Final Drainage Plan
Bellechase Addition

Wichita, Sedgwick County, Kansas

March 29, 2006

Drainage Report
Belle Chase Addition
Wichita, Sedgwick County, Kansas

February 2, 2006
Updated March 28, 2006

Introduction: Belle Chase Addition is located near the northwest corner of the intersection of 127th Street East and Harry Street. The plat consists of approximately 16.3 Acres. From the *Soil Survey of Sedgwick County, Kansas*, the predominant soils on site are Rd and Ce, Type D and C Hydrological Group soils respectively. For the sake of the drainage analysis, Type D Hydrological Group soils will be used for analysis. The site is used for pasture at this time.

Belle Chase is situated immediately south of Country Hollow Addition, Wichita, Sedgwick County, Kansas, with a tributary feeding Spring Creek draining from north to south across the site. A FEMA Zone B Flood Zone exists on the site, looping into Reserve E, South of the South Entrance. There is no other flood zone encroachment on the Addition.

Drainage Plan References:

Drainage Report, The Country Hollow Addition, Wichita, Sedgwick County, Kansas, July 2005, prepared by MKEC Engineering Consultants, Inc. (MKEC Report)

Spring Branch Master Drainage Plan, City of Wichita, Kansas, December 2004, prepared by PEC, P.A. (PEC Report)

Detention Storage: From the MKEC Report, the area immediately north of Belle Chase Addition located in The Country Hollow Addition consists of 10 acres noted as West Area. This 10 acre basin produces a 100 year flow of 60.5 cfs in the undeveloped condition, and 0 cfs in the developed condition.

Inspection of the detention storage provided by Country Hollow Addition yields a net reduction of the 100 year flow from the site from a pre-developed total of 519.3 cfs (from three drainage basins) to a post developed flow of 437.2 cfs (from two drainage basins). Each of the remaining Country Hollow basins discharge at a rate lower than the 100 year pre-developed peak, indicating that the site has been designed to decrease the 100 year post-developed discharge below pre-developed peaks.

The area that naturally drains to the outlet in Belle Chase Addition (not counting the 10 acres from Country Hollow Addition) is 35.2 Acres (See Map 1). The SCS Curve Number for the undeveloped condition is 80 (see MKEC). Adding the 10 acres from the Country Hollow Addition results in 45.2 acres that flow into the Belle Chase tributary.

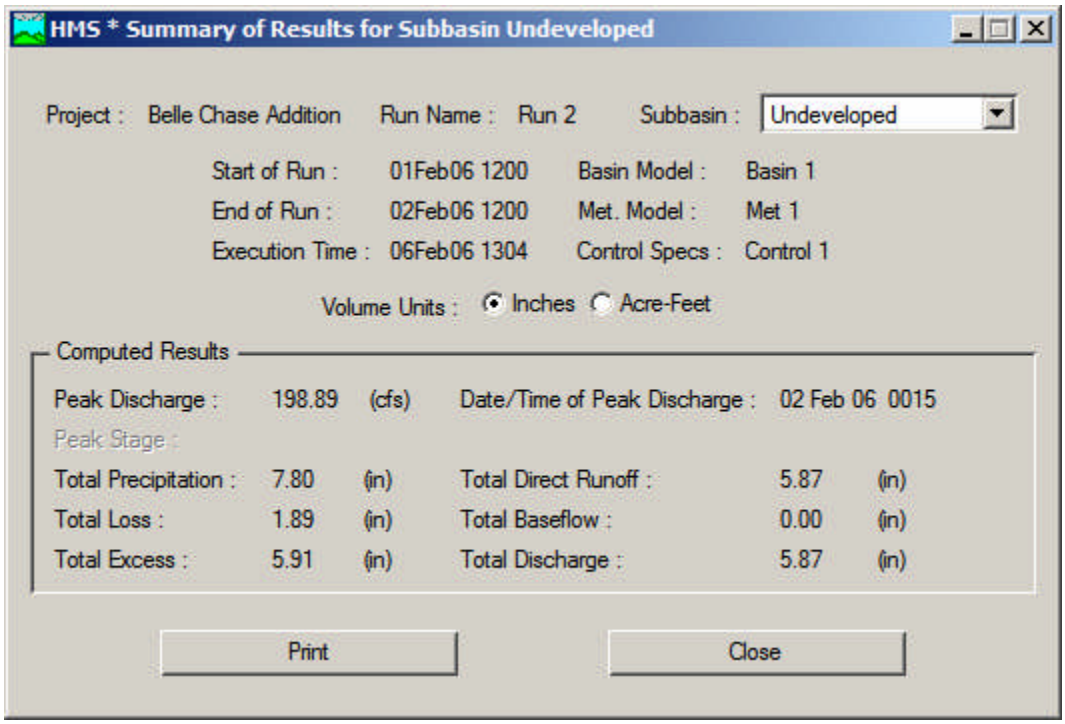
In keeping with the methodology used on the Country Hollow Addition site, the FAA Time of Concentration method of estimating will be used. Results of each of the basins can be found on Exhibit A – Time of Concentration Calculations – Belle Chase Addition.

In the undeveloped condition, the 45.2 acres tributary has a Tc of 23 minutes.

This data modeled in HEC-HMS yields the following results:

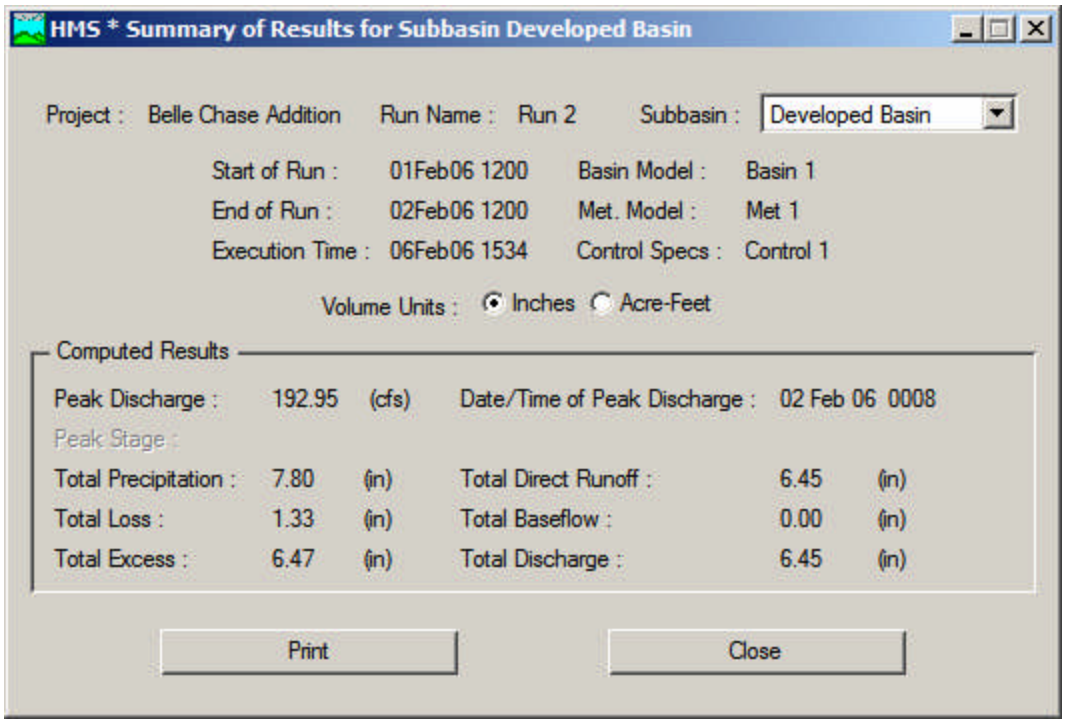
Undeveloped Condition Input Data:
Basin Area = 45.2 acres = 0.07063 square miles
Tc = 23 minutes
CN = 80
Rainfall Event: 100 year – 24 hour precipitation of 7.8 inches, using SCS Type II Distribution.

Output results:



Developed Basin: (Includes adjacent area that will be platted in the future, and eliminates the 10 acres formerly draining through the tributary) = 33.3 Acres. To model the developed basin, a 30 percent impervious area will be added to the model. Also, a Tc of 16 minutes is calculated for the developed condition (See Appendix A).

Results of Developed Basin:



The difference in the peak pre and post developed condition are as follows:

Pre-Developed Peak flow (100 year rainfall event) = 199 cfs
Post-Developed Peak flow (100 year rainfall event) = 193 cfs
No detention required for this subdivision.

Localized Drainage Areas: (See Map for Descriptions)

Runoff from these basins is calculated using the Rational Method (Q = CiA), with data from Attachment D, City of Wichita Drainage Criteria.

Basin	Area (sf)	Area (Ac)	Tc (Min)	C2	C100	I2 (In/Hr)	I100 (In/Hr)	Q2	Q100
A	57766	1.3	15	0.5	0.76	3.83	7.37	2.5	7.4
B	187210	4.3	15	0.5	0.76	3.83	7.37	8.2	24.1
C	429349	9.9	15	0.5	0.76	3.83	7.37	18.9	55.2
D	387171	8.9	15	0.5	0.76	3.83	7.37	17.0	49.8
E	69767	1.6	15	0.5	0.76	3.83	7.37	3.1	9.0
F	109387	2.5	15	0.5	0.76	3.83	7.37	4.8	14.1
G	53736	1.2	15	0.5	0.76	3.83	7.37	2.4	6.9
H	77346	1.8	15	0.5	0.76	3.83	7.37	3.4	9.9

Storm Water Sewer Systems:

The hydraulic capacity of each storm water sewer system is analyzed using Haestad Method's STORMCad program. Adjacent to known floodplains, the starting water surface elevation is the BFE (100 year storm).

To the extent possible, the natural drainage ways that exist on the property will be maintained. Storm water sewer systems will be placed only as necessary to cross streets, or provide an outlet for rear yard drainage.

System 100: Northerly most SWS Crossing of Spring Valley Street
Inlet capacity: The major street sump intercepts 24.1 cfs of flow. Two 5 foot type 1A Inlets in a sump condition can accommodate 26 cfs in capacity at R/W elevation, so use two 10' type IA Inlets at this location. The beehive inlet to the north of the sump can be a single inlet, with overspill permitted to the street. The beehive is set at the same elevation as the top of curb to allow overspill.

System 200: Southeasterly sump crossing Belle Chase
Inlet Capacity: The approach flow at this sump location is 49.8 cfs, with need for inlet capacity to accept a large portion of this flow. Two 10 foot inlets in a sump condition can capture 52 cfs, and with the ability to overspill south, this is acceptable. The pipe system is designed to handle the 100 year storm.

System 300: South system near south-central portion of the addition
Inlet Capacity: The approach flow in the street is 14.1 cfs, use 2 – 5' Type 1A Inlets. This system is sized for 100 year pipe capacity.

For output data for each run, see the STORMCad generated profiles included with this report.

Area G – Side road drainage crossing under Spring Valley Street. The 100 year flow at this location totals 6.9 cfs. With inlet control, an 18" RCP culvert can pass 7.0 cfs – use an 18" RCP Culvert pipe at this location.

Areas H (and area G) have a combined flow of 16.8 cfs in the 100 year event. With inlet control, a 24" RCP Culvert pipe will pass this flow with a HW depth of 2.3 feet. Coordination with Conoco-Phillips Pipeline Company will be necessary at the actual time of design.

Included with this report is a lot grading plan and the aforementioned exhibits.