

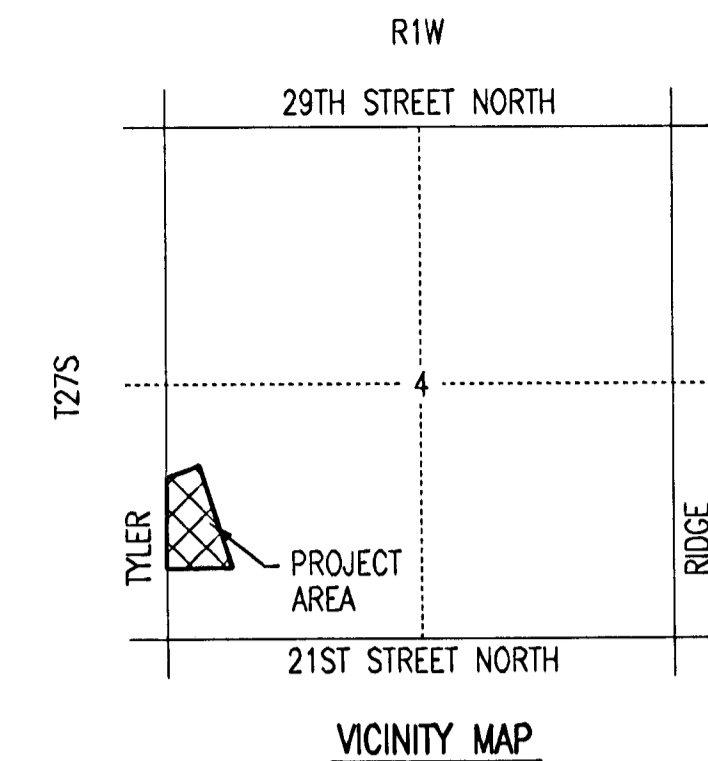
DRAINAGE PLAN

REFLECTION RIDGE 2ND WEST

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

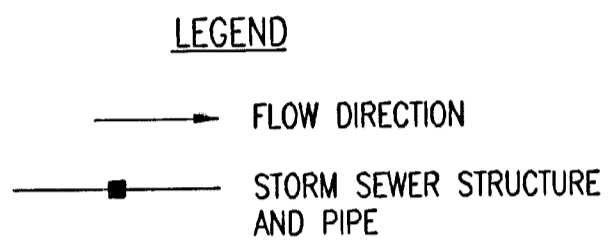
SCALE: 1" = 50'

• = 3/4" IRON PIPE W/PEC CAP UNLESS OTHERWISE NOTED
 TOPOGRAPHY SURVEY BY: GRIFFITH & ASSOCIATES
 DATE: SEPTEMBER 20, 2000



NOTES:
 Benchmark: City of Wichita disk at NE corner of 21st & Tyler
 Elevation: 170.95 City Datum
 On Site Benchmark: Top of fire hydrant on west side of Tyler
 Elevation: 168.56 City Datum

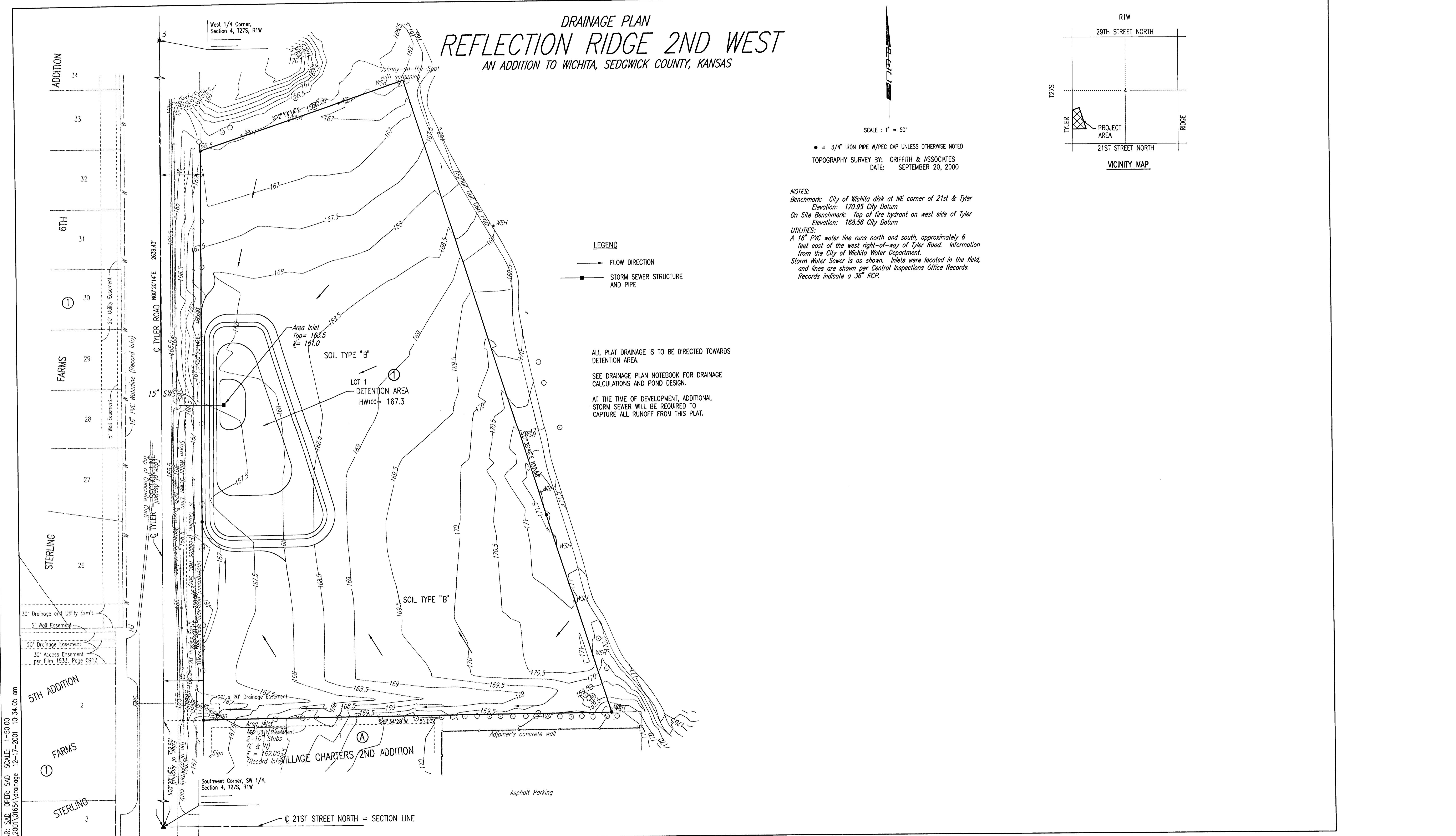
UTILITIES:
 A 16" PVC water line runs north and south, approximately 6 feet east of the west right-of-way of Tyler Road. Information from the City of Wichita Water Department.
 Storm Water Sewer is as shown. Inlets were located in the field, and lines are shown per Central Inspections Office Records. Records indicate a 36" RCP.



ALL PLAT DRAINAGE IS TO BE DIRECTED TOWARDS DETENTION AREA.

SEE DRAINAGE PLAN NOTEBOOK FOR DRAINAGE CALCULATIONS AND POND DESIGN.

AT THE TIME OF DEVELOPMENT, ADDITIONAL STORM SEWER WILL BE REQUIRED TO CAPTURE ALL RUNOFF FROM THIS PLAT.



DSNR: SLD OPER: SLD SCALE: 1"=50.00
 Q:\2001\01694\drainage 12-17-2001 10:34:05 am

DRAINAGE PLAN

REFLECTION RIDGE WEST 2ND
AN ADDITION TO WICHITA,
SEDGWICK COUNTY, KANSAS

DECEMBER 2001



Reflection Ridge West 2nd
Wichita, Sedgwick County, Kansas
12/11/01

Reflection Ridge West 2nd is a one-lot plat in northwest Wichita that encompasses approximately 6.8 acres. The site will be developed as a retirement center. The site is located northeast of 21st Street North and Tyler Road. The drainage plan, supporting computations and data for Reflection Ridge West 2nd drainage plan are presented herein.

Hydrology

The proposed plat lies in the W ½, SW ¼, Section 4, T27S, R1W. The existing landscape is cultivated agricultural with some trees along the western and southern borders. Currently the site slopes to the west and drains into Tyler Road and the adjacent storm sewer system. There is an apparent swale along the southern property boundary. This swale should be maintained or a storm sewer system installed to accommodate drainage from offsite.

Plans for future development include a retirement center. In order to reduce the runoff volumes and provide fill material for grading, a dry detention pond will be included with site development. The detention area is approximately 0.7 acre and will have a 15" outfall pipe to the storm sewer system along Tyler Road. This detention area reduces the runoff volume to below existing flows into Tyler Road. The 100-year high water elevation was designed at 167.3 with a flow out of 7.7 cfs. Offsite drainage was not included in these pond calculations; therefore offsite drainage should be routed around the plat as much as possible.

The outfall for the pond is an area inlet with a 15" RCP. This pipe can then be routed to the existing curb inlet on the east side of Tyler Road to the north. There is an existing 10" stub to the east that will have to be modified to accommodate a 15" pipe.

Runoff coefficients were estimated based on tables presented in the Design Aids section and existing land use. A map showing the existing topography and the proposed drainage pattern, as well as drainage calculations and HEC-HMS models are included.

○ The analysis made is based on the available site data which includes the following: 1" = 50' topographic map with 0.5' contours of the site and adjacent areas, aerial photo of site, Sedgwick County Soil Survey Map and references noted herein.

Storm Sewer Design

A storm sewer system for the site was not designed at this time. The pond was sized to accept all drainage from the plat and to provide fill material to elevate the site so it could be graded toward the pond.

Culvert Sizing

The FHWA's culvert program HY8 Ver. 6.1 was used to aid in the design of the detention area. This program was used to determine the rating curve of the detention area discharge for the HEC-HMS modeling.

Design Aids

This section includes material used to assist in designing the drainage system. A 1"=50' scale drainage plan map is enclosed in the pocket.

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.

○

Existing Conditions

Soil Type:

Fb – Farnum Loam, 1-3% slopes, well drained

Land Use:

Agricultural/Cultivated (C+0.02)

C₂ = 0.22C₅ = 0.24C₁₀ = 0.30C₁₀₀ = 0.43

Time of Concentration:

460' @ 0.5'/sec = 15 minutes

i₂ = 3.80 in/hri₅ = 4.62 in/hri₁₀ = 5.21 in/hri₁₀₀ = 7.40 in/hr

Total Area = 6.79 acres

Runoff – Rational MethodQ₂ = 5.7 cfsQ₅ = 7.5 cfsQ₁₀ = 10.6 cfsQ₁₀₀ = 21.6 cfsProposed Conditions

Land Use:

Multi-Family Residential (65% Impervious)

C₂ = 0.61C₅ = 0.64C₁₀ = 0.68C₁₀₀ = 0.75

Area = 6.79 acres

Time of Concentration = 15 minutes

Runoff – Rational MethodQ₂ = 15.7 cfsQ₅ = 20.1 cfsQ₁₀ = 24.1 cfsQ₁₀₀ = 37.7 cfs

Detention Storage

Dry detention area with area inlet and 15" RCP (50 L.F.) to existing storm sewer system along Tyler Road.

<u>Elevation</u> (City Datum)	<u>Area</u> (acres)	<u>Storage Volume</u> (acre-ft)	<u>Discharge</u> (cfs)
164.0	0.42	0	0
165.0	0.49	0.46	3
166.0	0.57	0.99	6
167.0	0.64	1.60	7.5
168.0	0.83	2.34	8.5

<u>Storm Frequency</u>	<u>High Water Elevation</u>	<u>Pond Discharge</u>
2-yr.	165.46	4.4 cfs
5-yr.	165.94	5.8 cfs
10-yr.	166.23	6.3 cfs
100-yr.	167.24	7.7 cfs

Detention area calculations were done using HY8 version 6.1 for outlet rating curve and HEC-HMS for detention storage elevations and discharges.

Assumptions

- Assume drainage from entire plat reaches detention area.
- Assume off-site drainage is routed around plat.
- Area inlet with 15" RCP to existing curb inlet at Tyler Road 50 L.F.
Flowline In = 163.5
Flowline Out = 160.50 (at Tyler Road Curb Inlet)

HMS * Summary of Results

Project : Reflection Rdg West Run Name : Run 1

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 2-Year Storm
Execution Time : 04Oct00 1504 Control Specs : 24 Hour Rainfall

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Total Volume (ac ft)	Drainage Area (sq mi)
North Area	9.5817	11 Jan 00 1200	0.95879	0.006375
South Area	6.8520	11 Jan 00 1200	0.73360	0.004234375
Pond	4.3838	11 Jan 00 1230	1.6904	0.010609375

HMS * Summary of Results

Project : Reflection Rdg West Run Name : Run 2

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 100-Year Storm
Execution Time : 04Oct00 1505 Control Specs : 24 Hour Rainfall

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Total Volume (ac ft)	Drainage Area (sq mi)
North Area	22.757	11 Jan 00 1200	2.3949	0.006375
South Area	15.415	11 Jan 00 1200	1.6979	0.004234375
Pond	7.7376	11 Jan 00 1240	4.0882	0.010609375

HMS * Summary of Results

Project : Reflection Rdg West Run Name : Run 3

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 5-Year Storm
Execution Time : 04Oct00 1504 Control Specs : 24 Hour Rainfall

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Total Volume (ac ft)	Drainage Area (sq mi)
North Area	12.987	11 Jan 00 1200	1.3233	0.006375
South Area	9.0489	11 Jan 00 1200	0.98006	0.004234375
Pond	5.8198	11 Jan 00 1230	2.3007	0.010609375

HMS * Summary of Results

Project : Reflection Rdg West Run Name : Run 4

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 10-Year Storm
Execution Time : 04Oct00 1505 Control Specs : 24 Hour Rainfall

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Total Volume (ac ft)	Drainage Area (sq mi)
North Area	15.138	11 Jan 00 1200	1.5568	0.006375
South Area	10.444	11 Jan 00 1200	1.1370	0.004234375
Pond	6.3408	11 Jan 00 1230	2.6907	0.010609375

HMS * Summary of Results for Pond

Project : Reflection Rdg West Run Name : Run 1

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 2-Year Storm
Execution Time : 04Oct00 1504 Control Specs : 24 Hour Rainfall

Computed Results

Peak Inflow : 16.434 (cfs) Date/Time of Peak Inflow : 11 Jan 00 1200
Peak Outflow : 4.3838 (cfs) Date/Time of Peak Outflow : 11 Jan 00 1230
Total Inflow : 2.99 (in) Peak Storage : 0.70446(ac-ft)
Total Outflow : 2.99 (in) Peak Elevation : 165.46(ft)

HMS * Summary of Results for Pond

Project : Reflection Rdg West Run Name : Run 2

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 100-Year Storm
Execution Time : 04Oct00 1505 Control Specs : 24 Hour Rainfall

Computed Results

Peak Inflow : 38.172 (cfs) Date/Time of Peak Inflow : 11 Jan 00 1200
Peak Outflow : 7.7376 (cfs) Date/Time of Peak Outflow : 11 Jan 00 1240
Total Inflow : 7.23 (in) Peak Storage : 1.7758(ac-ft)
Total Outflow : 7.23 (in) Peak Elevation : 167.24(ft)

HMS * Summary of Results for Pond

Project : Reflection Rdg West Run Name : Run 3

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 5-Year Storm
Execution Time : 04Oct00 1504 Control Specs : 24 Hour Rainfall

Computed Results

Peak Inflow : 22.036 (cfs) Date/Time of Peak Inflow : 11 Jan 00 1200
Peak Outflow : 5.8198 (cfs) Date/Time of Peak Outflow : 11 Jan 00 1230
Total Inflow : 4.07 (in) Peak Storage : 0.95816(ac-ft)
Total Outflow : 4.07 (in) Peak Elevation : 165.94(ft)

HMS * Summary of Results for Pond

Project : Reflection Rdg West Run Name : Run 4

Start of Simulation : 11Jan00 0000 Basin Model : Proposed Conditions
End of Simulation : 12Jan00 0600 Precip Model : 10-Year Storm
Execution Time : 04Oct00 1505 Control Specs : 24 Hour Rainfall

Computed Results

Peak Inflow : 25.582 (cfs) Date/Time of Peak Inflow : 11 Jan 00 1200
Peak Outflow : 6.3408 (cfs) Date/Time of Peak Outflow : 11 Jan 00 1230
Total Inflow : 4.76 (in) Peak Storage : 1.1286(ac-ft)
Total Outflow : 4.76 (in) Peak Elevation : 166.23(ft)

