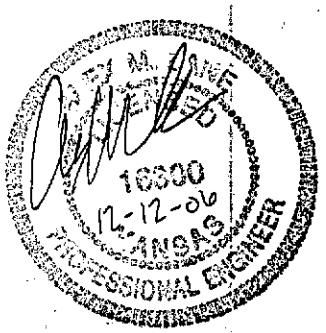
DRAINAGE REPORT
WILLOW CREEK EAST
WICHITA, SEDGWICK COUNTY, KANSAS

November 29, 2006



Ruggles & Bohm P.A.

Engineering, Surveying, Land Planning

WILLOW CREEK EAST
DRAINAGE ANALYSIS
November 29, 2006

INTRODUCTION

This report contains supporting documentation and calculations for the proposed Willow Creek East development. The proposed site is an undeveloped 15.9 acre tract of land located in the NW ¼ of Section 34 T27S R2E on Harry Street East of Greenwich Road. 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 8'X8' RCBC. The drainage patterns of the site currently direct the water off the site in two directions. An 8.59 acre tributary area drains to the northwest and into the unnamed tributary of Spring Creek. The second tributary area which drains from the site is a 16.93 acre area which flows to the northeast and drains into the south ditch of Harry Street and thence easterly to a 36 inch culvert passing under Harry Street.

The proposed development will provide detention at the northeast corner of the plat. The proposed development is the first phase of a residential subdivision and therefore will accept runoff from offsite future development. Storm sewer stubs are also designed to accommodate the future development.

HYDROLOGY

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.

Existing	Area	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NE	16.93	80	43	13.35	20.4	24.81	32.31	45.3
NW	8.59	80	17	12.20	18.54	22.48	29.15	40.65

Proposed	Area	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NE	18.74	87	30	24.13	34.19	40.30	50.50	67.79
NW	5.73	85	15	12.02	17.31	20.53	25.98	35.34

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. All starting hydraulic grade line elevations are calculated using the 100 year water surface of the detention pond at elevation 1333.27.

HARRY STREET RCBC

The RCBC under Harry Street has a tributary area of 619 acres with a weighted c factor of 0.69. The analysis of the 2-8'x8' culvert under Harry Street was performed using HY-8. The rational equation was used to determine the Q_{100}=1427 cfs. The output is attached in this report and indicates that the 100-year W.S. is 1326.80. Harry Street is overtopped at an elevation of 1327.32. It would be more conservative to base the minimum pad elevations of the houses located upstream of the Harry St. RCBC on the overtop elevation rather than the 100-year water surface. Therefore, the minimum pad elevations of Lots 1-6 of Block 4 shall be 1328.40.

DETENTION POND

The single detention pond will provide sufficient storage to detain the necessary flow from the proposed site and some additional future development. 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 shall be controlled by a 2-30" RCP culvert which maintains the static pool at 1330.50 and drains into the south ditch of Harry Street and drains east. A summary of the detention pond's performance in the various design storms can be found in the table below.

Design Storm	Peak Inflow (cfs)	Peak Outflow (cfs)	Allowable Release (cfs)	Peak Storage (ac-ft.)	Peak Elevation
2-yr	24.13	12.44	13.35	1.15	1331.84
5-yr	34.19	19.69	20.40	1.50	1332.22
10-yr	40.30	24.25	24.81	1.71	1332.43
25-yr	50.50	31.91	32.31	2.03	1332.77
100-yr	67.79	44.89	45.30	2.54	1333.27

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

Stage	Area (ac-ft)
1330.5	0.81
1331	0.84
1332	0.92
1333	1.00
1334	1.08
1335	1.16

The detention pond will have a top of 1334.50 to provide and will provide 1.23 feet of freeboard in the 100-year design storm. Lots 1-8, Block 1 shall have a minimum pad elevations of 1334.50.

EXISTING CONDITIONS

Project: Willow Creek East2 Simulation Run: Ex 2

Start of Run: 01Jan2006, 00:00 Basin Model: Existing
End of Run: 02Jan2006, 00:05 Meteorologic Model: 2
Compute Time: 07Dec2006, 13:57:18 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.0402	19.71	01Jan2006, 12:15	1.62
NE	0.0268	13.35	01Jan2006, 12:40	1.61
NW	0.0134	12.20	01Jan2006, 12:10	1.63

Project: Willow Creek East2 Simulation Run: Ex 5

Start of Run: 01Jan2006, 00:00 Basin Model: Existing
End of Run: 02Jan2006, 00:05 Meteorologic Model: 5
Compute Time: 07Dec2006, 13:57:24 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.0402	30.35	01Jan2006, 12:15	2.43
NE	0.0268	20.40	01Jan2006, 12:35	2.42
NW	0.0134	18.54	01Jan2006, 12:10	2.45

Project: Willow Creek East2 Simulation Run: Ex 10

Start of Run:	01Jan2006, 00:00	Basin Model:	Existing
End of Run:	02Jan2006, 00:05	Meteorologic Model:	10
Compute Time:	07Dec2006, 13:57:12	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.0402	36.98	01Jan2006, 12:15	2.95
NE	0.0268	24.81	01Jan2006, 12:35	2.94
NW	0.0134	22.48	01Jan2006, 12:10	2.97

Project: Willow Creek East2 Simulation Run: Ex 25

Start of Run: 01Jan2006, 00:00 Basin Model: Existing
End of Run: 02Jan2006, 00:05 Meteorologic Model: 25
Compute Time: 07Dec2006, 13:57:21 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.0402	48.29	01Jan2006, 12:15	3.83
NE	0.0268	32.31	01Jan2006, 12:35	3.82
NW	0.0134	29.15	01Jan2006, 12:10	3.85

Project: Willow Creek East2 Simulation Run: Ex 100

Start of Run:	01Jan2006, 00:00	Basin Model:	Existing
End of Run:	02Jan2006, 00:05	Meteorologic Model:	100
Compute Time:	07Dec2006, 13:57:15	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.0402	67.89	01Jan2006, 12:15	5.38
NE	0.0268	45.30	01Jan2006, 12:35	5.37
NW	0.0134	40.65	01Jan2006, 12:10	5.41

EXISTING CONDITIONS
DRAINAGE MAP

PROPOSED CONDITIONS

Project: Willow Creek East2 Simulation Run: Prop 2

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed
End of Run: 02Jan2006, 00:05 Meteorologic Model: 2
Compute Time: 06Dec2006, 09:04:31 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	24.13	01Jan2006, 12:25	2.16
NW	0.0103	12.02	01Jan2006, 12:10	1.97
Pond 1	0.0279	9.39	01Jan2006, 13:00	1.92

Project: Willow Creek East2 Simulation Run: Prop 5

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed
End of Run: 02Jan2006, 00:05 Meteorologic Model: 5
Compute Time: 06Dec2006, 09:04:39 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	34.19	01Jan2006, 12:20	3.07
NW	0.0103	17.31	01Jan2006, 12:10	2.85
Pond 1	0.0279	15.29	01Jan2006, 12:55	2.80

Project: Willow Creek East2 Simulation Run: Prop 10

Start of Run:	01Jan2006, 00:00	Basin Model:	Proposed
End of Run:	02Jan2006, 00:05	Meteorologic Model:	10
Compute Time:	06Dec2006, 09:04:23	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	40.30	01Jan2006, 12:20	3.63
NW	0.0103	20.53	01Jan2006, 12:10	3.40
Pond 1	0.0279	19.10	01Jan2006, 12:55	3.34

Project: Willow Creek East2 Simulation Run: Prop 25

Start of Run:	01Jan2006, 00:00	Basin Model:	Proposed
End of Run:	02Jan2006, 00:05	Meteorologic Model:	25
Compute Time:	06Dec2006, 09:04:35	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	50.50	01Jan2006, 12:20	4.58
NW	0.0103	25.98	01Jan2006, 12:05	4.33
Pond 1	0.0279	25.43	01Jan2006, 12:50	4.25

Project: Willow Creek East2 Simulation Run: Prop 100

Start of Run:	01Jan2006, 00:00	Basin Model:	Proposed
End of Run:	02Jan2006, 00:05	Meteorologic Model:	100
Compute Time:	06Dec2006, 09:04:28	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	67.79	01Jan2006, 12:20	6.21
NW	0.0103	35.34	01Jan2006, 12:05	5.94
Pond 1	0.0279	36.30	01Jan2006, 12:50	5.84

PROPOSED CONDITIONS
DRAINAGE MAP

DETENTION POND

Project : Willow Creek East2 Simulation Run : Prop 2 Reservoir: Pond 1

Start of Run :	01Jan2006, 00:00	Basin Model :	Proposed
End of Run :	02Jan2006, 00:05	Meteorologic Model :	2
Compute Time :	06Dec2006, 12:52:23	Control Specifications :	Control

Volume Units : IN

Computed Results

Peak Inflow :	24.13 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:25
Peak Outflow :	12.44 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:50
Total Inflow :	2.16 (IN)	Peak Storage :	1.15 (AC-FT)
Total Outflow :	1.99 (IN)	Peak Elevation :	1331.84 (FT)

Project : Willow Creek East2 Simulation Run : Prop 5 Reservoir: Pond 1

Start of Run :	01Jan2006, 00:00	Basin Model :	Proposed
End of Run :	02Jan2006, 00:05	Meteorologic Model :	5
Compute Time :	06Dec2006, 12:52:30	Control Specifications :	Control

Volume Units : IN

Computed Results

Peak Inflow :	34.19 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:20
Peak Outflow :	19.69 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:45
Total Inflow :	3.07 (IN)	Peak Storage :	1.50 (AC-FT)
Total Outflow :	2.88 (IN)	Peak Elevation :	1332.22 (FT)

Project : Willow Creek East2 Simulation Run : Prop 10 Reservoir: Pond 1

Start of Run :	01Jan2006, 00:00	Basin Model :	Proposed
End of Run :	02Jan2006, 00:05	Meteorologic Model :	10
Compute Time :	06Dec2006, 12:52:15	Control Specifications :	Control

Volume Units : IN

Computed Results

Peak Inflow :	40.30 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:20
Peak Outflow :	24.25 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:45
Total Inflow :	3.63 (IN)	Peak Storage :	1.71 (AC-FT)
Total Outflow :	3.42 (IN)	Peak Elevation :	1332.43 (FT)

Project : Willow Creek East2 Simulation Run : Prop 25 Reservoir: Pond 1

Start of Run :	01Jan2006, 00:00	Basin Model :	Proposed
End of Run :	02Jan2006, 00:05	Meteorologic Model :	25
Compute Time :	06Dec2006, 12:52:27	Control Specifications :	Control

Volume Units : IN

Computed Results

Peak Inflow :	50.50 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:20
Peak Outflow :	31.91 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:45
Total Inflow :	4.58 (IN)	Peak Storage :	2.03 (AC-FT)
Total Outflow :	4.35 (IN)	Peak Elevation :	1332.77 (FT)

Project : Willow Creek East2 Simulation Run : *Prop 100* Reservoir: *Pond 1*

Start of Run :	01Jan2006, 00:00	Basin Model :	Proposed
End of Run :	02Jan2006, 00:05	Meteorologic Model :	100
Compute Time :	06Dec2006, 12:52:19	Control Specifications :	Control

Volume Units : IN

Computed Results

Peak Inflow :	67.79 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:20
Peak Outflow :	44.89 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:45
Total Inflow :	6.21 (IN)	Peak Storage :	2.54 (AC-FT)
Total Outflow :	5.95 (IN)	Peak Elevation :	1333.27 (FT)

HARRY STREET RCBC

CURRENT DATE: 12-07-2006 FILE DATE: 12-07-2006
CURRENT TIME: 11:08:22 FILE NAME: 2916P

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULVERT NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS	SHAPE	MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1316.58	1316.40	33.00	2	RCB		8.00	8.00	.013	CONVENTIONAL
2										
3										
4										
5										
6										

FILE: 2916P CULVERT HEADWATER ELEVATION (ft) DATE: 12-07-2006

DISCHARGE (cfs)	1	2	3	4	5	6	ROADWAY
0	1316.58	0.00	0.00	0.00	0.00	0.00	0.00
143	1318.65	0.00	0.00	0.00	0.00	0.00	0.00
285	1319.86	0.00	0.00	0.00	0.00	0.00	0.00
428	1320.89	0.00	0.00	0.00	0.00	0.00	0.00
571	1321.82	0.00	0.00	0.00	0.00	0.00	0.00
714	1322.67	0.00	0.00	0.00	0.00	0.00	0.00
856	1323.47	0.00	0.00	0.00	0.00	0.00	0.00
999	1324.26	0.00	0.00	0.00	0.00	0.00	0.00
1142	1325.06	0.00	0.00	0.00	0.00	0.00	0.00
1284	1325.90	0.00	0.00	0.00	0.00	0.00	0.00
1427	1326.80	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The last row, if not 0, is for a point above the roadway.

CURRENT DATE: 12-07-2006 FILE DATE: 12-07-2006
CURRENT TIME: 11:08:22 FILE NAME: 2916P

PERFORMANCE CURVE FOR CULVERT 1 - 2(8.00 (ft) BY 8.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1316.58	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
142.70	1318.65	2.07	2.07	1-S2n	1.11	1.35	1.18	2.11	7.53	3.17
285.40	1319.86	3.28	3.28	1-S2n	1.80	2.15	1.92	3.05	9.29	3.87
428.10	1320.89	4.31	4.31	1-S2n	2.40	2.82	2.56	3.76	10.46	4.34
570.80	1321.82	5.24	5.24	1-S2n	2.94	3.41	3.13	4.34	11.38	4.69
713.50	1322.67	6.09	6.09	1-S2n	3.47	3.96	3.67	4.85	12.15	4.98
856.20	1323.47	6.89	6.89	1-S2n	3.98	4.47	4.17	5.30	12.82	5.23
998.90	1324.26	7.68	7.68	1-S2n	4.46	4.96	4.67	5.70	13.38	5.45
1141.60	1325.06	8.48	8.48	5-S2n	4.95	5.42	5.13	6.08	13.91	5.65
1284.30	1325.90	9.32	9.32	5-S2n	5.42	5.86	5.59	6.43	14.36	5.82

1427.00 1326.80 10.22 10.22 5-S2n 5.89 6.29 6.03 6.76 14.80 5.99

El. inlet face invert 1316.58 ft El. outlet invert 1316.40 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1316.58 ft
OUTLET STATION	33.00 ft
OUTLET ELEVATION	1316.40 ft
NUMBER OF BARRELS	2
SLOPE (V/H)	0.0055
CULVERT LENGTH ALONG SLOPE	33.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	8.00 ft
BARREL RISE	8.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 12-07-2006 FILE DATE: 12-07-2006
CURRENT TIME: 11:08:22 FILE NAME: 2916P

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	15.00 ft
SIDE SLOPE H/V (X:1)	3.0
CHANNEL SLOPE V/H (ft/ft)	0.003
MANNING'S n (.01-0.1)	0.035
CHANNEL INVERT ELEVATION	1316.40 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1316.40 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1316.40	0.000	0.00	0.00	0.00
142.70	1318.51	0.384	2.11	3.17	0.40
285.40	1319.45	0.391	3.05	3.87	0.57
428.10	1320.16	0.394	3.76	4.34	0.70
570.80	1320.74	0.397	4.34	4.69	0.81
713.50	1321.25	0.399	4.85	4.98	0.91
856.20	1321.70	0.401	5.30	5.23	0.99
998.90	1322.10	0.402	5.70	5.45	1.07
1141.60	1322.48	0.404	6.08	5.65	1.14
1284.30	1322.83	0.405	6.43	5.82	1.20
1427.00	1323.16	0.406	6.76	5.99	1.26

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE PAVED
EMBANKMENT TOP WIDTH 30.00 ft
***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X ft	Y ft
1	0.00	1330.00
2	76.87	1329.09
3	147.71	1328.18
4	219.25	1327.54
5	290.24	1327.32
6	362.75	1327.32
7	392.62	1327.46
8	460.57	1327.60
9	530.95	1328.19
10	604.55	1328.95
11	680.00	1329.83
12	754.00	1330.78

STORM SEWER PROFILES

ADDITIONAL CALCULATIONS

Willow Creek East 11-28-06 AML

Harry RCBC	SCS	c factor
218 ac. ½ acre lots,	CN = 85	0.72
100 ac. ¼ acre lots,	CN = 87	0.70
301 ac. Pasture in Good Condition,	CN = 80	0.65
619 ac total	CN ≈ 83	0.69

Tc total L = 10,400'

T_1: L = 300' Sheet Flow, S = 1.6% $V_1 = 0.25$ fps $\frac{300'}{2.5 \text{ fps}}$ = 20.0 min.

T_2: L = 1000' Grassed Waterway S = 1.0% $V_2 = 1.12 \frac{1000'}{1.12 \text{ fps}}$ = 14.9 min.

T_3 L = 9100' Assumed Velocity $V_3 = 4.0$ fps $\frac{9100'}{4.0 \text{ fps}}$ = 37.9 min.

USE ≈ 73 min.

$Q_{100} = 0.69 \times 619 \times 3.34 = 1427$ cfs

STREET PROFILE

	Sta	El.
1	0	30.00
2	76.87	29.09
3	147.71	28.18
4	219.25	27.54
5	290.24	27.32
6	362.75	27.32
7	392.62	27.46
8	460.57	27.60
9	530.95	28.19
	604.55	28.95
	680	29.83
	754	30.78

Willow Creek East 11-28-06 AML 1/2

EXISTING CONDITIONS

NE

SOIL TYPE Rd, Roschill Hydrologic Group D

CN = Pasture, Good Condition = 80

AREA = 16.93 acres

Tc

T_1 = 300' Overland Flow $S = \frac{2'}{300} = 0.67\%$ $V_1 = 0.23$ fps $T_1 = \frac{300'}{0.23 fps} = 21.7$ min.

T_2 = 950' Grassed Waterway $S = 0.7\%$ $V_2 = 0.91$ fps $T_2 = \frac{950'}{0.91 fps} = 17.4$ min.

T_3 = 700' Assumed Vel. $V_3 = 3.0$ fps = 3.9 min.

USE 43 min.

NW

CN = 80

AREA = 8.59 ac.

Tc

T_1 = 300' Overland Flow $S = \frac{4.5}{300} = 1.5\%$ $V_1 = 0.37$ fps $T_1 = \frac{300'}{} = 13.5$ min.

T_2 300' Grassed Waterway $S = \frac{8'}{475} = 1.68\%$ $V_2 = 1.74$ fps $= \frac{300}{1.74 fps} = 2.9$ min.

T_3 175' Assumed Velocity $V_3 = 3.0$ fps $\frac{175}{3.0} = 1.8$ min.

17 min.

Proposed Conditions

POND

CN = Single Family, 1/4 acre Lots = 87

AREA = 18.74

T_1 300' Overland Flow $S = 1.00\%$ $V_1 = 0.28$ $T_1 = \frac{300'}{0.28 fps} = 17.9$ min.

T_2 730' Grassed Waterway $S = 1.00\%$ $V_2 = 1.12$ $T_2 = \frac{730'}{1.12 fps} = 10.9$ min.

T_3 280' Assumed Velocity $V_3 = 3.00$ fps $\frac{280'}{3.00 fps} = 1.6$ min.

USE 30 min.

Existing			Proposed	
	NE	NW	NE	NW
100-year	45.30 cfs	40.05 cfs	45.06 cfs	30.74 cfs
25-year	32.31 cfs	29.15 cfs	31.74 cfs	22.59 cfs
10-year	24.81 cfs	22.48 cfs	24.11 cfs	17.85 cfs
5-year	20.40 cfs	18.54 cfs	19.66 cfs	15.05 cfs
2-year	13.35 cfs	12.20 cfs	12.20 cfs	10.45 cfs

NW

Weighted CN (Proposed) ASSUME TC = 15 min

Impervious Area = 1.85 ac. $\frac{(1.85)(98) + 4.74(80)}{6.59} = 85$

Grass / Turf = 4.74