Oak Creek Glen Meadows
Wichita, Sedgwick County, Kansas
June 2009

Drainage Improvement Narrative:

The future Glen Meadows development is south of the Oak Creek Office Park and is a 12 acre parcel planned for 21 single family lots of approximately 15,000 SF in size. The site drainage was analyzed with the HEC-HMS software and the SCS CN method for routing the runoff through a future retention pond No. 5 in the overall Oak Creek Development. The model for this project is part of a comprehensive stormwater model that is being updated for the overall Oak Creek Development to reflect planning changes. An existing condition runoff CN of 84 for Hydrologic Soil Group D was used for an average pastureland condition. A post development runoff CN of 86 was used representing residential lots of approximately 1/3 acre. The area to be developed drains to a natural watercourse that is piped underneath Chateau Parkway in an existing 48 inch RCP internally through the overall development. This drainage analysis was submitted as part of the Oak Creek Office Park drainage plan. See the enclosed Drainage Map.

The future Glen Meadows development drainage area is 19.72 acres in size and drains to this 48 inch culvert. The existing time of concentration is approximately 20.2 minutes. In the developed condition, the site will be collected in an urban storm sewer system and piped to a retention pond. The time of concentration will be reduced to approximately 11 minutes.

The resulting pre and post peak 100-year runoff rates are 127.8 and 162.3 cfs respectively. A retention pond of approximately 0.5 acres will be developed in Reserve E at the low area of the subdivision to attenuate site runoff. An upstream existing pond (Pond 4) discharges 11.3 cfs during the 100-year event. The total 100-year pre peak runoff rate of 139.1 cfs will be reduced by 6.9 cfs making the allowable discharge rate only 132.2 cfs from the retention pond. This will account for the Office Park's non-attenuated runoff described below.

A 5-foot long weir in the pond's outfall control structure will be required to regulate the post development peak runoff rate to 127.1 cfs. The normal water level of the future retention pond will be at elevation 1375.0. The post 100-year runoff will raise the pond level 4 feet to elevation 1379. This future retention pond can serve for the logically developed area drainage into it as well as address the excess runoff from the office park site. The pre and post runoff hydrology calculations as well as the storm routing computational results for the 2, 5, 10 and 25 year 24-hour precipitation events are also enclosed and tabularized on the Drainage Map. All developed weir discharges are less than the pre condition discharge for each precipitation event.

A preliminary grading plan for the subdivision and a storm sewer system layout plan are also enclosed in this Drainage Report.

The following discussion is from the drainage analysis for the Oak Creek Office Park. The Oak Creek Office Park on 21st Street and west of Greenwich Road is a portion of the planned Oak Creek 3rd Addition which is part of the Oak Creek Development Master Plan. The proposed plat lies in the NE ¼, Section 9, T27S, R2E. An approved Drainage Plan for the Oak Creek 3rd Addition is on file with the City of Wichita. This Drainage Report will also address the planned development of the Oak Creek Office Park along 21st Street.

The office park site plan area is approximately 3.34 acres. Runoff will be collected in a stormwater inlet and piped to the existing storm sewer system in 21st Street. Excess runoff will be retained in the parking lot as much as possible.

The existing condition is undeveloped land with planted pine trees for sale. The soil on-site is comprised primarily of Goessel silty clay, Irwin silty clay loan and Rose Hill silty clay which are all classified in the Hydrologic Soil Group as D soils.

An existing vacant lands Rational Method runoff coefficient C of 0.52, 0.54, 0.59, 0.61 and 0.68 is applicable for the 2, 5, 10, 25 and 100 storms respectively. The time of concentration is approximately 15 minutes. Peak runoff rates from the 2, 5, 10, 25 and 100 year recurrence interval precipitation events would generate 6.6, 8.3, 10.2, 12.3 and 16.7 cfs respectively.

The post development condition of the office park site with the planned impervious area would represent a weighted C value of 0.67, 0.70, 0.75, 0.76 and 0.82 for the 2, 5, 10, 25 and 100 storms respectively considering lawns, roofs and parking lots. The time of concentration would be reduced to approximately 10 minutes. Correspondingly, the recurrence interval storms would generate 10.1, 12.7, 15.2, 18.1 and 23.6 cfs respectively.

The increased difference in these peak runoff rates between pre and post developed conditions for the 100-year storm is 6.9 cfs. This excess runoff rate is planned to be routed through the future retention pond system in the Glen Meadows residential development to the south as was previously conceptually presented in the approved Stormwater Master Plan.

Acceptable best management practices (BMPs) will be employed in the final drainage design before and during construction.

References

Design of Urban Highway Drainage – The State of the Art, by Reitz & Jens, Inc., April 1980.

Drainage of Highway Pavements, Hydraulic Engineering Circular #12, by Tye Engineering, Inc., March 1984.

Interim Drainage and Storm Sewer Policy for Design Criteria and Documentation, City of Wichita, Kansas, 1985.

Soil Survey of Sedgwick County, Kansas, US Department of Agriculture, Soil Conservation Service, 1979.