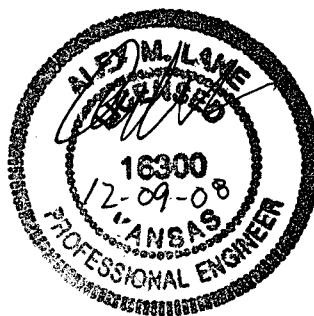


**DRAINAGE REPORT
GIRRENS ADDITION
WICHITA, SEDGWICK COUNTY,
KANSAS**

December 8, 2008



Ruggles & Bohm P.A.

Engineering, Surveying, Land Planning



Ruggles & Bohm, P.A.

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

Date: Tuesday, December 09, 2008

DEC 09 2008

MEMO

To: Scott Lindebak
City Hall
455 N. Main
Wichita, KS 67202

Description:

- Confirmation
- Transmittal
- Transmittal under separate cover by

From: Alex M. Lane, P.E.

Purpose:

- Approval
- Review & comment
- Use
- Other : _____
- Distribution
- Information
- Record

Project: Girrens Addition

RB Project No.: 3220P

Enclosures/Attachments:

- Prints
- Originals
- Diskettes containing: _____
- Other: _____
- Change Order
- Shop Drawings

Other Project Reference No.: _____

Copies	Description
1	Drainage Plan

Remarks: _____

Copies to:
Julianne Kallman

If checked below, please:

- Acknowledge receipt of enclosures
- Return enclosures to us.

Signed 

Scott Lindebak, P.E.
City of Wichita
455 N Main
Wichita, KS 67202

December 9, 2008

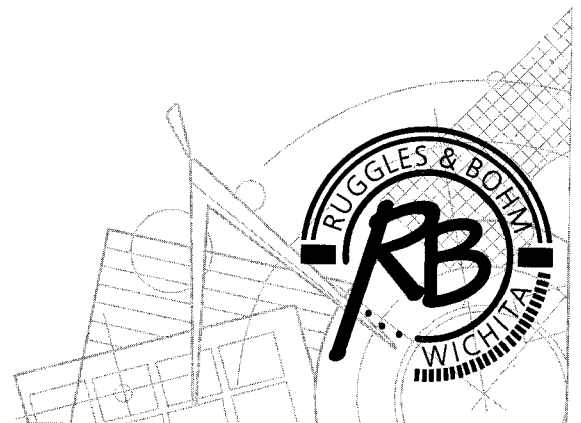
Scott,

Please find attached the drainage plan for the Girrens Addition located at Pawnee and 119th Street West. I have included the calculations you requested for the detention of the 2-year storm for information only. The requirement for the 2-year detention pond for stormwater treatment will be contested at the Subdivision Committee hearing on Dec. 11, 2008. If the Planning Commission upholds the detention requirement the calculations will stand as published in the drainage report. If the Planning Commission does not uphold the detention requirement the 2-year detention calculations as presented herein will be disregarded as the property is developed.

Sincerely,



Alex M. Lane, P.E.
Ruggles & Bohm, P.A.



**DRAINAGE REPORT
GIRRENS ADDITION
WICHITA, SEDGWICK COUNTY,
KANSAS**

December 8, 2008

**Girrens Addition
DRAINAGE ANALYSIS
December 8, 2008**

INTRODUCTION

This report contains supporting documentation and calculations for the proposed Girren's Addition development. The proposed site is an undeveloped 38.5 acre parcel of land located in the NE ¼ of Section 1 T28S R2W at the southwest corner of Pawnee Street and 119th Street West. The area is currently farm ground and the soil types located on site are Farnum (40%) and Blanket (60%), both silty silty loams in hydrologic groups B and C respectively. Calfskin Creek runs just off the west edge of the plat. The tributary passes under Pawnee Street through an existing Bridge structure. The drainage patterns of the site currently direct the water off the site in two directions. A 25.2 acre tributary area drains to the west and into the Calfskin Creek. The other on site tributary area of 8.8 acres drains generally to the northeast and to a 24" RCP culvert under 119th Street West. There are no offsite areas draining onto the site. Calfskin Creek is located within FEMA Zone A as shown on FIRM 20173C0340E, a firmette of the project area is attached within this report. The western plat line is located just outside the floodplain boundary. The boundaries of the plat are located to stay out of the floodplain boundary.

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.

<u>Lots</u>	<u>Min. Pad</u>
Lot 1, Blk 1	1334.8
Lot 7, Blk 1	1334.9
Lot 8, Blk 1	1334.9

The bridge on Pawnee just west of the project location has a tributary area of app. 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 38.5 acres of the 3904 acre tributary area, or less than one percent. The policy paper also requires channel protection for developments. However, sites where the development area is less than 5% of the watershed area upstream of the development area are exempted from the requirement. 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.

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 existing condition 100-year flow of 3377.4 cfs falls within 4% of the Q₁₀₀ used for the Southwest Passage Addition LOMR, 3501 cfs. The parameters and results of the model are shown in the table below.

<u>Node or Junc.</u>	<u>Existing</u>			<u>Proposed</u>			<u>No Detention</u>		
	<u>Tc</u>	<u>CN</u>	<u>Q (cfs)</u>	<u>Tc</u>	<u>CN</u>	<u>Q (cfs)</u>	<u>Tc</u>	<u>CN</u>	<u>Q (cfs)</u>
Calfskin	225	80	1559.6	225	80	1584.4	225	80	1584.4
North Offsite	157	80	1971.6	157	80	1971.6	157	80	1971.6
Girrens	21	80	92.4	15	88	132.8	15	88	132.8
Reservoir-1	--	--	--	--	--	91.8	--	--	--
Pawnee	--	--	3383.1	--	--	3410.0	--	--	3407.7

As demonstrated in the table above the downstream runoff is increased at the Pawnee bridge in either of the following cases, with detention provided or with no detention. In fact, there is a slight increase in the runoff at the Pawnee bridge when detention is provided. Therefore no detention will be provided for this development.

Low Flow Design Storm Detention & Stormwater Treatment

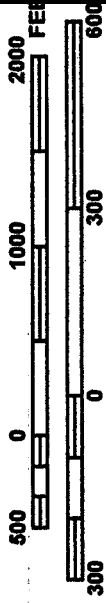
The storm water management criteria for the city of Wichita is currently in the process of being revised and updated. The final design criteria are likely to include criteria for stormwater treatment. Although it is impossible to design for unknown future requirements one of the likely options to treat stormwater is through a detention pond. The need for and location of the detention pond will be determined at the time of site development. The pond shall detain for the 2-year 24-hour storm and a 3' rectangular concrete weir shall control the outlet flow. A HEC-HMS model demonstrates that the pond shall have a surface area of approximately 1 acre and store 1.8 acre-ft in the 2-year storm.

<u>Elevation</u>	<u>Area (Acre)</u>	<u>Discharge (cfs)</u>
96	0.86	0.0
97	0.92	9.6
98	0.98	28.2

DRAINAGE PLAN

FEMA FIRM

MAP SCALE 1" = 1000'



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

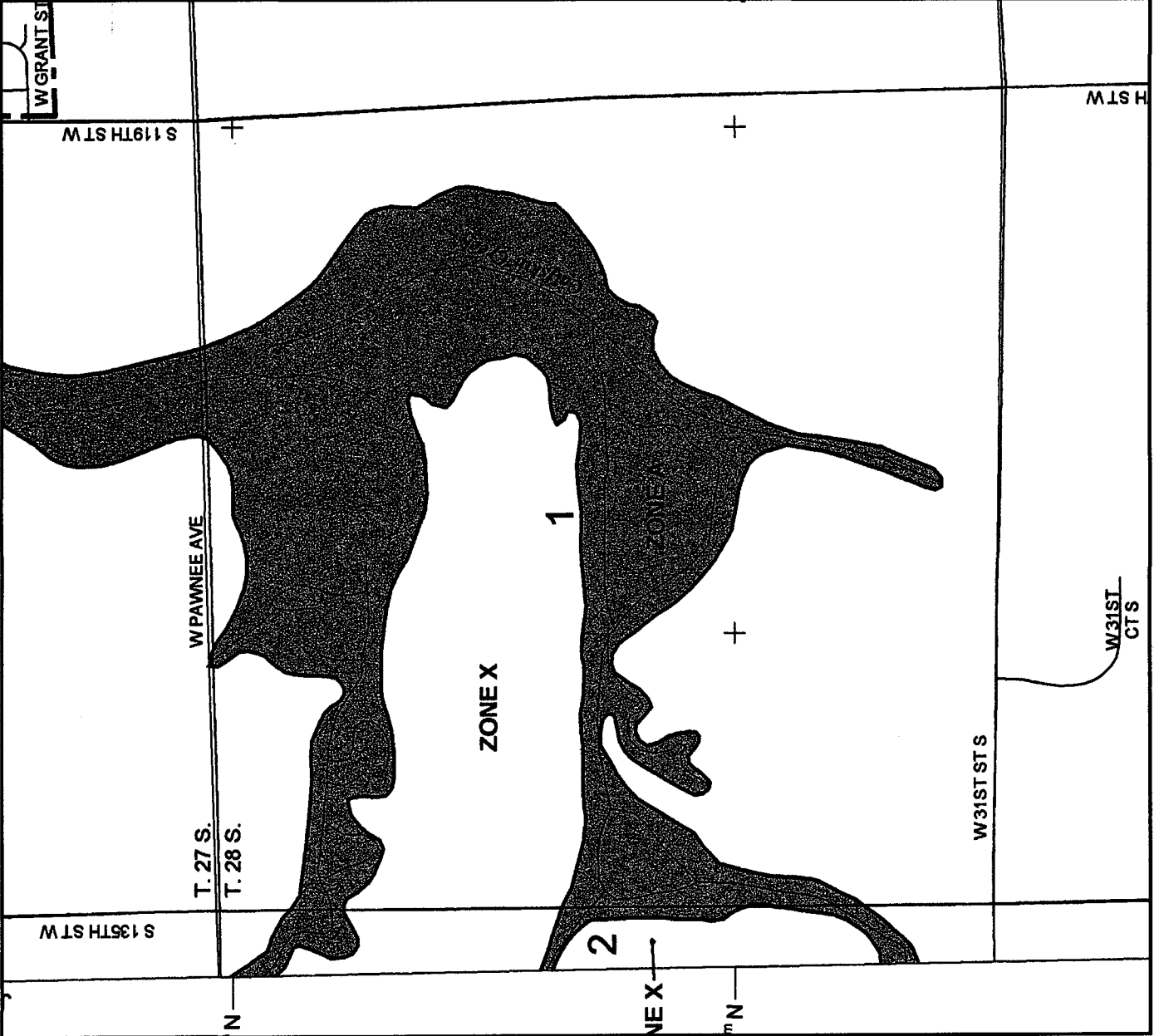
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
 20173C0340E

EFFECTIVE DATE
 FEBRUARY 2, 2007
 Federal Emergency Management Agency

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



USGS MAP

HEC-RAS DATA

HEC-RAS Plan: CC_existing River: Calfskin Creek Reach: CC Profile: 100 Yr

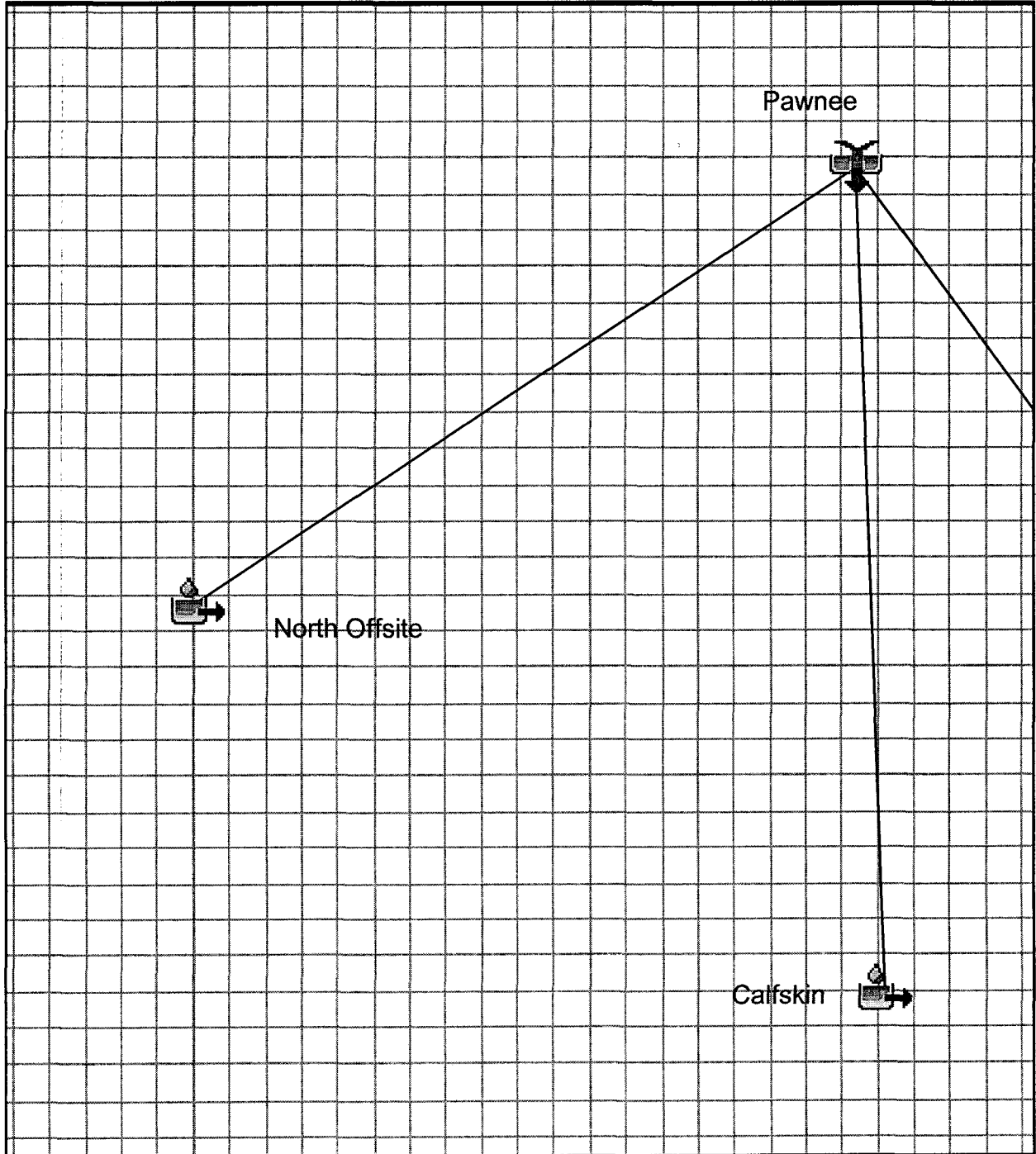
Reach	River Sta	Profile	Q Total (cfs)	Min Chl El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Cntl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Cnl
CC	25313.67	100 Yr	1440.89	1337.48	1339.36		1339.41	0.003974	2.85	824.88	1066.60	0.43
CC	24723.19	100 Yr	1440.89	1333.37	1337.88	1337.80	1338.05	0.001499	5.57	1058.31	1743.18	0.59
CC	23356.01	100 Yr	1440.89	1331.03	1332.89	1332.89	1333.09	0.019093	5.23	439.49	1112.03	0.91
CC	22214.72	100 Yr	1440.89	1329.19	1332.91	1330.29	1332.91	0.000016	0.33	4908.00	2897.93	0.03
CC	20401.50	100 Yr	1440.89	1328.21	1332.89	1329.27	1332.89	0.000010	0.31	4778.79	2339.22	0.03
CC	19212.51	100 Yr	1440.89	1327.20	1332.87	1329.68	1332.87	0.000025	0.57	3070.14	1207.20	0.04
CC	19001.35	100 Yr	4415.68	1326.64	1332.79	1330.38	1332.84	0.000359	1.98	2369.97	1070.50	0.18
CC	18805.08	100 Yr	4415.68	1325.65	1332.68	1331.14	1332.76	0.000498	3.32	2164.90	1027.46	0.26
CC	18668.61		Bridge									
CC	18662.39	100 Yr	4860.45	1324.45	1332.27	1330.62	1332.40	0.000859	4.41	1905.09	750.16	0.33
CC	18408.01	100 Yr	4860.45	1324.63	1331.84	1330.19	1332.07	0.001592	4.13	1270.22	745.01	0.33
CC	18049.13	100 Yr	4860.45	1325.10	1331.48		1331.60	0.001081	3.66	1811.76	714.86	0.28
CC	17474.38	100 Yr	4860.45	1322.83	1329.50		1330.24	0.007257	9.27	775.30	365.43	0.72
CC	16585.85	100 Yr	4860.45	1321.82	1329.27	1327.72	1329.33	0.000305	1.89	2764.83	924.31	0.15
CC	16207.21	100 Yr	4860.45	1320.99	1329.11	1328.05	1329.20	0.000361	2.37	2228.14	686.09	0.17
CC	15829.18	100 Yr	4860.45	1320.36	1328.86		1328.94	0.001059	3.93	2921.78	958.83	0.28
CC	15517.96	100 Yr	4860.45	1320.31	1328.61	1325.07	1328.66	0.000445	2.57	3054.59	1258.83	0.18
CC	15151.89	100 Yr	4860.45	1319.47	1328.53	1324.56	1328.56	0.000186	1.77	3411.35	1410.68	0.12
CC	14911.41	100 Yr	4860.45	1319.93	1326.96	1325.94	1328.10	0.009145	11.53	721.41	1204.25	0.83
CC	14810.29		Bridge									
CC	14708.17	100 Yr	4860.45	1318.65	1326.72	1325.82	1327.77	0.007978	11.25	794.88	1196.42	0.78
CC	14504.08	100 Yr	4860.45	1319.38	1326.75	1323.75	1328.80	0.000956	3.90	3597.13	1087.21	0.27
CC	14077.15	100 Yr	4860.45	1318.65	1326.45		1326.49	0.000642	3.40	4323.22	1020.40	0.23
CC	13717.09	100 Yr	4860.45	1318.21	1326.25		1326.28	0.000512	3.03	4642.42	1130.31	0.20
CC	13372.97	100 Yr	4860.45	1317.12	1326.08	1322.48	1326.11	0.000419	2.95	4733.21	1233.13	0.19
CC	13092.43	100 Yr	4860.45	1315.86	1323.97	1323.68	1325.36	0.015549	14.83	670.64	1462.75	0.99
CC	13035.43		Bridge									
CC	12883.12	100 Yr	4860.45	1315.78	1323.89	1321.86	1324.45	0.006449	6.85	812.20	1131.78	0.44
CC	12487.87	100 Yr	4860.45	1315.77	1323.38	1320.85	1323.44	0.001145	3.88	3120.03	1575.71	0.26
CC	12151.00	100 Yr	4860.45	1314.89	1323.17	1320.74	1323.20	0.000476	2.95	4846.17	1765.60	0.20
CC	11836.73	100 Yr	4860.45	1314.77	1323.05	1319.94	1323.06	0.000229	1.85	6640.93	2146.81	0.12
CC	11134.15	100 Yr	4860.45	1313.55	1322.95		1322.96	0.000107	1.21	8116.76	2489.42	0.08
CC	10767.88	100 Yr	4860.45	1313.52	1322.91	1318.47	1322.92	0.000121	1.29	6999.67	2265.68	0.09
CC	10338.88	100 Yr	4985.85	1312.29	1322.89		1322.90	0.000050	0.96	9494.88	2323.82	0.06
CC	10130.07	100 Yr	4985.85	1312.71	1322.88		1322.88	0.000083	1.23	9446.29	2433.94	0.07
CC	9735.084	100 Yr	4985.85	1312.46	1322.86		1322.87	0.000021	0.82	10849.20	2368.72	0.04
CC	9283.014	100 Yr	4985.85	1312.82	1322.86		1322.86	0.000013	0.47	11824.33	2524.91	0.03
CC	8441.594	100 Yr	4985.85	1311.92	1322.86	1315.83	1322.86	0.000005	0.34	16644.07	3030.33	0.02
CC	7966.484	100 Yr	15698.07	1310.43	1322.84	1318.04	1322.85	0.000046	1.10	18216.76	3367.42	0.06
CC	7779.804	100 Yr	15698.07	1309.82	1322.81	1318.18	1322.83	0.000098	1.61	14824.50	2859.08	0.08
CC	7727.804		Bridge									
CC	7605.464	100 Yr	15698.07	1309.56	1322.73	1318.39	1322.75	0.000066	1.23	14892.56	3028.94	0.07
CC	7121.825	100 Yr	15698.07	1308.68	1322.71	1315.30	1322.72	0.000056	1.27	17880.96	2400.48	0.07
CC	6722.03	100 Yr	15698.07	1308.12	1322.67		1322.70	0.000097	1.78	15585.27	2187.53	0.09
CC	6456.298	100 Yr	14502.25	1308.15	1322.64		1322.67	0.000142	2.27	14010.44	2162.59	0.11
CC	6000.795	100 Yr	14502.25	1308.10	1322.54		1322.59	0.000329	3.25	8756.17	1209.36	0.16
CC	5673.692	100 Yr	14502.25	1307.08	1322.39		1322.50	0.000215	2.74	6701.36	879.93	0.13
CC	5136.408	100 Yr	14502.25	1306.24	1322.23		1322.38	0.000563	4.52	5672.43	977.10	0.21
CC	4731.272	100 Yr	14096.70	1306.15	1322.19		1322.26	0.000135	2.30	7371.95	1273.77	0.10
CC	4460.406	100 Yr	14096.70	1306.15	1322.14		1322.21	0.000307	3.44	8450.30	1345.97	0.16
CC	4088.83	100 Yr	14096.70	1307.19	1322.02		1322.12	0.000166	3.15	6802.28	939.12	0.15
CC	3758.199	100 Yr	14096.70	1306.05	1321.67		1322.00	0.000688	6.68	4487.44	852.51	0.31
CC	3117.735	100 Yr	14172.94	1307.28	1321.45	1315.09	1321.67	0.000381	4.67	5181.67	792.02	0.22
CC	3099.735		Inl Struct									
CC	3059.206	100 Yr	14172.94	1306.23	1321.34		1321.62	0.000581	6.03	4795.12	785.50	0.28
CC	2418.12	100 Yr	14172.94	1306.23	1321.16		1321.34	0.000398	4.41	5041.77	703.32	0.20
CC	2223.285	100 Yr	14172.94	1306.23	1321.08	1315.38	1321.24	0.000529	4.97	6035.03	757.54	0.23
CC	1852.396	100 Yr	14172.94	1306.23	1320.97		1321.11	0.000270	3.55	5452.60	851.74	0.17
CC	1604.664	100 Yr	14172.94	1306.23	1320.93		1321.05	0.000180	3.40	5589.86	742.67	0.16
CC	1268.408	100 Yr	14172.94	1303.42	1320.79		1320.99	0.000453	4.55	4173.80	567.74	0.21
CC	1138.278	100 Yr	14172.94	1303.34	1320.75	1314.81	1320.94	0.001393	3.55	4241.15	850.68	0.15
CC	1103.276		Bridge									
CC	971.006	100 Yr	14172.94	1303.92	1318.65	1314.96	1319.44	0.001877	8.25	2879.08	846.82	0.42
CC	844.033	100 Yr	14172.94	1303.34	1317.75	1314.67	1318.74	0.002034	9.56	2743.52	857.88	0.45
CC	414.184	100 Yr	14172.94	1303.34	1314.77	1314.77	1317.73	0.008657	16.38	1753.50	635.81	0.88
CC	81.63	100 Yr	14220.09	1303.34	1313.95	1311.44	1314.37	0.001351	5.74	3610.43	814.93	0.34

HEC-HMS DATA



HEC-HMS

Project : Girrens
Basin Model : Existing
Dec 09 11:13:23 CST 2008



Project: Girrens Simulation Run: Exist100

Start of Run: 31Oct2005, 00:00 Basin Model: Existing
End of Run: 01Nov2005, 00:15 Meteorologic Model: Met100
Compute Time: 20Nov2008, 16:01:45 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Calfskin	2.461	1559.6	31Oct2005, 14:45	5.15
Girrens	0.039	92.4	31Oct2005, 12:15	5.42
North Offsite	3.700	1971.6	31Oct2005, 15:45	5.48
Pawnee	6.200	3383.1	31Oct2005, 15:15	5.35

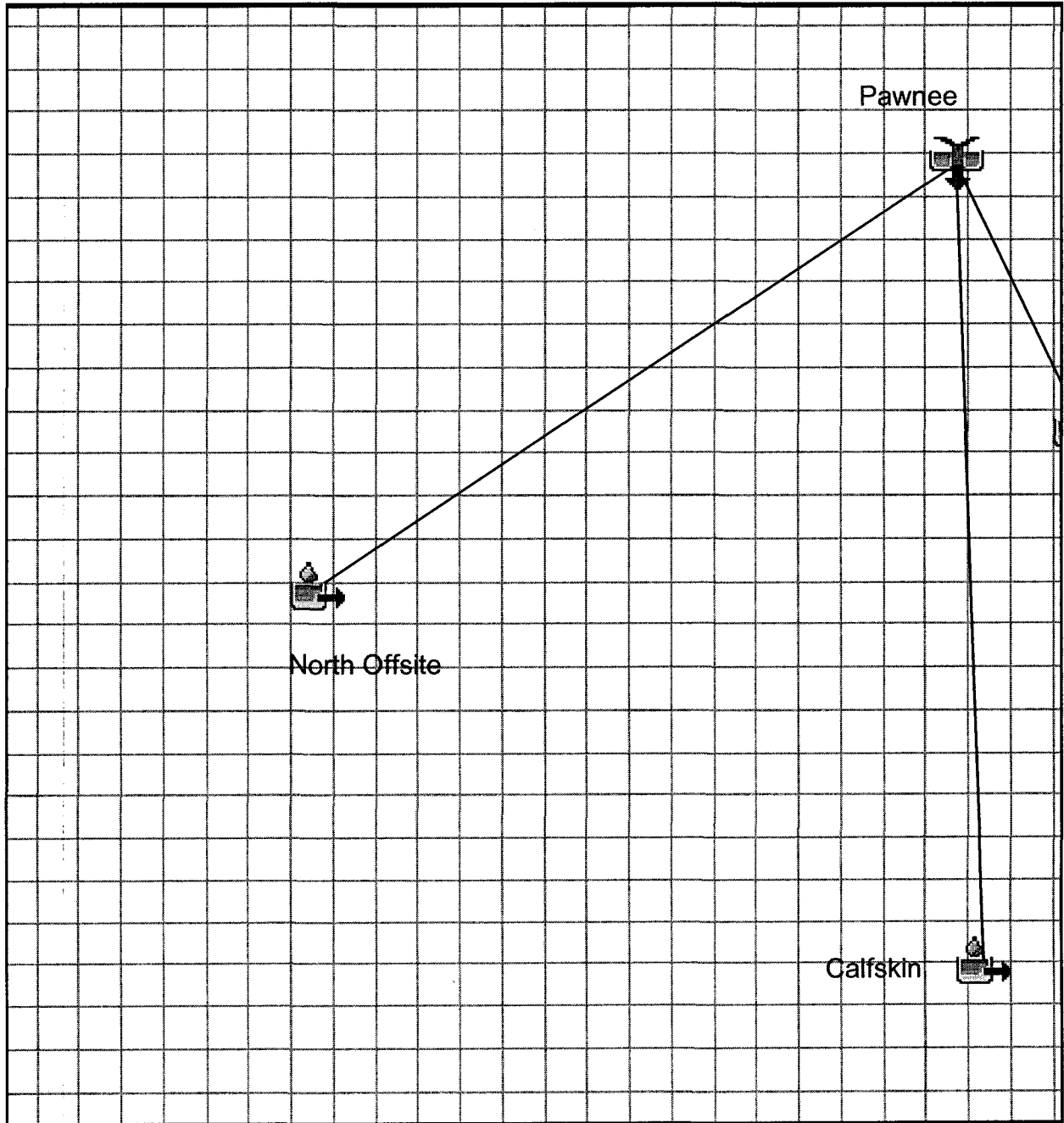


HEC-HMS

Project : Girrens

Basin Model : Proposed No Detention

Dec 09 11:13:48 CST 2008



Project: Girrens Simulation Run: PropNoDet100

Start of Run: 31Oct2005, 00:00 Basin Model: Proposed No Detention
End of Run: 01Nov2005, 00:15 Meteorologic Model: Met100
Compute Time: 20Nov2008, 11:08:00 Control Specifications: Control 1

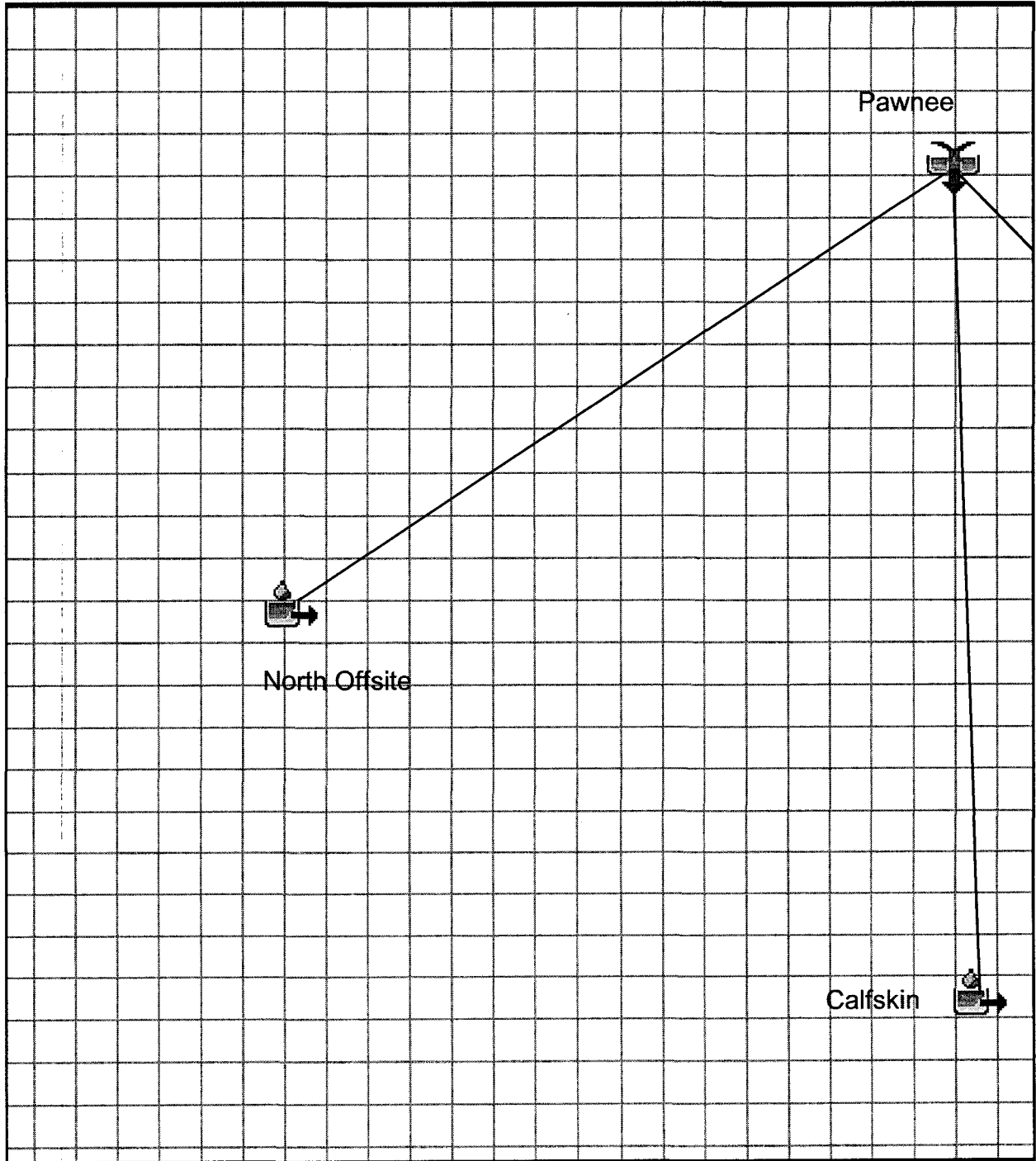
Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Calfskin	2.5000	1584.4	31Oct2005, 14:45	5.15
Girrens	0.0478	132.8	31Oct2005, 12:00	6.36
North Offsite	3.7000	1971.6	31Oct2005, 15:45	5.48
Pawnee	6.2478	3407.7	31Oct2005, 15:15	5.36



HEC-HMS

Project : Girrens
Basin Model : Proposed Detained
Dec 09 11:13:36 CST 2008



Reservoir-1
|
Girrens

Project: Girrens Simulation Run: Prop 100

Start of Run: 31Oct2005, 00:00 Basin Model: Proposed Detained
End of Run: 01Nov2005, 00:15 Meteorologic Model: Met100
Compute Time: 09Dec2008, 11:16:11 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Calfskin	2.5000	1584.4	31Oct2005, 14:45	5.15
Girrens	0.0478	132.8	31Oct2005, 12:00	6.36
North Offsite	3.7000	1971.6	31Oct2005, 15:45	5.48
Pawnee	6.2478	3410.0	31Oct2005, 15:15	5.35
Reservoir-1	0.0478	91.8	31Oct2005, 12:30	6.27

2-year Pond Run

Project : Girrens Simulation Run : Prop 2 Reservoir: Reservoir-1
Start of Run : 31Oct2005, 00:00 Basin Model : Proposed Detained
End of Run : 01Nov2005, 00:15 Meteorologic Model : Met2
Compute Time : 09Dec2008, 09:52:34 Control Specifications : Control 1

Volume Units : IN

Computed Results

Peak Inflow :	48.6 (CFS)	Date/Time of Peak Inflow :	31Oct2005, 12:15
Peak Outflow :	27.1 (CFS)	Date/Time of Peak Outflow :	31Oct2005, 12:30
Total Inflow :	2.26 (IN)	Peak Storage :	1.8 (AC-FT)
Total Outflow :	2.22 (IN)	Peak Elevation :	97.9 (FT)

2-year Existing
Conditions

Project: Girrens Simulation Run: Exist2

Start of Run: 31Oct2005, 00:00 Basin Model: Existing
End of Run: 01Nov2005, 00:15 Meteorologic Model: Met2
Compute Time: 09Dec2008, 09:52:30 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Calfskin	2.461	456.9	31Oct2005, 14:45	1.53
Girrens	0.039	27.6	31Oct2005, 12:15	1.63
North Offsite	3.700	658.1	31Oct2005, 16:00	1.80
Pawnee	6.200	1064.8	31Oct2005, 15:15	1.69

2-year Proposed

Project: Girrens Simulation Run: Prop 2

Start of Run: 31Oct2005, 00:00 Basin Model: Proposed Detained
End of Run: 01Nov2005, 00:15 Meteorologic Model: Met2
Compute Time: 09Dec2008, 09:52:34 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Calfskin	2.5000	464.2	31Oct2005, 14:45	1.53
Girrens	0.0478	48.6	31Oct2005, 12:15	2.26
North Offsite	3.7000	658.1	31Oct2005, 16:00	1.80
Pawnee	6.2478	1074.8	31Oct2005, 15:15	1.70
Reservoir-1	0.0478	27.1	31Oct2005, 12:30	2.22