DRAINAGE PLAN
STEVE KELLEY 6TH ADDITION
TO
WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY

Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

24 September 2009

Project # 09-08-P528

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PRELIMINARY REPORT

Prepared by Baughman Company, P.A.
24 September 2009

By Patrick S. Baer, P.E.

REPORT CONTENTS

EXISTING CONDITIONS

This rectangular lot is located east of Lark, south of the intersection of Lark and Carr in the City of Wichita, KS. The site is currently three unplatted parcels. The site is bordered on the north and south by 2/3rd of an acre parcels with single family residences and bordered on the east with a 1.9acre parcel with a single family residence. The site is fronted by Lark Road to the west.

The entire 1.86 acre tract of land is currently vacant with a hedge row along the west lot line and a drainage channel along the east. The peak runoff was calculated using the Rational Method with the following site considerations: soil conditions, percentage of impervious area, surface slope and observed topography. The site drains from the west line to the east, with the drainage channel draining runoff to the north. The drainage channel routes runoff from this site, the 1.9acre property to the east, and an addition 7.5 acres located to the south. The overall limits of the runoff basin are limited East to West by Lark and Stoney Point, and North to South by 350' south of Carr and the drainage channel located just south of May.

PROPOSED CONDITIONS

The proposed backyards (basin 3) will drain to the east, the proposed front yard and Lark Court will drain to the west, into the existing Lark Lane. The proposed development will increase the overall impervious area of the site. The existing offsite drainage, draining along the east line of the addition will continue to drain along the proposed drainage and utility easement and drain to the north. Downstream of this site is an existing pair of detention ponds located on both the south and north side of Carr Road. The existing and proposed time of concentration will be equal at 15 minutes, the minimum time of concentration. The limited increase to the peak runoff by will have a negligible effect on the downstream detention pond. For this reason, detention basins will not be recommended for this project.

OFFSITE CONDITIONS

To the south and east, 9.36 acres of large single residential lots drain thru the channel located along the east line of this property, draining to the north. Directly downstream of this parcel, at the north east corner of the property, is located a detention pond. This detention pond extends under Carr Road, and drains into a second detention pond. This second detention pond then discharges into an abandoned railroad right of way, draining east and into the Cowskin creek. Cumulatively, 61 acres drain to these detention ponds. With the size and total detention pond drainage size, the in limited increased runoff, from the development of this parcel of land, will not create an observable increase in the peak runoff or peak detention pond elevation. Since the detention pond will not have an observable increase in the peak runoff or detention pond elevation, we propose the construction of detention basins for these improvements will have no benefit and not be required.

EXISTING CONDITIONS RUNOFF CALCULATIONS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in calculating the existing conditions runoff values.

- STORM SERIES
  - 2-year, 5-year, 10-year, 25-year, 100-year Storm Events Modeled
  - Time of Concentration (TR55 Method) 15 min
  - 2-yr Rainfall Depth = 3.83 in
  - 5-yr Rainfall Depth = 4.54 in
  - 10-yr Rainfall Depth = 5.22 in
  - 25-yr Rainfall Depth = 6.06 in
  - 100-yr Rainfall Depth = 7.37 in

- FLOW DATA
  - Existing Conditions modeled using Rational Method.
  - Areas per USGS Quadrangle Sheet, Aerial Photos, and Site Visits
  - Runoff Coefficient:

Factors	Offsite	Ex. Site*
C_2 =	0.33	0.22
I_2 =	3.83	3.83
C_5 =	0.35	0.24
I_5 =	4.53	4.53
C_{10} =	0.4	0.3
I_{10} =	5.22	5.22
C_{25} =	0.43	0.32
I_{25} =	6.06	6.06
C_{100} =	0.51	0.41
I_{100} =	7.37	7.37

SITE CHARACTERISTICS

The current site has groups B soil classifications; with no impervious cover (buildings & parking lot) on site. The offsite area draining onto this parcel are large single residential lots (1/2 to 1 acre lots). Downstream (north) has two detention ponds with runoff routing from single family structures with approximately 4 lots per acre. Additionally a commercial site is located on the east side of the detention ponds. The aerial photograph with lidar information illustrates the drainage pattern.

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The site was analyzed for existing-development conditions using the rational method for the 2, 5, 10, 25 and 100 year storm events. The runoff coefficients were calculated for the existing soil conditions and percentage of impervious area for existing conditions. The time of concentration of 15 minutes has been used, per city of Wichita design requirement, since the TR55 method was calculated to be less this the minimum Tc. Below is a table with the peak discharge calculated for the

northeast corner of this parcel, including the offsite contribution of runoff. Basin #3 is the total peak runoff component for this parcel of land.

Existing Site Runoff table:

Basin #	Area (ac) (acres)	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
1	7.50	9.48	11.89	15.66	19.54	28.19
2	1.86	2.35	2.95	3.88	4.85	6.99
3*	1.86	1.57	2.02	2.91	3.61	5.62
Total Basin =	11.22	**13.4**	**16.9**	**22.5**	**28.0**	**40.8**

* = Existing site (undeveloped, soil Group B)

DOWNSTREAM DRAINAGE CAPACITY

Directly north, downstream of this parcel is a detention pond. This detention pond discharges to the north with multiple culvert pipes, crossing Carr Road. Runoff continues to drain north into 2 detention ponds tied in series, discharging into a channel located on the south line of an abandoned railroad right of way. The total drainage basin for these pond include approximately 61 acres, developed with residential lots located on the east and residential and commercial land developed along the west. The existing size and capacity of these detention ponds (225 cfs during a 100 year event) suggest the development of this parcel of land will not create a measurable increase in peak runoff.

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in developing the drainage and grading plans.

- STORM SERIES
  - 2-year, 5-year, 10-year, 25-year, 100-year Storm Events Modeled
  - Time of Concentration (TR55 Method) 15 min
  - 2-yr Rainfall Depth = 3.83 in
  - 5-yr Rainfall Depth = 4.54 in
  - 10-yr Rainfall Depth = 5.22 in
  - 25-yr Rainfall Depth = 6.06 in
  - 100-yr Rainfall Depth = 7.37 in

- FLOW DATA
  - Existing Conditions modeled by Rational Method.
  - Areas per USGS Quadrangle Sheet, Aerial Photos, and Site Visits
  - Runoff Coefficient:

Factors	Offsite	Prop. Site#
C_2 =	0.33	0.39
I_2 =	3.83	3.83
C_5 =	0.35	0.41
I_5 =	4.53	4.53
C_{10} =	0.4	0.47
I_{100} =	5.22	5.22
C_{25} =	0.43	0.5
I_{100} =	6.06	6.06
C_{100} =	0.51	0.57
I_{100} =	7.37	7.37

  - Peak calculated runoff:

Basin #	Area (ac) (acres)	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
1	7.50	9.48	11.89	15.66	19.54	28.19
2	1.86	2.35	2.95	3.88	4.85	6.99
3#	1.14	1.70	2.12	2.80	3.45	4.79
4#	0.72	1.08	1.34	1.77	2.18	3.02
Total Basin =	11.22	**14.6**	**18.3**	**24.1**	**30.0**	**43.0**

= Revised coefficient from proposed improvements

- GRADING CONSTRAINTS
  - Minimum 0.5% Street & Pavement Grades
  - Minimum 1.0% Rear Lot Grades, Goal of 1.5%
  - Double Curb Inlets utilized at all street sump locations
  - Emergency Overflows for 24-hr, 100-yr Storm Event

DETENTION FACILITIES

The construction of a detention basin for the development for this parcel has not shown to have a significant impact on the upstream or downstream properties. The limited increase to detention runoff and proximity to existing detention ponds appear to show no calculated increase in peak runoff or peak detention elevation.

DISCHARGE POINTS SUMMARY

The site currently sheet flows to the northeast corner of the site onto the land to the north. The 20' drainage and utility easement located along the north and south line will ensure backyard runoff travels directly east, into the existing channel (basin #3). The existing channel should be preserved to ensure no destruction to the existing vegetation and protect against erosion within the channel. Basin 4, the front yards and Lark Court will drain to the west and into Lark. Lark has a existing 6" full height curb with minimal slope to the north. This curb collects only the runoff from the street and adjacent drives and routes it to the north. The increase in runoff from the proposed Lark Court will increase the total runoff to Lark, however the existing curb has a capacity of 10 cfs.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

There do not appear to be any significant impacts upstream or downstream of this site due to development.

SOURCE OF FLOODPLAIN INFORMATION

The site is not located within a mapped FEMA SFHA. The location of the property, on FEMA FIRM Panel 340 of 700, map 20173 C, is attached as Exhibit 5 (for Sedgwick County, Kansas; effective February 2, 2007).

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS

There does not appear to be any USACOE permitting needed on the proposed site at this time.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING

There does not appear to be any DWR permitting needed on the proposed site at this time.

FEMA

There is no mapped floodplain located upon the proposed site. Therefore, no FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION

There does not appear to be any KDOT permitting needed on the proposed project.

SEDGWICK COUNTY PERMITTING

No portion of the site will discharge into Woodlawn Street ROW and will therefore not require a county ROW Permit.

EXHIBITS

EXHIBIT 1: Aerial Photo Exhibit with Topography

EXHIBIT 2: Plat – Half Scale

EXHIBIT 3: Drainage Plan – Half Scale

EXHIBIT 4: FIRMETTE

APPENDICES - SUPPORTING CALCULATIONS

APPENDIX A: CDM Soil Map

APPENDIX B: HydraFlow Hydrographs Routing
- Downstream Pond Routing

APPENDIX C: Runoff Coefficient Tables

CDM Soil Map

HydraFlow Hydrographs Routing

PROPOSED POND ROUTING

Runoff Coefficient Tables

DRAINAGE PLAN Scale 1:20