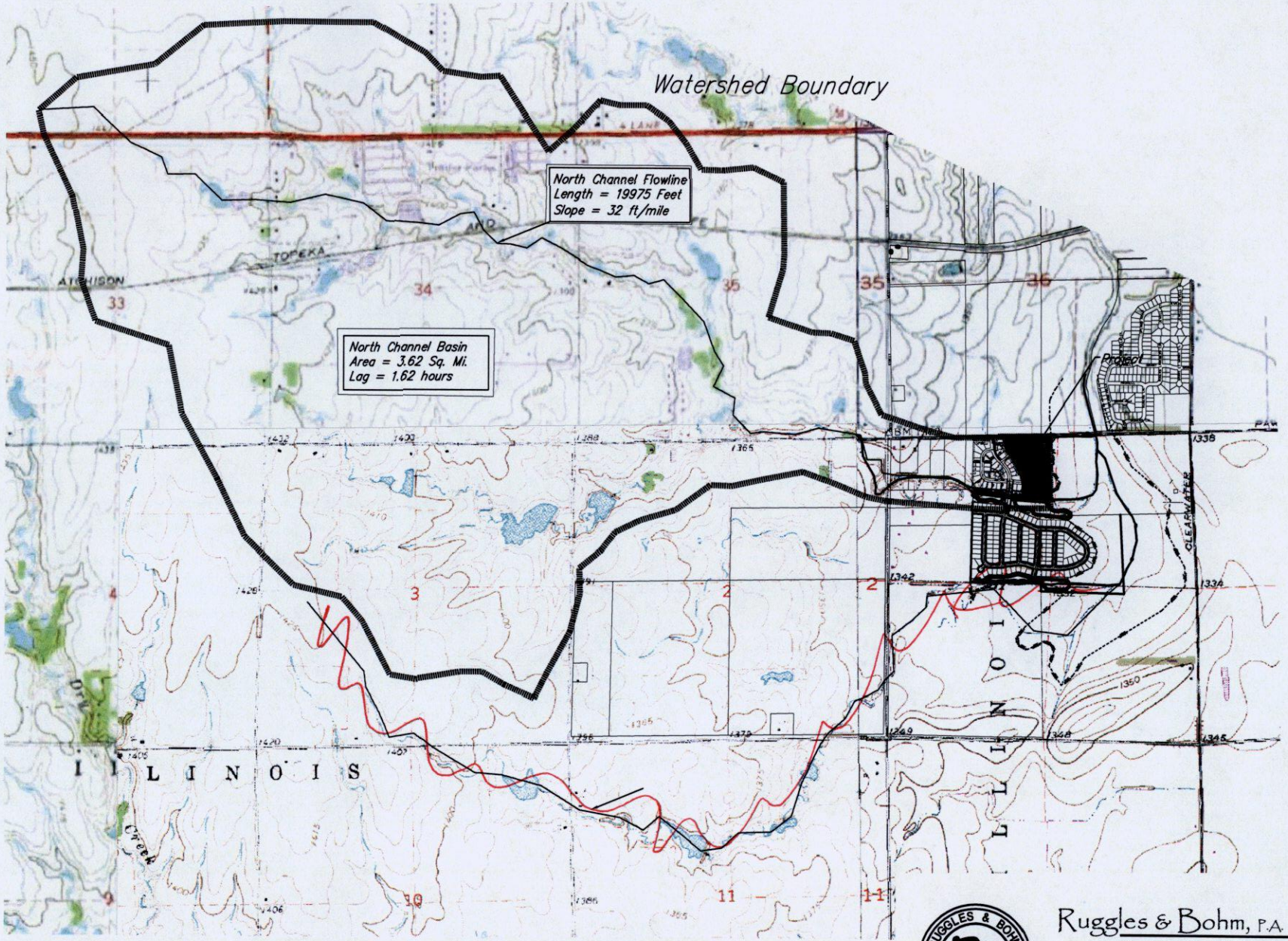

JOINS PANEL 0320
35
S 135TH ST W
ZONE X
36
ZONE A
REVISED AREA
W PAWNEE AVE
T. 27 S.
T. 28 S.
ZONE A
ZONE X
2
1
ZONE A
Calfskin Creek
W 31ST ST S
W 31ST CT S
12
11
Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
MAP SCALE 1" = 1000'
500 0 1000 FEET
300 0 300 METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0340E
FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY, KANSAS
AND INCORPORATED AREAS
PANEL 340 OF 700
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
SEDGWICK COUNTY 200321 0340 E
WICHITA, CITY OF 200328 0340 E
REVISED TO REFLECT LOMR EFFECTIVE APR 0 9 2008
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 20173C0340E
EFFECTIVE DATE FEBRUARY 2, 2007
Federal Emergency Management Agency

USGS MAP

Red Rock Village

USGS Quad Maps

Wichita West & Goddard



SCALE
1:30 000

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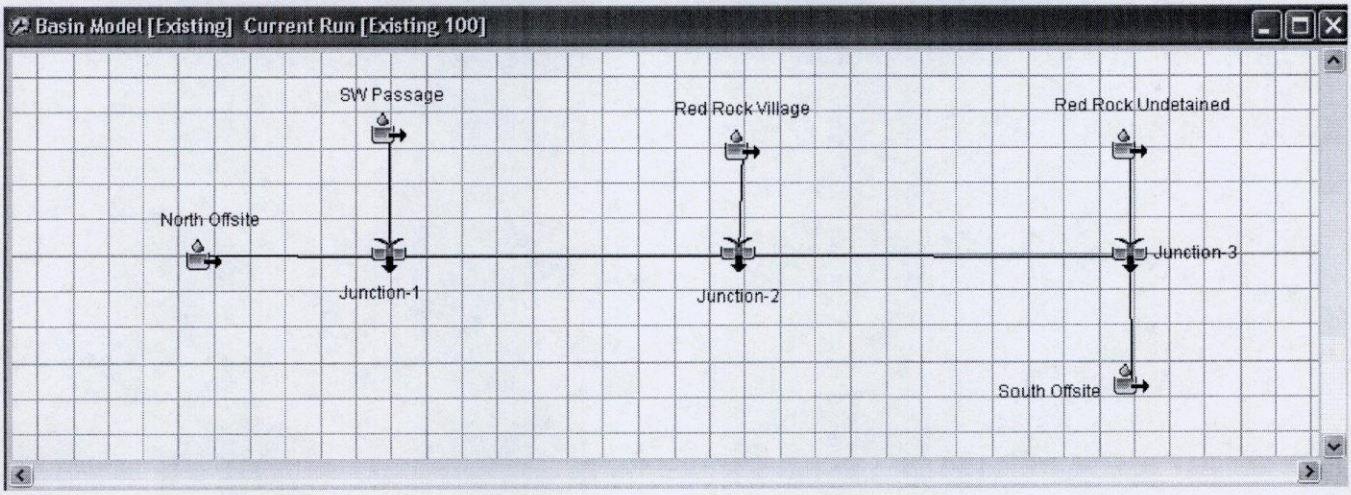
(316) 264-4621 fax
E-mail: info@rbkansas.com

HEC-HMS DATA


Basin Model [Existing] Current Run [Existing 100]
SW Passage
Red Rock Village
Red Rock Undetained
North Offsite
Junction-1
Junction-2
Junction-3
South Offsite

Project: RedRock Simulation Run: Existing 2

Start of Run: 06Mar2009, 00:00 Basin Model: Existing
End of Run: 07Mar2009, 00:04 Meteorologic Model: Met2
Compute Time: 09Mar2009, 07:47:10 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	3.7200	671.2	06Mar2009, 16:00	1.80
Junction-2	3.7320	671.6	06Mar2009, 16:00	1.80
Junction-3	6.2067	1067.6	06Mar2009, 15:24	1.66
North Offsite	3.7000	670.3	06Mar2009, 16:00	1.80
Red Rock Undeveloped	0.0047	1.6	06Mar2009, 12:24	0.94
Red Rock Village	0.0120	4.0	06Mar2009, 12:24	0.94
South Offsite	2.4700	445.5	06Mar2009, 14:48	1.45
SW Passage	0.0200	21.7	06Mar2009, 12:08	1.95

Project: RedRock Simulation Run: Existing 5

Start of Run: 06Mar2009, 00:00 Basin Model: Existing
End of Run: 07Mar2009, 00:04 Meteorologic Model: Met5
Compute Time: 09Mar2009, 10:51:03 Control Specifications: Control 1

Volume Units: IN

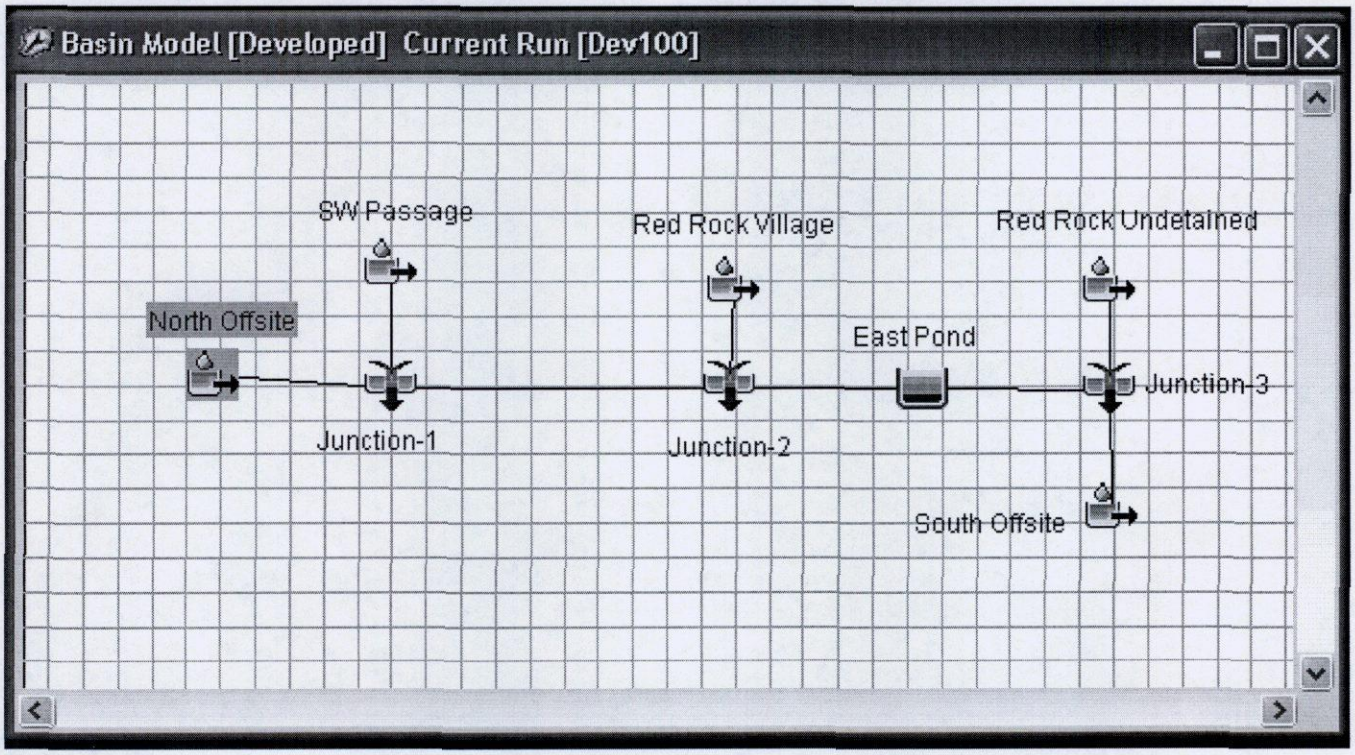
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	3.7200	974.7	06Mar2009, 15:56	2.61
Junction-2	3.7320	975.3	06Mar2009, 15:56	2.61
Junction-3	6.2067	1595.7	06Mar2009, 15:16	2.45
North Offsite	3.7000	973.5	06Mar2009, 15:56	2.61
Red Rock Undeveloped	0.0047	2.8	06Mar2009, 12:24	1.58
Red Rock Village	0.0120	7.3	06Mar2009, 12:24	1.58
South Offsite	2.4700	696.1	06Mar2009, 14:44	2.22
SW Passage	0.0200	31.5	06Mar2009, 12:08	2.77

Project: RedRock Simulation Run: Existing 100

Start of Run: 06Mar2009, 00:00 Basin Model: Existing
End of Run: 07Mar2009, 00:04 Meteorologic Model: Met100
Compute Time: 08Mar2009, 12:33:55 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	3.7200	2013.7	06Mar2009, 15:52	5.47
Junction-2	3.7320	2015.1	06Mar2009, 15:52	5.46
Junction-3	6.2067	3440.5	06Mar2009, 15:12	5.30
North Offsite	3.7000	2011.3	06Mar2009, 15:52	5.47
Red Rock Undeveloped	0.0047	7.9	06Mar2009, 12:24	4.14
Red Rock Village	0.0120	20.1	06Mar2009, 12:24	4.14
South Offsite	2.4700	1589.8	06Mar2009, 14:40	5.05
SW Passage	0.0200	66.1	06Mar2009, 12:08	5.72


Basin Model [Developed] Current Run [Dev100]
SW Passage
Red Rock Village
Red Rock Undetained
North Offsite
East Pond
Junction-3
Junction-1
Junction-2
South Offsite

Project: RedRock Simulation Run: Dev2

Start of Run: 06Mar2009, 00:00 Basin Model: Developed
End of Run: 07Mar2009, 00:04 Meteorologic Model: Met2
Compute Time: 09Mar2009, 10:49:13 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	3.7320	669.7	06Mar2009, 16:08	1.77
Junction-1	3.7200	671.2	06Mar2009, 16:00	1.80
Junction-2	3.7320	671.7	06Mar2009, 16:00	1.80
Junction-3	6.2067	1053.6	06Mar2009, 15:28	1.64
North Offsite	3.7000	670.3	06Mar2009, 16:00	1.80
Red Rock Undeveloped	0.0047	2.5	06Mar2009, 12:20	1.32
Red Rock Village	0.0120	11.0	06Mar2009, 12:08	1.71
South Offsite	2.4700	445.5	06Mar2009, 14:48	1.45
SW Passage	0.0200	21.7	06Mar2009, 12:08	1.95

Project: RedRock Simulation Run: Dev5

Start of Run: 06Mar2009, 00:00
End of Run: 07Mar2009, 00:04
Compute Time: 09Mar2009, 10:50:12

Basin Model: Developed
Meteorologic Model: Met5
Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	3.7320	973.6	06Mar2009, 16:04	2.58
Junction-1	3.7200	974.7	06Mar2009, 15:56	2.61
Junction-2	3.7320	975.4	06Mar2009, 15:56	2.61
Junction-3	6.2067	1578.8	06Mar2009, 15:24	2.44
North Offsite	3.7000	973.5	06Mar2009, 15:56	2.61
Red Rock Undeveloped	0.0047	4.0	06Mar2009, 12:20	2.02
Red Rock Village	0.0120	16.3	06Mar2009, 12:08	2.46
South Offsite	2.4700	696.1	06Mar2009, 14:44	2.22
SW Passage	0.0200	31.5	06Mar2009, 12:08	2.77

Project: RedRock Simulation Run: Dev100

Start of Run: 06Mar2009, 00:00 Basin Model: Developed
End of Run: 07Mar2009, 00:04 Meteorologic Model: Met100
Compute Time: 08Mar2009, 12:08:13 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	3.7320	1785.3	06Mar2009, 16:00	4.75
Junction-1	3.7200	2013.7	06Mar2009, 15:52	5.47
Junction-2	3.7320	2015.1	06Mar2009, 15:52	5.47
Junction-3	6.2067	3141.2	06Mar2009, 15:12	4.81
North Offsite	3.7000	2011.3	06Mar2009, 15:52	5.47
Red Rock Undeveloped	0.0047	9.7	06Mar2009, 12:16	4.69
Red Rock Village	0.0120	36.2	06Mar2009, 12:08	5.25
South Offsite	2.4700	1589.8	06Mar2009, 14:40	5.05
SW Passage	0.0200	66.1	06Mar2009, 12:08	5.72

Adopted: February 23, 2007

CITY OF WICHITA

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)

	Applicant			Engr	
Tab 1. Project Narrative	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Site Location Map, using USGS Map				✓	
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain				✓	
C. Discussion of offsite conditions				✓	
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				✓	
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.)			grading plan will be provided by 3/13/09		
H. Professional Engineer seal, signature and date on cover of report				✓	
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover			will provide upon approval		

	Applicant			Engr	
Tab 2. Existing Conditions Runoff Calculations	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)				✓	
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)				✓	
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)				✓	
D. Total Site Area and Total Impervious Area (acres)					
E. Benchmarks used for site control				✓	
F. Streams, creeks, and waterway labeled				✓	
G. Predominant soils from USDA soil surveys, and/or on site soil borings			from USDA	✓	
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted				✓	
I. Location of existing roads, buildings, parking lots and other impervious areas.				✓	

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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				✓	
L. Flow paths				✓	
M. Location and dimensions of existing channels, bridges or culvert crossings				✓	
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				✓	
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					

	Applicant			Engr	
Tab 3. Post-Development Hydrologic Analysis	**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)			having trouble w/ Hec-Hms. will have submittal by Friday.		X
B. Proposed time of concentrations used in calculations				✓	
C. Assumed post-developed runoff curve numbers				✓	
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)				✓	
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			working on output from Hec-Hms		✓
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary				✓	
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)				✓	
I. Design water surface elevations and normal pool elevation for ponds.				✓	
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.				✓	
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				✓	
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings					X

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P. Preliminary selection and location of stormwater controls				✓	
Q. Emergency overflow structure's flow path					X
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)			will be added to construction plans		X
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				✓	

	Applicant			Engr	
Tab 4. Floodplain Submittal	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Provide source of flood profile				✓	
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)				.	X
F. Provide source of floodway data table and discharges					X
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				✓	

	Applicant			Engr	
Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	**I/R**	**NA**	**Explanation / Location in Plan**	**I/R**	**NA**
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)			approved w/ SW Passage Project	✓	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.)			approved w/ SW Passage Project		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.			approved LOMR reflects changes on property		X
D. Kansas Department of Transportation					X
E. Sedgwick County Right-of-way Permit					X

Consulting Engineer Initials _____