

DRAINAGE PLAN
**EDGE WATER
ADDITION**
TO
WICHITA, SEDGWICK COUNTY, KANSAS

Prepared By



31 JANUARY 2007

Drainage Plan

EDGE WATER ADDITION

Wichita, Sedgwick County, Kansas

Baughman Company, P.A.
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Project Narrative

The proposed Edge Water Addition is located south of 45th Street North and west of Hoover Road in Wichita, Kansas.

The site consists of approximately 175 acres and is mostly of Type A and Type D soils (Appendix A). The majority of soils is of Type A, therefore a soil type of B was assumed for curve numbers and Rational Method 'C' factors. Site soils were found using NRCS Soil Survey and boring logs.

The site will consist of a residential subdivision with associated streets, utilities, and stormwater management systems (pipes, ponds, ditches, etc.). The addition will include approximately 286 lots and 4 ponds. Two surface water ponds will be located near the southeast corner of the property and two groundwater ponds near the center and north of the proposed development.

The existing conditions of the site consist of farm/cropland and is relatively flat. There are no FEMA floodway or floodplain boundaries, as of this date, located on the property. There are no identifiable wetlands on the property.

There are currently 3 structures that drain this property. They are located along the south line of the property and drain runoff to the south ROW of K-96. These structures will continue to drain the K-96 ROW as well as be used for emergency overflows for the proposed site. The existing conditions exhibit shows the current draining basins and patterns for these structures. Upon development, these points will discharge less than the existing conditions. The structures to the south ROW of K-96 and appear to drain slowly to the east. The current drainage appears to sit in the ROW ditches and does not drain.

Existing trees, where applicable, will be left at existing grade. An existing pipeline runs along 45th Street North. Grading will be left as existing.

The proposed ponds will serve as sedimentation basins as well as storage for storm water runoff. The ponds will also be used for recreation purposes and will allow for pedestrian access.

Existing Runoff Conditions

The project is bounded by K-96 ROW to the south, Hoover Road on the east, 45th Street North on the north, and the (as of this date) undeveloped Midland Baptist Church Addition to the west. There are three exceptions along the east side and two on the north. These are existing residential homes.

Offsite runoff enters the property along the west line from Midland Baptist Church Addition. This runoff, minimal sheet flow, will be conveyed in the proposed storm sewer system.

The site is generally flat and primarily drains to the south. Three box culverts under K-96 that drain the site, shown on the accompanying aerial exhibit.

Existing conditions runoff was calculated using the Rational Method and time of concentrations from TR-55. The existing 'C' factor used for existing conditions was 0.67.

Proposed Runoff Conditions

The proposed ponds were modeled using PondPack (Appendix C). The ponds were modeled with runoff from the proposed site assuming a minimum time of concentration of 15 minutes. In the modeling, no outfall was assumed leading to complete retention of the design storms. A curve number of 70 was used for the proposed development. Due to the size of the ponds, the direct rainfall onto the ponds was modeled using a CN of 99 and a Tc of 0.01 hrs. All other Tc's used were the minimum 15 minutes

For storm sewer sizing, a 15 minute Tc was also assumed and the rational method was utilized for runoff rates (Appendix B). StormCAD software was used for pipe sizing (Appendix B).

Detention Facilities

Reserve G The pond in Reserve G, referred to in PondPack as Pond A, will consist of a 1 acre surface water pond. This pond will serve as detention as well as an entry pond. The static water surface is expected to be a 1332.0 with a 100-yr water surface of 1333.5. The pond will drain via a 18" RCP to another surface water pond in Reserve J.

Reserve J There will be two ponds in this reserve. A groundwater pond (Pond C) and a surface water pond (Pond B). The surface water pond in Reserve J will be approximately 2.5 acres. This pond is referred to as Pond B in PondPack. This pond will also be surface water with a static water surface of 1332. The pond will outlet to a groundwater pond via a 15" RCP and a 20' grass-lined, broadcrested weir section at elevation of 1333.0. The groundwater pond, Pond C, will be approximately 7.5 acres at its static elevation of 1325.0. The pond will serve as retention as well as for recreational purposes. This pond will discharge via 2-48" RCP into another groundwater pond in Reserve H. The groundwater pond will have a 100-yr water surface of a 1330.0.

Reserve H The pond in Reserve H, referred to as Pond D in PondPack, will have an area of 1.8 acres at its static elevation of 1325.0. This pond will serve as detention/retention as well as an entry feature pond for the subdivision. In the future, this pond will discharge to the north, under 45th Street North, into another series of groundwater ponds. The ponds will all be interconnected via 6' x4' RCBC (modeled as 6' x3' RCBC's) and is expected to ultimately discharge to the east under Hoover Road via the existing 24" CMP conveying east under Hoover Road. The future ponds are shown on the accompanying "Overall Site Exhibit". All ponds, proposed and future, have been included in the PondPack modeling (Appendix C).

Detention Summary

Proposed Pond System

POND	INFLOW	OUTFLOW	100-yr WSE	OUTLET
Pond A	40 cfs	4 cfs	1333.9	18" RCP
Pond B	102 cfs	20 cfs	1333.7	15" RCP/w weir
Pond C	544 cfs	23 cfs	1331.3	2-48" RCP
Pond D	112 cfs	1 cfs	1331.3	2-48" RCP

Pond D, in the future, is expected to drain/connect to a series of groundwater ponds to the north. These ponds will then drain to an existing 24" CMP under Hoover Road.

All ponds have been modeled using the entire storm series (2, 5, 10, 25, 50, 100, and 500 yr). The rear lot grades adjacent to the groundwater ponds will allow for 1' freeboard to the 500-yr, 24 hour storm. The 500-year peak rainfall depth was calculated using a regression analysis (Appendix C). The peak rainfall for the 500-yr storm was calculated to be 9.6 in.

The 500-yr water surface elevation for the proposed groundwater ponds was calculated to be a 1331.3.

Discharge Points Summary

The three box culverts under K-96 are currently draining this property. After development, these culverts will drain the current K-96 ROW and a minimal amount of runoff from the proposed site. The double 6'x3' RCBC located at the intersection of Hoover Road and K-96 will serve as an emergency overflow for the pond systems. The outlet flow line of the box is at an elevation of a 1330.5.

Peak Rainfall Intensities

According to the 'Rainfall-Runoff Relationship' done for this area by Mr. Carl Nuzman, the maximum 24-hour, 100-yr rainfall was measured to be 4.65 inches (Appendix E). According to the report, this site (including the future north area) would need 0.257 acre-feet of water storage for every acre of area developed to retain the 100-yr storm. The proposed addition will be approximately 315 acres. This would mean 81 ac-ft of storage would be needed when using Mr. Nuzman's calculated storage factor. The proposed development, as shown, will provide approximately 225 ac-ft of storage in the proposed ponds (Appendix F). Normally, the 24-hour, 100-year peak rainfall used is 7.9 inches, which is derived from TP-40. This value (7.9 inches) was the rainfall modeled in PondPack calculations.

The 24-hour, 500-yr rainfall event was calculated using a regression analysis and was found to be 9.6 inches. When compared to 'Rainfall - Runoff Relationship' values, the 500-year event was considered to be the 'worst case scenario' and its rainfall was used as the maximum value in the pond modeling. The lowest adjacent lot grade was then set to at least 1 foot above the 500-year water surface elevation produced in the PondPack modeling, and the lowest structure opening set 2 foot above the lot grade.

APPENDIX A

**Soil Survey
Boring Logs**

Appendix B

StormCAD

-Proposed SWS Systems 9-15, 17-18

Appendix C

PondPack

- Regression Analysis

-Pond Systems

Appendix D

HY-8

-Existing Structures

Appendix E

Rainfall – Runoff Relationship Report
By Carl Nuzman, P.E., P.Hg.

Appendix F

**Stage – Storage of Proposed Ponds
- Using Open-End Area Method**