

**DRAINAGE REPORT**  
**WILLOW CREEK EAST 2<sup>nd</sup> Addition**  
**WICHITA, SEDGWICK COUNTY,**  
**KANSAS**

July 31, 2008



Ruggles & Bohm P.A.

Engineering, Surveying, Land Planning

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**WICHITA, SEDGWICK COUNTY,**  
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**WILLOW CREEK EAST 2<sup>nd</sup> Addition**  
**DRAINAGE ANALYSIS**  
**July 31, 2008**

**INTRODUCTION**

This report contains supporting documentation and calculations for the proposed Willow Creek East 2<sup>nd</sup> Addition development. The proposed site is an undeveloped 59.5 acre parcel of land located in the NW ¼ of Section 34 T27S R2E, on Harry Street East of Greenwich Road. Willow Creek East 2<sup>nd</sup> Addition is directly south and west of Willow Creek East Addition. The area is currently pasture land and the soil type is designated as Rosehill which is in hydrologic group D. An unnamed tributary of Spring Creek runs just off the northwest corner of the plat. The tributary passes under Harry Street through an existing 2-8'x8' RCBC. The drainage patterns of the site currently direct the water off the site in two directions. An 48.2 acre tributary area drains to the northwest and into the unnamed tributary of Spring Creek. An offsite area of 10.6 acres from Highland Acres also flows into the northwest tributary. The second tributary area that drains from the site is a 11.2 acre area which flows to the southeast with 2.3 acres of offsite area from Highland Acres and drains into a detention pond located in Tara Falls Addition.

The proposed development will provide detention at the southeast corner of the plat. There will not be a detention pond in the northwest tributary because, as will be explained in the Hydrology section of this report, the drainage conditions are improved by allowing the site to flow to the Harry Street RCBC before the peak of the entire RCBC arrives.

**HYDROLOGY**

The pre and post development models of the proposed project also include the area of the first phase of development, Willow Creek East Addition. The detention analysis and the hydrology for the Harry Street RCBC were performed using HEC-HMS. The times of concentration were calculated using the velocity method and overland flow rates from attachment E. of the City of Wichita Drainage Criteria. The parameters and results of the existing and proposed analysis are shown in the tables below. An additional table shows the results of not detaining the runoff from the site into the creek at the northwest corner of the site. The node designated as NW Release shall serve as the target for the pond release in the detention analysis.

Existing	Area(ac.)	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NW Ph. 1	3.3	80	20	4.6	7.0	8.4	10.9	15.3
NW Ph. 2	44.7 onsite 10.6 offsite	80	37	44.7	68.3	83.0	108.1	151.4
Harry RCBC	565.7	83	73	354.0	523.6	628.0	804.4	1107.2
SE	10.8 onsite 2.3 offsite	80	30	16.1	24.5	29.7	38.6	54.0
NE	16.5	80	43	13.9	21.2	25.7	33.5	46.9
NW Release	--	--	--	46.6	71.2	86.5	112.6	157.7
Harry St.	--	--	--	382.6	567.5	681.5	874.3	1205.7

Proposed w/ Detention	Area(ac.)	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NW Ph. 1	1.7	84.5	15	3.4	4.9	5.8	7.4	10.0
NW Ph. 2	30.8 onsite 10.6 offsite	87	33	55.2	78.2	92.1	115.2	154.6
NW Bypass	13.2	80	33	12.9	19.8	24.0	31.2	43.7
Harry RCBC	565.7	83	73	354.0	523.6	628.0	804.4	1107.2
SE	10.7 onsite 2.3 offsite	87	24	21.6	30.5	35.9	44.9	60.2
NE	16.0	87	30	22.8	32.3	38.0	47.6	63.8
NE Bypass	2.9	80	30	3.0	4.6	5.6	7.3	10.3
NW Release	--	--	--	46.2	70.1	84.9	110.1	153.5
Harry St.	--	--	--	389.7	575.9	690.5	883.6	1215.0

Proposed w/o Detention	Area(ac.)	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NW Ph. 1	1.7	84.5	15	3.4	4.9	5.8	7.4	10.0
NW Ph. 2	30.8 onsite 10.6 offsite	87	33	55.2	78.2	92.1	115.2	154.6
NW Bypass	13.2	80	33	12.9	19.8	24.0	31.2	43.7
Harry RCBC	565.7	83	73	354.0	523.6	628.0	804.4	1107.2
SE	10.7 onsite 2.3 offsite	87	24	21.6	30.5	35.9	44.9	60.2
NE	16.0	87	30	22.8	32.3	38.0	47.6	63.8
NE Bypass	2.9	80	30	3.0	4.6	5.6	7.3	10.2
NW Release	--	--	--	69.5	100.0	118.5	149.5	202.4
Harry St.	--	--	--	379.4	560.2	671.6	859.5	1182.2

The results show that providing detention in the northwest basin will actually increase the peak runoff at the Harry Street RCBC. This occurs because detention delays the peak runoff from the site to coincide nearer to the peak of the channel itself, which has a much longer time of concentration. The peak runoff is reduced at the Harry Street RCBC, even from the existing condition, by not providing detention for the portion of the site that drains to the northwest channel. Therefore a detention pond will not be provided for the site area in the northwest tributary. Further discussion of site detention can be found in a following section.

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. Storm water sewer design and flow capacities are calculated with Haestad Methods STORM Cad program. Output from this program is included with this report.

**HARRY STREET RCBC**

The RCBC under Harry Street has a tributary area of .651 acres and was analyzed in the drainage plan for Willow Creek East Addition. The analysis of the 2'-8"x8' culvert under Harry Street was performed using HY-8. The results of the analysis show that the 100-year W.S. is 1326.80. However, FIRM 20173C0387E with an effective date of Feb, 2, 2007 indicates the backwater of Spring Creek raises the 100-year water surface of the channel to 1328. Therefore, the minimum pad elevations of Lots 54-62 of Block 3, Willow Creek East 2<sup>nd</sup> Addition shall be 1331.00.

**DETENTION POND**

A detention pond will provide sufficient storage to detain the necessary flow from the southeast portion of the proposed site. The pond designated as Pond 1 in the output was designed and constructed with Willow Creek East Addition and will not be discussed in this report. As discussed earlier, a detention pond in the northwest tributary area will serve to increase peak runoff at the Harry Street RCBC and is therefore not proposed or recommended for this development. The information provided below for Pond 3 is therefore for information only. The SCS Type II Rainfall Distribution as modeled by the HEC-HMS program is used for analysis, with a total 100-year 24 hour rainfall event of 7.8 inches (TR-55). This rainfall model is used for all basins. The attached drainage maps demonstrate the extents of the detained tributary area. The outlet of the pond at the southeast part of the site shall be controlled by a 2'-24" RCP culvert that maintains the static pool at 1336.0 and drains into a detention pond located within Tara Falls. A summary of the detention pond's performance in the various design storms can be found in the table below:

Pond 2

Design Storm	Peak Inflow (cfs)	Peak Outflow (cfs)	Allowable Release (cfs)	Peak Storage (ac-ft)	Peak Elevation
2-yr	21.6	14.5	15.9	0.6	1337.6
5-yr	30.5	21.7	24.3	0.8	1338.0
10-yr	35.9	25.7	29.4	0.9	1338.2
25-yr	44.9	32.3	38.3	1.1	1338.6
100-yr	60.2	42.9	53.5	1.4	1339.2

The stage-storage data was calculated by HEC-HMS using the parameters located in the table below.

Stage	Area (ac-ft)
1336	0.32
1337	0.38
1338	0.45
1339	0.51
1340	0.58

The detention pond will have a top of 1340.20 and will provide 1.00 feet of freeboard in the 100-year design storm. Lots 7-12, Blk 5 shall have minimum pad elevations of 1341.50.

Pond 3  
(for information only)

Design Storm	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Storage (ac-ft)	Peak Elevation
2-yr	55.2	36.9	1.9	1327.7
5-yr	78.2	55.1	2.5	1328.2
10-yr	92.1	66.2	2.9	1328.5
25-yr	115.2	85.2	3.4	1329.0
100-yr	154.6	117.8	4.3	1329.7

The stage-storage data was calculated by HEC-HMS using the parameters located in the table below.

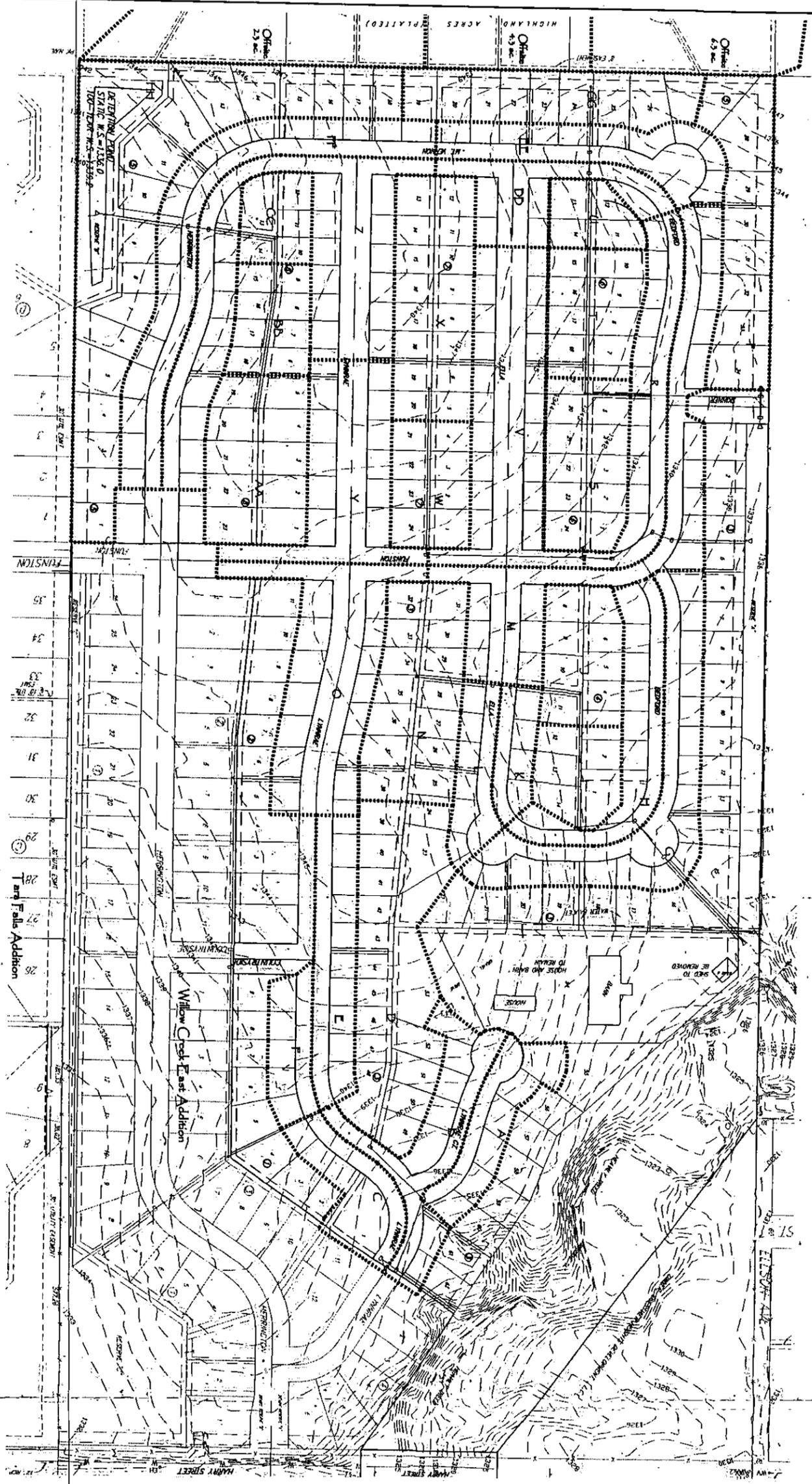
Stage	Area (ac-ft)
1326	1.12
1327	1.18
1328	1.24
1329	1.30
1330	1.36

**DRAINAGE MAP**

# WILLOW CREEK EAST 2nd ADDITION

## Drainage Map

Wichita, Sedgwick County, Kansas



SCALE: 1"=100'

NODE	AREA	TC	CS	IS	CI	MI	DI	Q100
A	0.78	15	0.50	3.83	0.78	7.37	1.5	4.4
B	1.12	15	0.50	3.83	0.78	7.37	1.5	4.4
C	0.74	15	0.50	3.83	0.78	7.37	1.4	4.1
D	2.26	24	0.50	3.83	0.78	7.37	2.1	6.3
E	0.57	15	0.50	3.83	0.78	7.37	1.8	5.2
F	0.87	15	0.50	3.83	0.78	7.37	1.9	5.7
G	1.06	15	0.50	3.83	0.78	7.37	2.0	5.9
H	1.17	15	0.50	3.83	0.78	7.37	2.0	5.9
I	0.81	17	0.50	3.83	0.78	7.37	1.8	5.3
J	0.88	15	0.50	3.83	0.78	7.37	1.8	5.3
K	0.43	15	0.50	3.83	0.78	7.37	1.1	3.3
L	2.76	15	0.50	3.83	0.78	7.37	5.3	16.5
M	1.80	15	0.50	3.83	0.78	7.37	3.8	11.9
N	1.48	15	0.50	3.83	0.78	7.37	3.1	9.8
O	1.36	15	0.50	3.83	0.78	7.37	2.9	9.2
P	1.18	15	0.50	3.83	0.78	7.37	2.5	8.0
Q	0.89	15	0.50	3.83	0.78	7.37	1.7	5.2
R	1.18	15	0.50	3.83	0.78	7.37	2.5	8.0
S	1.18	15	0.50	3.83	0.78	7.37	2.5	8.0
T	0.89	15	0.50	3.83	0.78	7.37	1.7	5.2
U	0.48	15	0.50	3.83	0.78	7.37	1.1	3.3
V	2.05	15	0.50	3.83	0.78	7.37	3.9	12.5
W	1.80	15	0.50	3.83	0.78	7.37	3.1	9.8
X	1.80	15	0.50	3.83	0.78	7.37	3.1	9.8
Y	1.80	15	0.50	3.83	0.78	7.37	3.1	9.8
Z	1.80	15	0.50	3.83	0.78	7.37	3.1	9.8
AA	2.50	20	0.50	3.83	0.78	7.37	6.0	18.8
AB	1.80	15	0.50	3.83	0.78	7.37	3.1	9.8
AC	1.80	15	0.50	3.83	0.78	7.37	3.1	9.8
AD	0.70	15	0.50	3.83	0.78	7.37	1.5	4.4
AE	0.64	15	0.50	3.83	0.78	7.37	1.4	4.1
AF	0.49	15	0.50	3.83	0.78	7.37	1.2	3.6
AG	1.80	15	0.50	3.83	0.78	7.37	3.1	9.8
AH	1.51	27	0.50	3.83	0.78	7.37	4.8	15.5

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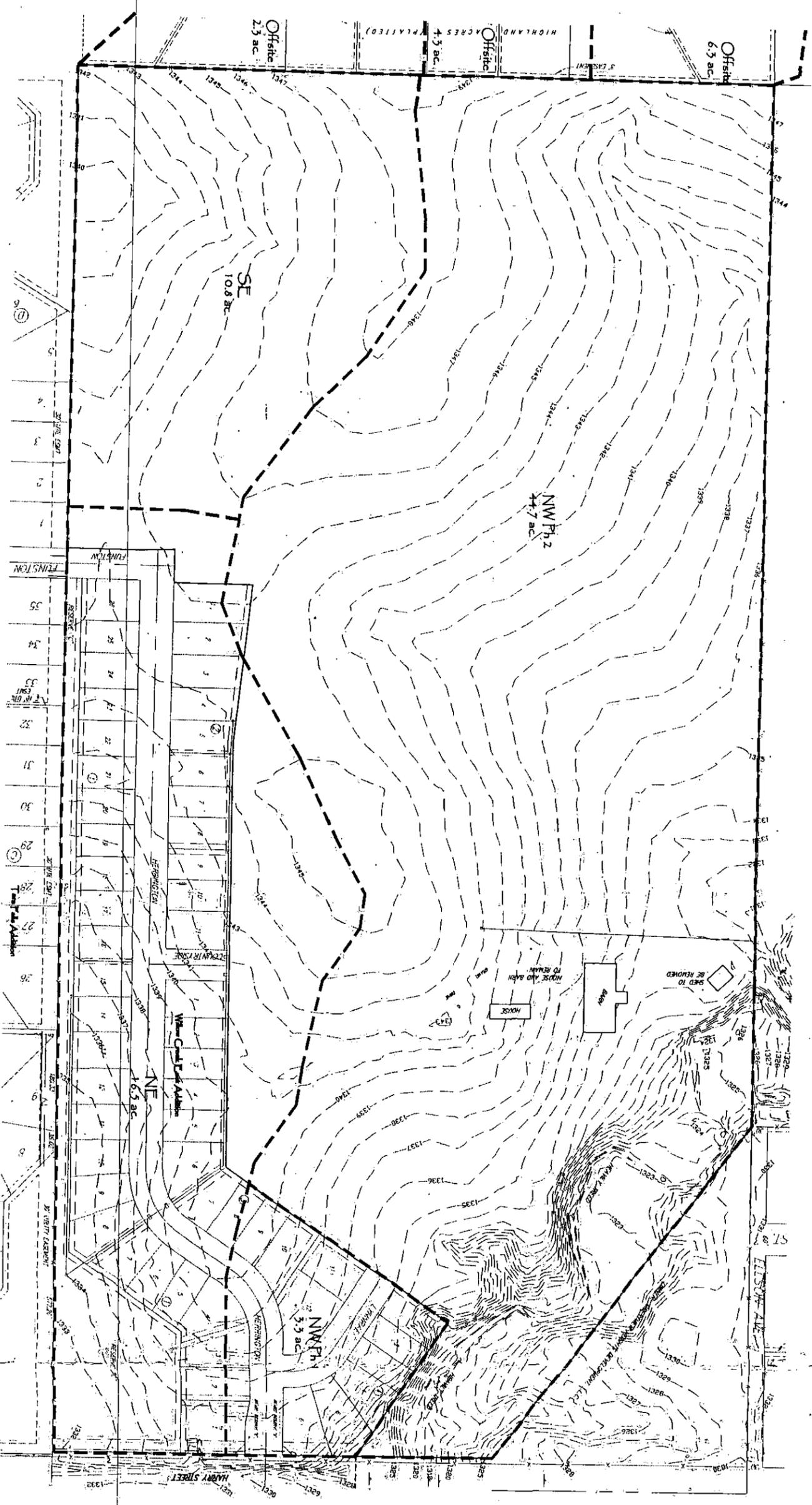
**EXISTING CONDITIONS**

# WILLOW CREEK EAST 2nd ADDITION

Existing Conditions Drainage Map  
Wichita, Sedgwick County, Kansas



SCALE: 1"=100'



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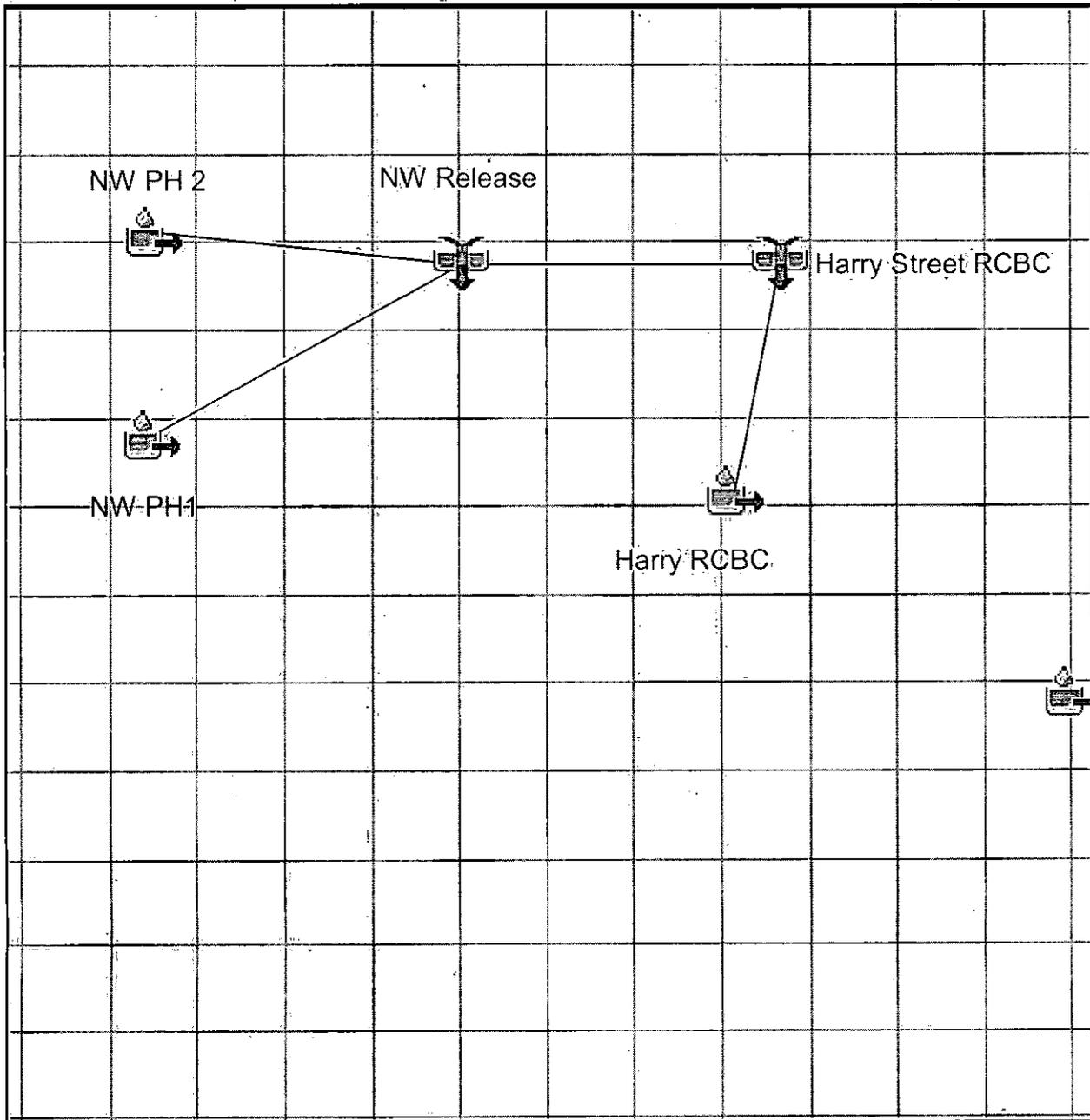


HEC-HMS

# Project : Willow Creek East

Basin Model : Existing

Jul 31 08:58:14 CDT 2008



Project: Willow Creek East Simulation Run: Ex 2

Start of Run: 01Jan2006, 00:00 Basin Model: Existing  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 2  
Compute Time: 30Jul2008, 16:04:31 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.88400	354.0	01Jan2006, 13:10	1.81
Harry Street RCBC	0.07556	382.6	01Jan2006, 13:06	1.79
NE	0.02675	13.9	01Jan2006, 12:38	1.61
NW PH1	0.00516	4.6	01Jan2006, 12:13	1.63
NW PH 2	0.08640	44.7	01Jan2006, 12:38	1.61
NW Release	0.09156	46.6	01Jan2006, 12:36	1.61
SE	0.02050	16.1	01Jan2006, 12:17	1.62

Project: Willow Creek East Simulation Run: Ex 5

Start of Run: 01Jan2006, 00:00 Basin Model: Existing  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 5  
Compute Time: 30Jul2008, 16:04:35 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.88400	523.6	01Jan2006, 13:09	2.66
Harry Street RCB	0.07556	567.5	01Jan2006, 13:04	2.64
NE	0.02675	21.2	01Jan2006, 12:37	2.43
NW PH1	0.00516	7.0	01Jan2006, 12:13	2.45
NW PH2	0.08640	68.3	01Jan2006, 12:37	2.43
NW Release	0.09156	71.2	01Jan2006, 12:36	2.43
SE	0.02050	24.5	01Jan2006, 12:17	2.44

Project: Willow Creek East Simulation Run: Ex 10

Start of Run: 01Jan2006, 00:00 Basin Model: Existing  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 10  
Compute Time: 30Jul2008, 16:04:42 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.88400	628.0	01Jan2006, 13:08	3.19
Harry Street RCBC	0.07556	681.5	01Jan2006, 13:03	3.16
NE	0.02675	25.7	01Jan2006, 12:36	2.94
NW PH1	0.00516	8.4	01Jan2006, 12:13	2.96
NW PH2	0.08640	83.0	01Jan2006, 12:36	2.94
NW Release	0.09156	86.5	01Jan2006, 12:35	2.94
SE	0.02050	29.7	01Jan2006, 12:16	2.96

Project: Willow Creek East Simulation Run: Ex 25

Start of Run: 01Jan2006, 00:00 Basin Model: Existing  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 25  
Compute Time: 30Jul2008, 16:04:47 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.88400	804.4	01Jan2006, 13:08	4.09
Harry Street RCBC	0.07556	874.3	01Jan2006, 13:03	4.06
NE	0.02675	33.5	01Jan2006, 12:36	3.82
NW PH1	0.00516	10.9	01Jan2006, 12:12	3.85
NW PH 2	0.08640	108.1	01Jan2006, 12:36	3.82
NW Release	0.09156	112.6	01Jan2006, 12:35	3.82
SE	0.02050	38.6	01Jan2006, 12:16	3.84

Project: Willow Creek East Simulation Run: Ex 100

Start of Run: 01Jan2006, 00:00 Basin Model: Existing  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 100  
Compute Time: 30Jul2008, 16:04:50 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.88400	1107.2	01Jan2006, 13:07	5.66
Harry Street RCBC	0.07556	1205.7	01Jan2006, 13:02	5.63
NE	0.02675	46.9	01Jan2006, 12:36	5.37
NW PH1	0.00516	15.3	01Jan2006, 12:12	5.41
NW PH 2	0.08640	151.4	01Jan2006, 12:36	5.37
NW Release	0.09156	157.7	01Jan2006, 12:34	5.37
SE	0.02050	54.0	01Jan2006, 12:16	5.40

**PROPOSED CONDITIONS**



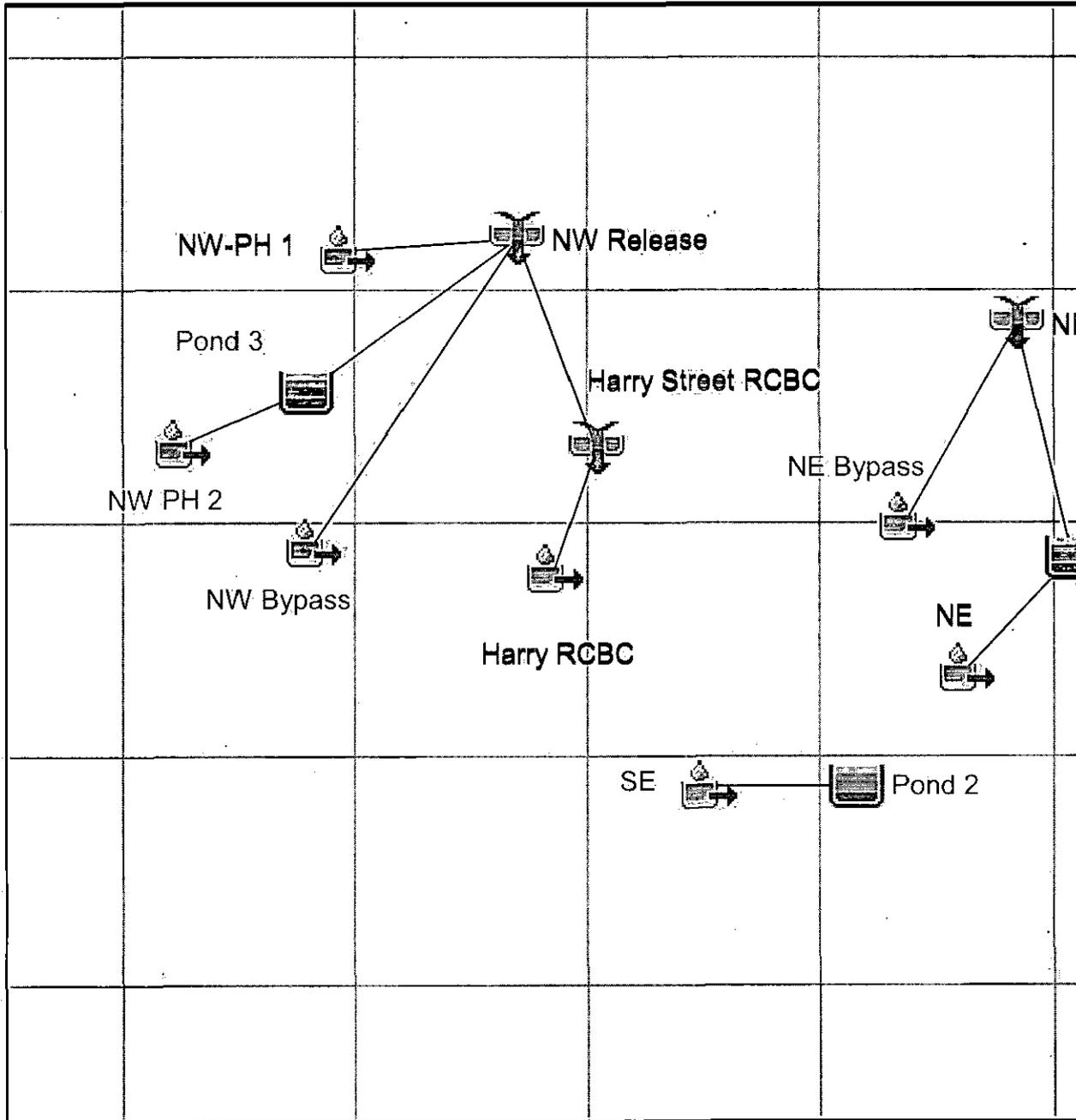


HEC-HMS

# Project : Willow Creek East

Basin Model : Proposed

Jul 31 08:58:30 CDT 2008



Project: Willow Creek East Simulation Run: Prop 2

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed  
 End of Run: 02Jan2006, 00:05 Meteorologic Model: 2  
 Compute Time: 30Jul2008, 17:19:23 Control Specifications: Control

Hydrologic Element	Volume Units: IN. Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
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Harry RCBC	0.884000	354.0	01Jan2006, 13:10	1.81
Harry Street RCBC	0.0071955	389.7	01Jan2006, 13:07	1.82
NE	0.025000	22.8	01Jan2006, 12:22	2.16
NE Bypass	0.004530	3.0	01Jan2006, 12:23	1.62
NE Release	0.029530	8.1	01Jan2006, 12:53	1.83
NW Bypass	0.020625	12.9	01Jan2006, 12:27	1.62
NW PH 1	0.002640	3.4	01Jan2006, 12:08	1.97
NW PH 2	0.064690	55.2	01Jan2006, 12:26	2.16
NW Release	0.087955	46.2	01Jan2006, 12:42	1.99
Pond 1	0.025000	6.9	01Jan2006, 13:07	1.86
Pond 2	0.020300	14.5	01Jan2006, 12:32	2.08
Pond 3	0.064690	35.9	01Jan2006, 12:48	2.11
SE	0.020300	21.6	01Jan2006, 12:16	2.17

Project: Willow Creek East Simulation Run: Prop 5

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 5  
Compute Time: 30Jul2008, 17:20:01 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	523.6	01Jan2006, 13:09	2.66
Harry Street R	0.0071955	575.9	01Jan2006, 13:05	2.68
NE	0.025000	32.3	01Jan2006, 12:22	3.07
NE Bypass	0.004530	4.6	01Jan2006, 12:23	2.44
NE Release	0.029530	13.4	01Jan2006, 12:49	2.69
NW Bypass	0.020625	19.8	01Jan2006, 12:26	2.43
NW-PH 1	0.002640	4.9	01Jan2006, 12:08	2.85
NW PH 2	0.064690	78.2	01Jan2006, 12:25	3.07
NW Release	0.087955	70.1	01Jan2006, 12:40	2.86
Pond 1	0.025000	11.3	01Jan2006, 13:01	2.73
Pond 2	0.020300	21.7	01Jan2006, 12:30	2.98
Pond 3	0.064690	53.9	01Jan2006, 12:45	3.00
SE	0.020300	30.5	01Jan2006, 12:16	3.08

Project: Willow Creek East Simulation Run: Prop 10

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed  
 End of Run: 02Jan2006, 00:05 Meteorologic Model: 10  
 Compute Time: 30Jul2008, 17:20:52 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	628.0	01Jan2006, 13:08	3.19
Harry Street R	0.0071955	690.5	01Jan2006, 13:05	3.21
NE	0.025000	38.0	01Jan2006, 12:22	3.63
NE Bypass	0.004530	5.6	01Jan2006, 12:23	2.95
NE Release	0.029530	16.8	01Jan2006, 12:44	3.22
NW Bypass	0.020625	24.0	01Jan2006, 12:26	2.95
NW-PH 1	0.002640	5.8	01Jan2006, 12:08	3.40
NW PH 2	0.064690	92.1	01Jan2006, 12:25	3.63
NW Release	0.087955	84.9	01Jan2006, 12:39	3.40
Pond 1	0.025000	14.2	01Jan2006, 12:59	3.27
Pond 2	0.020300	25.7	01Jan2006, 12:30	3.53
Pond 3	0.064690	64.8	01Jan2006, 12:44	3.55
SE	0.020300	35.9	01Jan2006, 12:16	3.64

Project: Willow Creek East Simulation Run: Prop-25

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 25  
Compute Time: 30Jul2008, 17:21:27 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	804.4	01Jan2006, 13:08	4.09
Harry Street R	0.0671955	883.6	01Jan2006, 13:04	4.11
NE	0.025000	47.6	01Jan2006, 12:22	4.58
NE Bypass	0.004530	7.3	01Jan2006, 12:22	3.84
NE Release	0.029530	22.3	01Jan2006, 12:40	4.13
NW Bypass	0.020625	31.2	01Jan2006, 12:25	3.83
NW-PH 1	0.002640	7.4	01Jan2006, 12:08	4.33
NW PH 2	0.064690	115.2	01Jan2006, 12:25	4.57
NW Release	0.087955	110.1	01Jan2006, 12:38	4.32
Pond 1	0.025000	18.3	01Jan2006, 12:57	4.18
Pond 2	0.020300	32.3	01Jan2006, 12:30	4.47
Pond 3	0.064690	83.6	01Jan2006, 12:43	4.48
SE	0.020300	44.9	01Jan2006, 12:16	4.58

Project: Willow Creek East Simulation Run: Prop 100

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed

End of Run: 02Jan2006, 00:05 Meteorologic Model: 100

Compute Time: 30Jul2008, 17:22:20 Control Specifications: Control

Volume Units: IN

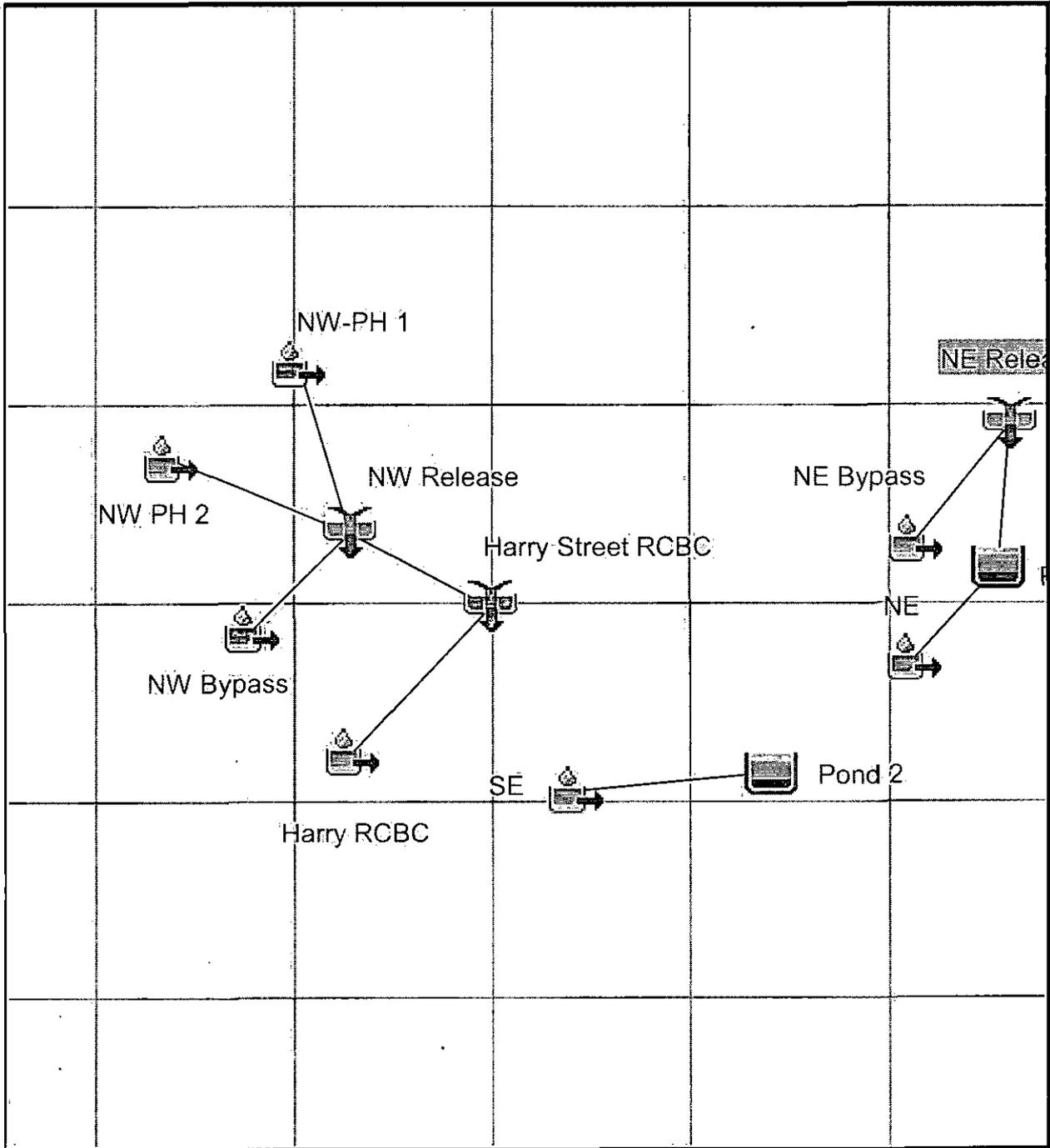
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	1107.2	01Jan2006, 13:07	5.66
Harry Street RCBC	0.071955	1215.0	01Jan2006, 13:03	5.68
NE	0.025000	63.8	01Jan2006, 12:22	6.21
NE Bypass	0.004530	10.3	01Jan2006, 12:22	5.39
NE Release	0.029530	29.1	01Jan2006, 12:31	5.70
NW Bypass	0.020625	43.7	01Jan2006, 12:25	5.39
NW-PH 1	0.002640	10.0	01Jan2006, 12:07	5.94
NW PH 2	0.064690	154.6	01Jan2006, 12:25	6.20
NW Release	0.087955	153.5	01Jan2006, 12:37	5.91
Pond 1	0.025000	22.3	01Jan2006, 13:00	5.76
Pond 2	0.020300	42.9	01Jan2006, 12:30	6.08
Pond 3	0.064690	115.8	01Jan2006, 12:42	6.08
SE	0.020300	60.2	01Jan2006, 12:16	6.22



HEC-HMS

# Project : Willow Creek East

Basin Model : Proposed No Detention  
Jul 31 08:58:56 CDT 2008



Project: Willow Creek East Simulation Run: 2 Nodet

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed No Detention  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 2  
Compute Time: 30Jul2008, 15:33:13 Control Specifications: Control.

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	354.0	01Jan2006, 13:10	1.81
Harry Street R	0.0071965	379.4	01Jan2006, 13:06	1.83
NE	0.025000	22.8	01Jan2006, 12:22	2.16
NE Bypass	0.004520	3.0	01Jan2006, 12:23	1.62
NE Release	0.029520	8.1	01Jan2006, 12:53	1.83
NW Bypass	0.020625	12.9	01Jan2006, 12:27	1.62
NW-PH 1	0.002650	3.4	01Jan2006, 12:08	1.97
NW PH 2	0.064690	55.2	01Jan2006, 12:26	2.16
NW Release	0.087965	69.5	01Jan2006, 12:25	2.03
Pond 1	0.025000	6.9	01Jan2006, 13:07	1.86
Pond 2	0.020300	14.5	01Jan2006, 12:32	2.08
SE	0.020300	21.6	01Jan2006, 12:16	2.17

Project: Willow Creek East Simulation Run: 5 Nodet

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed No Detention  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 5  
Compute Time: 30Jul2008, 15:34:07 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	523.6	01Jan2006, 13:09	2.66
Harry Street RCBC	0.071965	560.2	01Jan2006, 13:05	2.68
NE	0.025000	32.3	01Jan2006, 12:22	3.07
NE Bypass	0.004520	4.6	01Jan2006, 12:23	2.44
NE Release	0.029520	13.4	01Jan2006, 12:49	2.69
NW Bypass	0.020625	19.8	01Jan2006, 12:26	2.43
NW-PH 1	0.002650	4.9	01Jan2006, 12:08	2.85
NW PH 2	0.064690	78.2	01Jan2006, 12:25	3.07
NW Release	0.087965	100.0	01Jan2006, 12:25	2.91
Pond 1	0.025000	11.3	01Jan2006, 13:01	2.73
Pond 2	0.020300	21.7	01Jan2006, 12:30	2.98
SE	0.020300	30.5	01Jan2006, 12:16	3.08

Project: Willow Creek East Simulation Run: 10 Nodes

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed No Detention  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 10  
Compute Time: 30Jul2008, 15:34:46 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	628.0	01Jan2006, 13:08	3.19
Harry Street RCB	0.071965	671.6	01Jan2006, 13:04	3.21
NE	0.025000	38.0	01Jan2006, 12:22	3.63
NE Bypass	0.004520	5.6	01Jan2006, 12:23	2.95
NE Release	0.029520	16.8	01Jan2006, 12:44	3.22
NW Bypass	0.020625	24.0	01Jan2006, 12:26	2.95
NW-PH 1	0.002650	5.8	01Jan2006, 12:08	3.40
NW PH 2	0.064690	92.1	01Jan2006, 12:25	3.63
NW Release	0.087965	118.5	01Jan2006, 12:25	3.46
Pond 1	0.025000	14.2	01Jan2006, 12:59	3.27
Pond 2	0.020300	25.7	01Jan2006, 12:30	3.53
SE	0.020300	35.9	01Jan2006, 12:16	3.64

Project: Willow Creek East Simulation Run: 25 Nodet

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed No Detention  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 25  
Compute Time: 30Jul2008, 15:35:22 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	804.4	01Jan2006, 13:08	4.09
Harry Street RCBC	0.0071965	859.5	01Jan2006, 13:03	4.11
NE	0.025000	47.6	01Jan2006, 12:22	4.58
NE Bypass	0.004520	7.3	01Jan2006, 12:22	3.84
NE Release	0.029520	22.2	01Jan2006, 12:40	4.13
NW Bypass	0.020625	31.2	01Jan2006, 12:25	3.83
NW-PH 1	0.002650	7.4	01Jan2006, 12:08	4.33
NW PH 2	0.064690	115.2	01Jan2006, 12:25	4.57
NW Release	0.087965	149.5	01Jan2006, 12:24	4.39
Pond 1	0.025000	18.3	01Jan2006, 12:57	4.18
Pond 2	0.020300	32.3	01Jan2006, 12:30	4.47
SE	0.020300	44.9	01Jan2006, 12:16	4.58

Project: Willow Creek East Simulation Run: 100 Nodet

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed No Detention  
End of Run: 02Jan2006, 00:05 Meteorologic Model: 100  
Compute Time: 30Jul2008, 15:36:08 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.884000	1107.2	01Jan2006, 13:07	5.66
Harry Street RCBC	0.071965	1182.2	01Jan2006, 13:03	5.69
NE	0.025000	63.8	01Jan2006, 12:22	6.21
NE Bypass	0.004520	10.2	01Jan2006, 12:22	5.39
NE Release	0.029520	29.0	01Jan2006, 12:31	5.70
NW Bypass	0.020625	43.7	01Jan2006, 12:25	5.39
NW-PH 1	0.002650	10.0	01Jan2006, 12:07	5.94
NW PH 2	0.064690	154.6	01Jan2006, 12:25	6.20
NW Release	0.087965	202.4	01Jan2006, 12:24	6.00
Pond 1	0.025000	22.3	01Jan2006, 13:00	5.76
Pond 2	0.020300	42.9	01Jan2006, 12:30	6.08
SE	0.020300	60.2	01Jan2006, 12:16	6.22

**DETENTION POND**

Project : Willow Creek East Simulation Run : 2 Nodet Reservoir: Pond 2  
Start of Run : 01Jan2006, 00:00 Basin Model : Proposed No Detention  
End of Run : 02Jan2006, 00:05 Meteorologic Model : 2  
Compute Time : 24Jun2008, 13:12:29 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	18.6 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:16
Peak Outflow :	12.8 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:31
Total Inflow :	2.17 (IN)	Peak Storage :	0.5 (AC-FT)
Total Outflow :	2.06 (IN)	Peak Elevation :	1337.7 (FT)

Project : Willow Creek East Simulation Run : 5 Nodet Reservoir: Pond 2  
Start of Run : 01Jan2006, 00:00 Basin Model : Proposed No Detention  
End of Run : 02Jan2006, 00:05 Meteorologic Model : 5  
Compute Time : 24Jun2008, 13:13:04 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	26.3 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:16
Peak Outflow :	19.2 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:30
Total Inflow :	3.08 (IN)	Peak Storage :	0.7 (AC-FT)
Total Outflow :	2.96 (IN)	Peak Elevation :	1338.1 (FT)

Project : Willow Creek East Simulation Run : 10 Nodet Reservoir: Pond 2  
Start of Run : 01Jan2006, 00:00 Basin Model : Proposed No Detention  
End of Run : 02Jan2006, 00:05 Meteorologic Model : 10  
Compute Time : 24Jun2008, 13:14:13 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	30.9 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:16
Peak Outflow :	22.9 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:29
Total Inflow :	3.64 (IN)	Peak Storage :	0.8 (AC-FT)
Total Outflow :	3.51 (IN)	Peak Elevation :	1338.3 (FT)

Project : Willow Creek East Simulation Run : 25.Nodet Reservoir: Pond 2  
Start of Run : 01Jan2006,00:00 Basin Model : Proposed No Detention  
End of Run : 02Jan2006,00:05 Meteorologic Model : 25  
Compute Time : 24Jun2008,-13:14:44 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	38.7 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:16
Peak Outflow :	29.0 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:29
Total Inflow :	4.58 (IN)	Peak Storage :	0.9 (AC-FT)
Total Outflow :	4.44 (IN)	Peak Elevation :	1338.7 (FT)

Project : Willow Creek East Simulation Run : 100 Nodet Reservoir: Pond 2  
Start of Run : 01Jan2006, 00:00 Basin Model : Proposed No Detention  
End of Run : 02Jan2006, 00:05 Meteorologic Model : 100  
Compute Time : 24Jun2008, 13:14:57 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	51.9 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:16
Peak Outflow :	38.7 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:29
Total Inflow :	6.22 (IN)	Peak Storage :	1.1 (AC-FT)
Total Outflow :	6.05 (IN)	Peak Elevation :	1339.2 (FT)

Project : Willow Creek East Simulation Run : Prop 2 Reservoir: Pond 3

Start of Run : 01Jan2006, 00:00 Basin Model : Proposed  
End of Run : 02Jan2006, 00:05 Meteorologic Model : 2  
Compute Time : 30Jul2008, 15:29:07 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	55.2 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:26
Peak Outflow :	36.9 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:47
Total Inflow :	2.16 (IN)	Peak Storage :	1.9 (AC-FT)
Total Outflow :	2.11 (IN)	Peak Elevation :	1327.7 (FT)

Project : Willow Creek East Simulation Run : Prop 5 Reservoir: Pond 3

Start of Run : 01Jan2006, 00:00 Basin Model : Proposed

End of Run : 02Jan2006, 00:05 Meteorologic Model : 5

Compute Time : 30Jul2008, 15:29:42 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	78.2 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:25
Peak Outflow :	55.1 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:45
Total Inflow :	3.07 (IN)	Peak Storage :	2.5 (AC-FT)
Total Outflow :	3.00 (IN)	Peak Elevation :	1328.2 (FT)

Project : Willow Creek East Simulation Run: Prop 10 Reservoir: Pond 3

Start of Run : 01Jan2006, 00:00 Basin Model : Proposed

End of Run : 02Jan2006, 00:05 Meteorologic Model : 10

Compute Time : 30Jul2008, 15:30:18 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	92.1 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:25
Peak Outflow :	66.2 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:44
Total Inflow :	3.63 (IN)	Peak Storage :	2.9 (AC-FT)
Total Outflow :	3.55 (IN)	Peak Elevation :	1328.5 (FT)

Project : Willow Creek East Simulation Run : Prop:25 Reservoir: Pond 3

Start of Run : 01Jan2006, 00:00 Basin Model : Proposed

End of Run : 02Jan2006, 00:05 Meteorologic Model : 25

Compute Time : 30Jul2008, 15:30:54 Control Specifications : Control

Volume Units : IN

Computed Results

Peak Inflow :	115.2 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:25
Peak Outflow :	85.2 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:43
Total Inflow :	4.57 (IN)	Peak Storage :	3.4 (AC-FT)
Total Outflow :	4.48 (IN)	Peak Elevation :	1329.0 (FT)

Project : Willow Creek East Simulation Run : Prop 100 Reservoir: Pond 3

Start of Run : 01Jan2006, 00:00 Basin Model: Proposed

End of Run : 02Jan2006, 00:05 Meteorologic Model: 100

Compute Time : 30Jul2008, 15:31:30 Control Specifications : Control

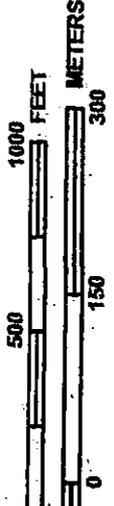
Volume Units : IN

#### Computed Results

Peak Inflow :	154.6 (CFS)	Date/Time of Peak Inflow:	01Jan2006, 12:25
Peak Outflow :	117.8 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:41
Total Inflow :	6.20 (IN)	Peak Storage :	4.3 (AC-FT)
Total Outflow :	6.08 (IN)	Peak Elevation :	1329.7 (FT)

FEMA FIRM

MAP SCALE 1" = 500'



PANEL 0387E

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

PANEL 387 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0387	E
WICHITA, CITY OF	200328	0387	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.

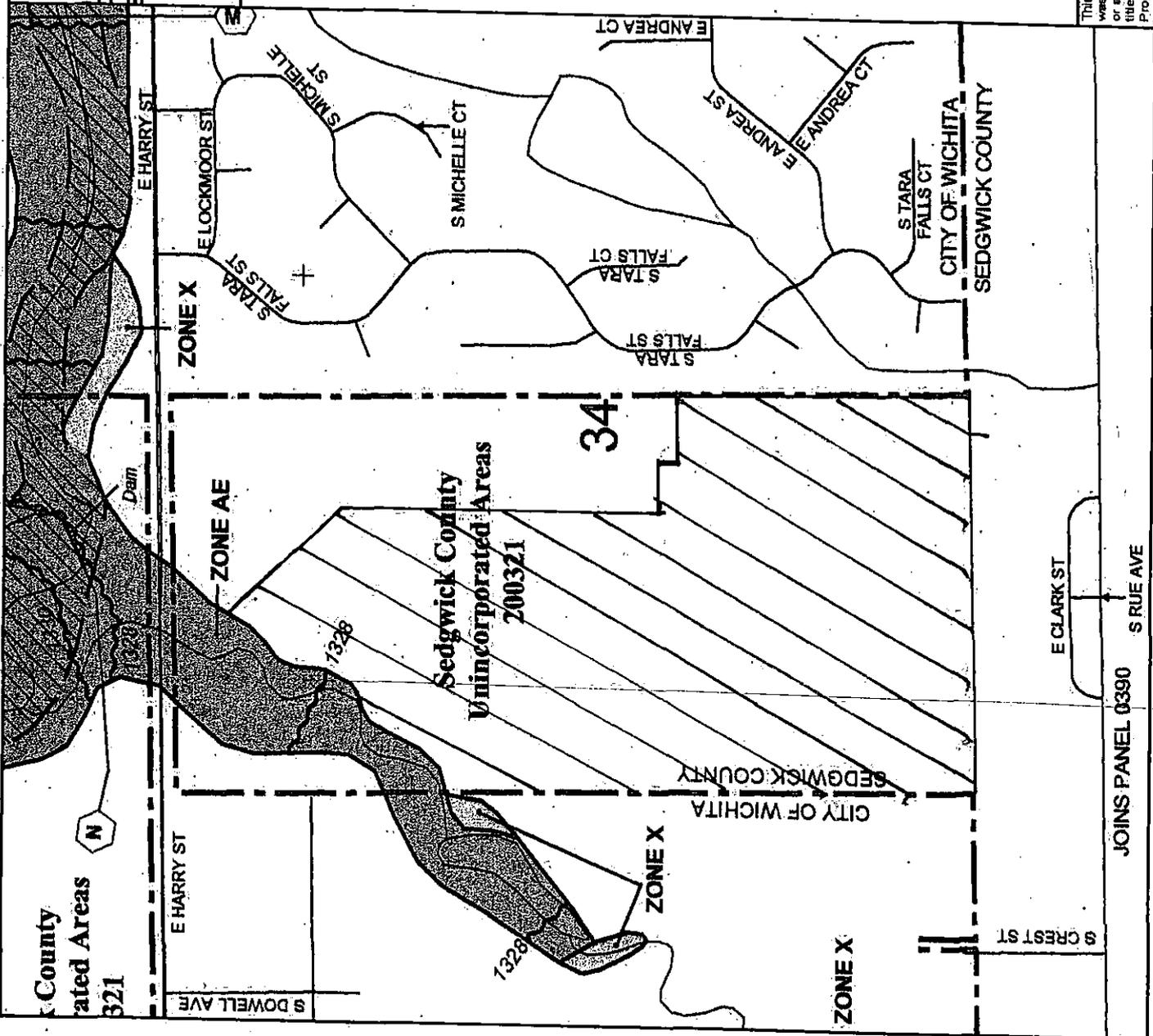


**MAP NUMBER**  
20173C0387E

**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)



JOINS PANEL 0390

**USGS MAP**

