Drainage Report

Maize South Campus Addition,

To Wichita, Sedgwick County, Kansas

October, 2007

kemiller engineering

516 S. Market
Wichita, Kansas 67202
(316) 264-0242

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Drainage Report

MAIZE SOUTH CAMPUS ADDITION

Introduction

The subject property is located on the south side of 37TH Street North between Maize Road and Tyler Road. The tract of land is approximately 270 acres and is zoned single-family SF-20, which is an acceptable zoning for schools. Maize Middle School is located at the northeast corner of the property, and the rest of the property is undeveloped. The current proposed use of the land is to expand the existing school, and add three more schools. At this time, the existing school will be expanded and 2 new schools will be built.

Current Conditions

The site is served by City of Wichita utilities. Most of the property is grassland, except for the existing school. The soils are a Type C, with average slopes of less than 0.4% slope. There are no signs of wetlands and the land is not in a floodplain.

The drainage patterns have been dictated by the development of the middle school and by the development of Fox Ridge Addition. The east half of the property drains northeast to the existing dry detention basin on the southwest corner of the 37th Street North and Tyler intersection. That basin drains to the northeast through a pair of 24-inch pipes, into the City of Wichita system, and eventually into the Big Slough. The rest of the property drains to the new on-site detention basins, then to the detention ponds in the Fox Ridge development. The drainage flows through Fox Ridge to Cadillac Lake, then eventually to the Westlink Tributary.

The attached plat with topography shows existing features including contours and utilities, and proposed easements.

Proposed Improvements

The entire site will be developed for school use. The site will be mass graded with detention ponds, building pads, and access drives. The excavation from the dry detention basins will be used to build up the pads and drives.

The Fox Ridge Addition dictates a peak 100-year runoff from the school site into the Fox Ridge ponds of 100 cfs, split between 2 different ponds that both drain south. The west pond (Fox Ridge Pond 2) takes 55 cfs in the 100-year storm. The east pond (Fox Ridge Pond 3) takes 45 cfs in the 100-year storm. The east pond is located near the middle of

the site, which is close to the natural ridgeline that divides the drainage of the property to the east and west. This, coupled with the site layout for the Maize schools, the discharge to the east pond will be inconsequential. Therefore, the entire property to be routed through Fox Ridge has a peak discharge from the site for the 100-year storm of less than 55 cfs.

The drainage to the existing detention basin northeast of the existing school at the southwest corner of 37th Street North and Tyler Road has undeveloped peak flow of 79 cfs. Analysis of the city storm sewer system indicates the discharge pipes from the detention basin were designed to allow a peak runoff of about 24 to 28 cfs. The proposed discharge from the site to the existing system is about 20 cfs for the 100-year storm.

Best management practices for erosion control will include ditch checks in the proposed swales, inlet protection at all inlets, silt fence where applicable, and sediment ponds within the detention ponds. The erosion control plan will have to constantly evolve as the site develops.

Appendix C illustrates no increased runoff, and actually a considerable reduction in peak runoff, after development of this site. The attached calculations show the existing and developed peak runoffs, including assumed coefficients and conditions. The attached erosion control plans show how silt will be retained on site. The ponds will act as sediment ponds during and after the development is complete.

Site Hydrological Analysis

Existing and proposed site conditions have been modeled using the rational method. The Values for Rainfall Intensity and Runoff Coefficients were established using the *Drainage and Strom Sewer Policy for Design Criteria and Documentation, City of Wichita, Kansas.* Existing times of concentration were calculated from existing ground conditions and can be found in Appendix C. Proposed times of concentration have been modeled using the proposed site runoff and accounting for the use of storm sewer pipe and channels to route runoff to the detention pond. Detention Pond routing and peak runoff calculations have been developed by storage-Indication Method, with the duration of storm varied to illustrate maximum detention and peak runoff for each storm event.

Future Development

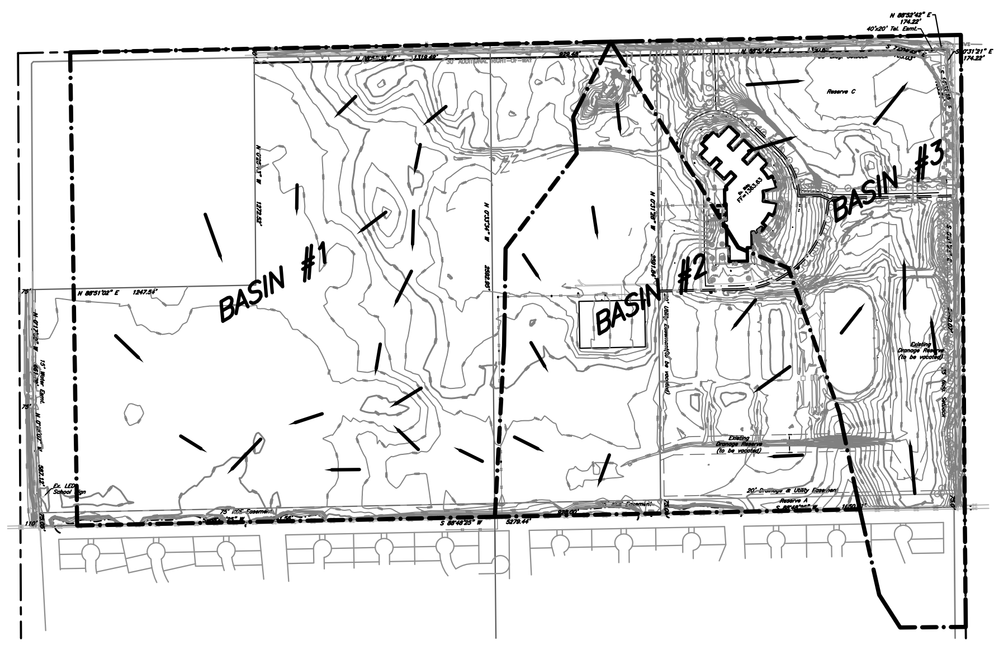
Over time, the entire project will develop into schools, parking, recreational facilities, and open-space. The detention ponds and discharge structures are designed for the site being fully developed. The site will require extensive internal storm sewer piping to drain the runoff to the ponds. The entire site is held under one ownership, so only one party is responsible for maintenance of the ponds and protecting the waters from erosion.

Appendix A

Drainage Plan
Preliminary Plat
Erosion Control Plan
USGS map with area highlighted
Aerial Photograph

DRAINAGE PLAN FOR MAIZE SOUTH CAMPUS

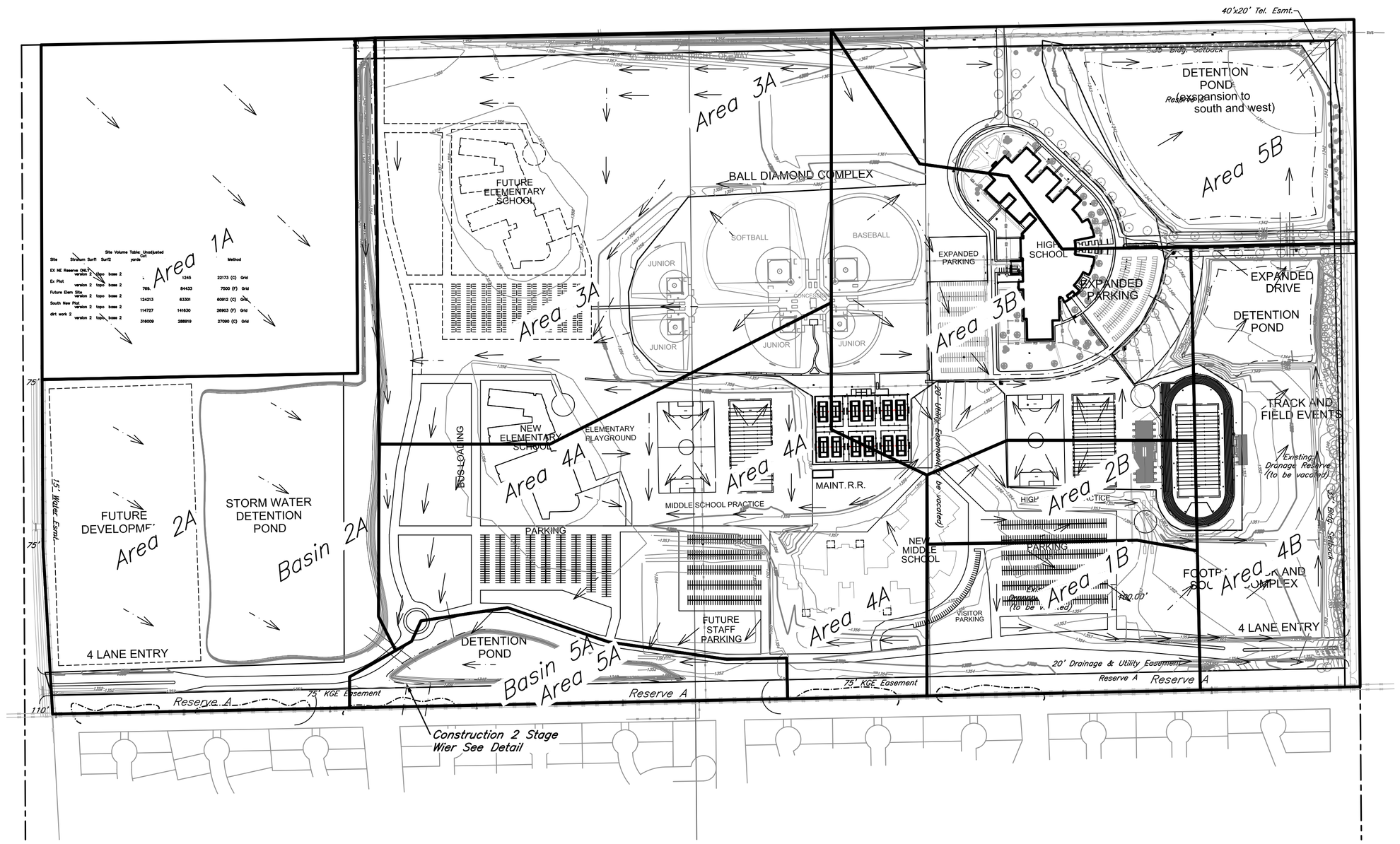
Existing Drainage Fields



Existing Site Drainage									
Block	# Acres	Tc	C5	I5	C100	I100	Q5	Q100
Basin 1	153.37	143.6 min	0.27	1.16	0.51	2.00	48.03	156.44
Basin 2	77.61	85.6 min	0.27	1.69	0.51	2.93	35.41	115.97
Basin 3	77.30	134.4 min	0.27	1.22	0.51	2.11	25.46	83.18
					Total Runoff=		108.90	355.59

Proposed Site Drainage										
Site	Acres	C2	I2	C5	I5	C100	I100	Q2	Q5	Q100
1A	37.80	0.24	0.21	0.27	0.28	0.51	0.47	1.90	2.86	9.06
2A	42.04	0.36	0.21	0.39	0.28	0.58	0.47	3.18	4.59	11.46
3A	59.67	0.49	0.21	0.51	0.28	0.66	0.47	6.14	8.52	18.51
4A&5A	57.77	0.45	0.21	0.47	0.28	0.63	0.47	5.46	7.60	17.11
1B	14.62	0.49	0.31	0.51	0.41	0.60	0.55	2.27	3.05	5.32
2B	9.41	0.49	0.31	0.51	0.41	0.66	0.55	1.46	1.96	3.42
3B	33.82	0.49	0.31	0.51	0.41	0.66	0.55	5.25	7.05	12.31
4B	25.86	0.24	0.31	0.27	0.41	0.51	0.55	1.97	2.85	7.27
5B	33.87	0.32	0.31	0.35	0.41	0.56	0.55	3.43	4.85	10.46

Proposed Drainage Plan



Engineer's Note:
Site drainage calculations developed using the Rational Method for peak runoff. "C" & "I" values established from the City of Wichita Design Criteria and Documentation. Detention Pond requirements developed from Stor-IND Method.

LEGEND

- Cedar Tree
- Fire Hydrant
- Light Pole
- Manhole (MH)
- Power Pole (PP)
- Sign
- Tree
- Water Valve
- Kansas Gas Service Line
- Sanitary Sewer
- Fence

OWNER: MAIZE SCHOOL DISTRICT
AREA: 269.56 acres (Existing)

Banchmark:
Inlet manhole lid. East side of Seville and South of Dubon.
Elev. = 1324.90

- 1/2" Rebar (found) PEC LS #65
- 1/2" Rebar (found)
- 5/8" Rebar (found)
- 3/4" Iron Pipe (found)
- 3/4" Pinched Iron Pipe (found)

300 150 0 300
(IN FEET)
1 inch = 300 ft.

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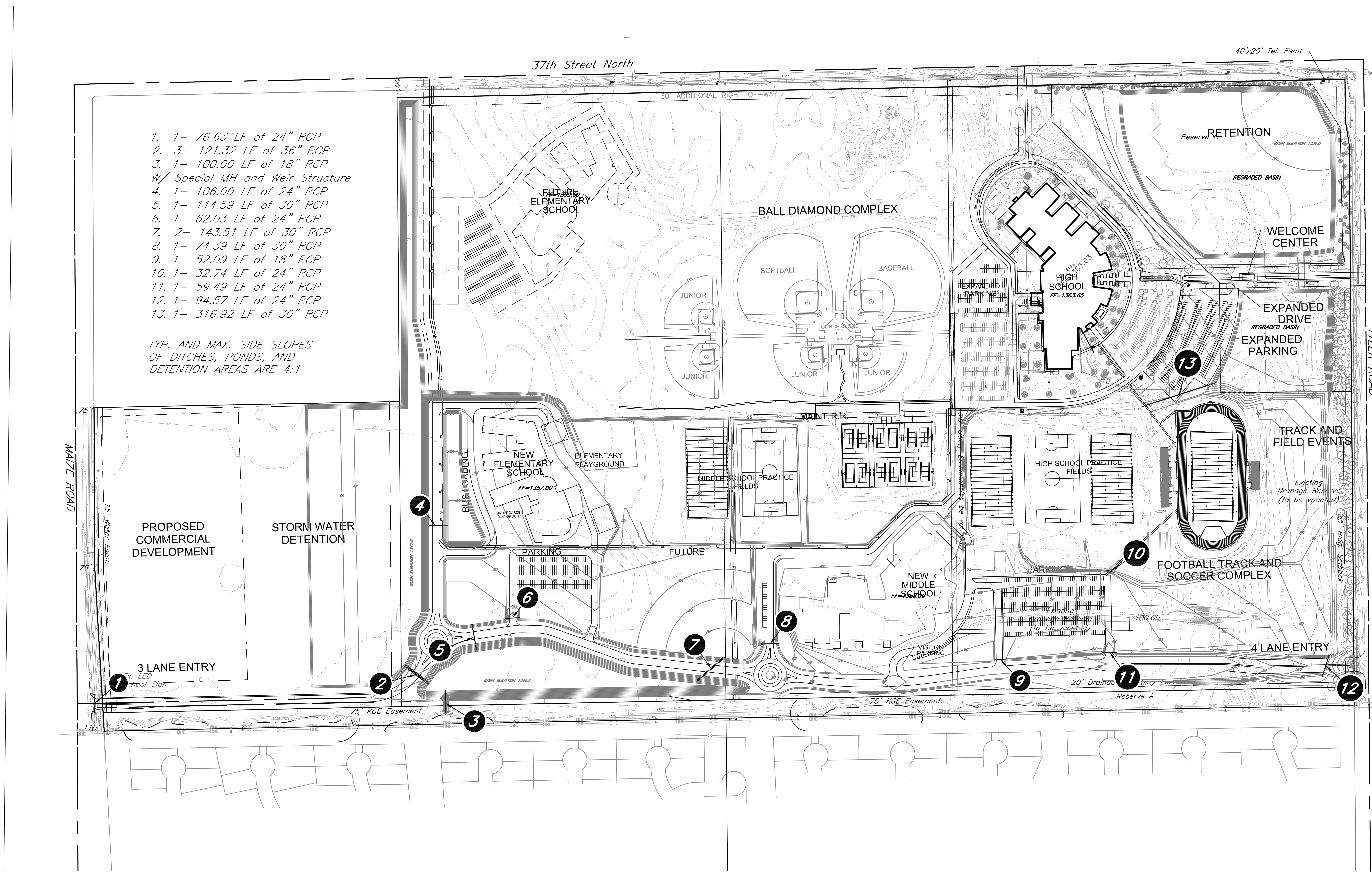
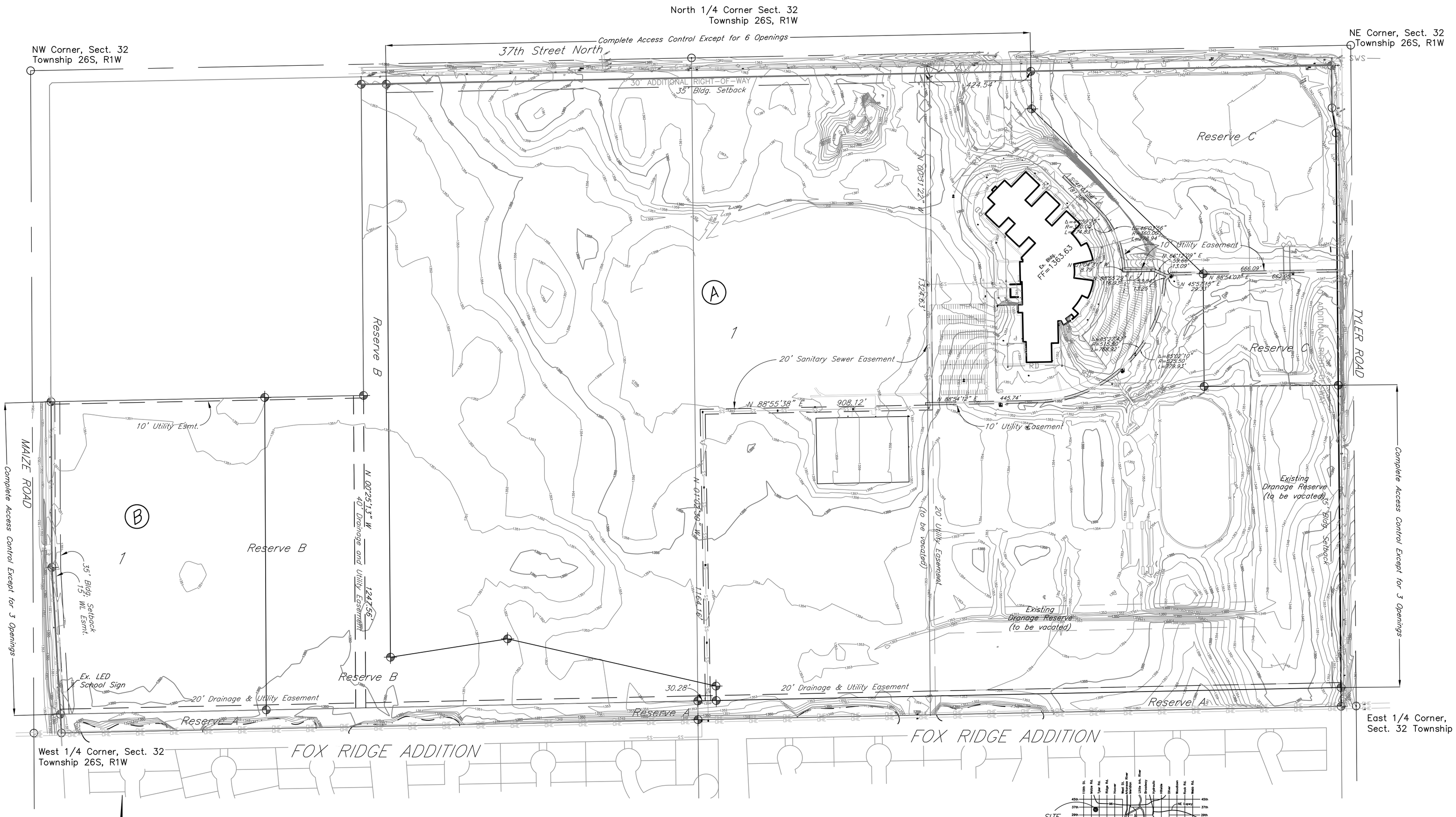

37th Street North
1. 1– 76.63 LF of 24" RCP
2. 3– 121.32 LF of 36" RCP
3. 1– 100.00 LF of 18" RCP
W/ Special MH and Weir Structure
4. 1– 106.00 LF of 24" RCP
5. 1– 114.59 LF of 30" RCP
6. 1– 62.03 LF of 24" RCP
7. 2– 143.51 LF of 30" RCP
8. 1– 74.39 LF of 30" RCP
9. 1– 52.09 LF of 18" RCP
10. 1– 32.74 LF of 24" RCP
11. 1– 59.49 LF of 24" RCP
12. 1– 94.57 LF of 24" RCP
13. 1– 316.92 LF of 30" RCP
TYP. AND MAX. SIDE SLOPES OF DITCHES, PONDS, AND DETENTION AREAS ARE 4:1
30' ADDITIONAL RIGHT-OF-WAY
FUTURE ELEMENTARY SCHOOL
BALL DIAMOND COMPLEX
SOFTBALL
BASEBALL
JUNIOR
JUNIOR
JUNIOR
JUNIOR
RETENTION
REGRADED BASIN
WELCOME CENTER
HIGH SCHOOL
FF=1363.65
EXPANDED PARKING
EXPANDED DRIVE
REGRADED BASIN
EXPANDED PARKING
TYLER ROAD
MAIZE ROAD
15' Water Esmt.
PROPOSED COMMERCIAL DEVELOPMENT
STORM WATER DETENTION
3 LANE ENTRY
BUS LOADING
NEW ELEMENTARY SCHOOL
FF=1357.00
ELEMENTARY PLAYGROUND
MIDDLE SCHOOL PRACTICE FIELDS
MAINT. R.R.
HIGH SCHOOL PRACTICE FIELDS
TRACK AND FIELD EVENTS
Existing Dranage Reserve (to be vacated)
PARKING
FUTURE
NEW MIDDLE SCHOOL
PARKING
FOOTBALL TRACK AND SOCCER COMPLEX
Existing Dranage Reserve (to be vacated)
100.00'
VISITOR PARKING
4 LANE ENTRY
75' KGE Easement
Reserve A
40'x20' Tel. Esmt.
35' Bldg. Setback
1
2
3
4
5
6
7
8
9
10
11
12
13

ONE-STEP PLAT OF
MAIZE SCHOOL SOUTH CAMPUS ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS



200 100 0 200

(IN FEET)
1 inch = 200 ft.

LEGEND

- Fire Hydrant
- Light Pole
- Pine Tree
- Power Pole
- Telephone Pedestal
- Tree
- Water Meter
- Water Valve
- RW Marker (found)
- ½" Iron Pipe (found)
- 5/8" Rebar (set) KEMPA CLS #157

Benchmarks:

¾" Moehring Cap, being West ¼ Corner of Section 32, west side of Maize Road.
Elev. = 1353.00

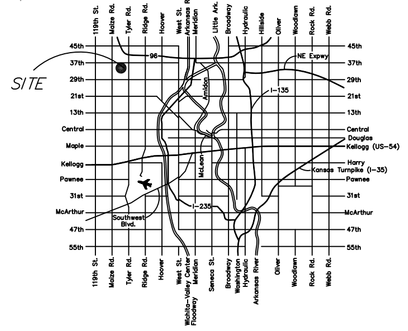
SGCO Marker, North ¼ Corner of Section 32, Center of 37th North.
Elev. = 1361.98

¾" Moehring Cap, being East ¼ Corner of Section 32, center of Tyler Road.
Elev. = 1361.25

Temp. RE #1, 14.5' South of LP, 138' West of NW corner of Building.
Elev. = 1359.94

Temp. RE #2, 250' W and 68' S of SW corner of Building, center of second row parking stripes.
Elev. = 1352.64

Temp. RE #3, 10' S of LP in SE Parking lot, 135' NE of sidewalk W, 335' E & 34' N of SE corner of Building.
Elev. = 1352.92



LOCATION MAP

Filename: 07081 MAIZE SCHOOL PLAT

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516 S. Market, Wichita, KS 67202 316/264-0242

CITY OF WICHITA

CONSTRUCTION POLLUTION PREVENTION PLAN

SITE DESCRIPTION

Project Name and Location	Maize South Campus South Side of 37th Between Tyler & Maize Wichita, Kansas	Owner Name and Address	James Baker USD 266 Maize 201 S Park Maize, Ks 67101
Project Description: Purpose and Type of Activity	New Maize School Facilities		
Site Area & Disturbed Area	Total Site Area = 270 Acres Distrurbed Area = 205 Acres		

Sequence of Major Activities

Phase 1: Strip existing soil and replace with selected backfill
Phase 2: Construction of utilities
Phase 3: Installation of Fire Lane and starting construction on the building
Phase 4: Building completion, final grading.

Feature Discharged To	City of Wichita Storm Sewer System

CONTROL MEASURES

Erosion and Sediment Control

Stabilization Practices

1. Hay bales and/or silt fence will be used at newly excavated areas to control soil erosion and to prevent silt for access into drainage system.
2. Silt fence and Ditch Checks will be installed to prevent sediment to enter the detention pond east of this project, until disturbed areas have been seeded and grass will hold silt.
3. Permanent seeding or sod will be performed when areas behind curbs have been final graded.

Stormwater Runoff Management

The above mentioned stormwater prevention methods will be monitored daily and maintained as required. A weekly erosion control log will be posted in the job trailer onsite, and updated weekly.
The project will evolve as the design of each school site is finalized. Each school will need a detailed erosion control plan in place prior to starting construction on its site. The detailed plan may be included under the initial permit as long as the detailed plan is approved by the city of Wichita.

OTHER CONTROL MEASURES

Waste Material Disposal

All construction material will be disposed to the appropriate landfill.

Excess dirt will be wasted at site determined by contractor.

Offsite Vehicle Tracking Control

1. All traffic possible will be diverted away from the immediate construction areas so that any tracking of mud will be kept to a minimum.
2. Where traffic must cross construction site, asphalt milling or crushed rock will be placed to prevent tracking.
3. Where mud tracking becomes a problem, alternate methods will be assessed & used.
4. Where mud tracking occurs, cleanup operations will be completed as soon as possible, but no later than the end of the business day.

Concrete Truck Washout

Concrete trucks will be permitted to wash out only at approved locations, then maintain and clean up as conditions require, by contractor.

OTHER CONTROL MEASURES (cont.)

Hazardous Waste

No hazardous materials are expected to be encountered.

Any spills (diesel, fuel, oil, etc.) will be cleaned up and removed immediately

Sanitary Waste

Portable toilets will be supplied and maintainted at various sites along the project. Disposal of sewage will be handled by a contracting firm specializing in this activity.

TIMING OF CONTROL MEASURES

Silt fence will be installed prior to dirt excavation. The installation of a construction entrance is required prior to the installation of the driveway & parking.
Gravel bags and/or silt fence will be installed around inlets as soon as inlets are constructed and in use. A three inch freeboard will be maintained behind curbs when necessary or immediately after curbs are backfilled.

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control and Maintenance Practices

1. Weekly Inspection and maintenance will be provided for silt barriers to control sediment from reaching storm drain basin.
2. Additional inspection and maintenance will be provided when .5" or more rain occurs. These inspections will be conducted within a 24 hour period after the rain event.
3. A log book showing the following will be kept at the field office:
   a. Dates of inspection
   b. Date and corrective action accomplished.

Non-Storm Water Discharges

1. Dewatering of storm water in the construction area will be thru silt barriers into storm drains
2. To control water used for saw cutting, this water will be directed to the nearest curb inlet and thru silt barrier into storm sewer. Sweeping of the work area will be done after work area is dry.

Inventory for Pollution Prevention Plan

1. Gravel filled tubes for curb inlet sediment barriers will be stored onsite. Enough sand bags will be on hand to replace two (2) inlets in an emergency situation.
2. Ten (10) bales of straw are to be kept on site
3. Twenty Five (25) feet of silt fence will be kept on site for emergency.

Spill Prevention

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills and other accidental exposure of materials and substances to storm water runoff.

Good Housekeeping: The following good housekeeping practices will be followed onsite during construction of the project:

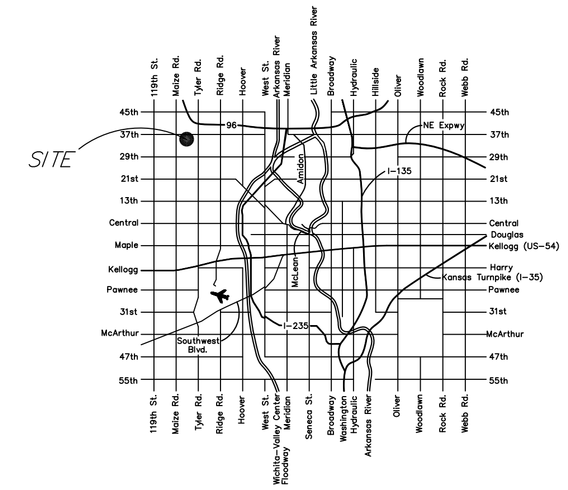
1. Prompt removal of silt build up at the barriers when required.
2. Cleanup silt buildup on paved areas for job cleanliness.
3. Placing of sand and rock barriers near as possible to work area, and install same barriers near inlets as quick as possible should minimize any material migration to the storm sewer system.
4. Because of the limited storage area for this site, all other material will be transported from yard as need arises.

Hazardous Products:	The following Practices will be used to reduce the risk associated with hazardous materials:

No hazardous products are expected to be encountered with the possible exception of fueling, oil and greasing of equipment.

Spill Control Practices

When fueling, oiling and greasing of equipment, use the best equipment possible to accomplish these jobs. But if a spill were to occur, our policy would be to contain the area to the smallest area possible and call in our hazmat team for cleanup.



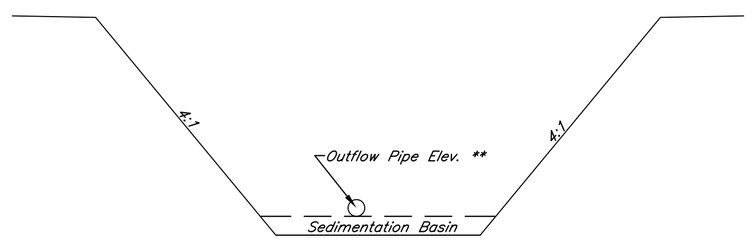
LOCATION MAP

General Notes

1. This standard detail sheet is a part of your building permit. The BMP's shown on this sheet are considered minimum standards. Whenever sediment enters the streets, storm sewers, ditches, or ponds, contractor will install additional BMP's, as needed, to correct the problem.
2. Follow these general principals on all commercial building sides.
3. The soil erosion BMP's shown hereon must be in place at all times during construction until such time as the site is re-established with paving or grass.
4. Any mud inadvertently tracked onto any street will be cleaned up by the general contractor at the end of each day's work.
5. Failure to install, protect, and maintain BMP's are violations of Section 16.32 of the City Code and will subject the contractor to the penalties provided therein. Included with your permit is an orange "notice" sign that must be posted on-site in a conspicious place at all times during construction. This sign is provided to asisst you in the maintenance of BMP'S.
6. Back of Curb Protection: Can include hay bale, silt fence, or Curlex barrier, as shown on City BMP standard details. This BMP must remain in place until the area between the curb and right-of-way line has been permanently stabilized.
7. The General Contractor is responsible for the installation and maintenance per the prevention maintenance plan.

LEGEND

- Flow Direction
- IP — Inlet Protection – to be provided at all inlets subject to silt laden runoff.
- Silt Fence – to be installed along property lines where runoff from construction site can run onto other properties.
- HB — Hay Bail Ditch Check
- Single Net Erosion Blanket
- SCE — Stabilized Construction Entrance – to be used at all locations where vehicles or equipment enter or exit property.



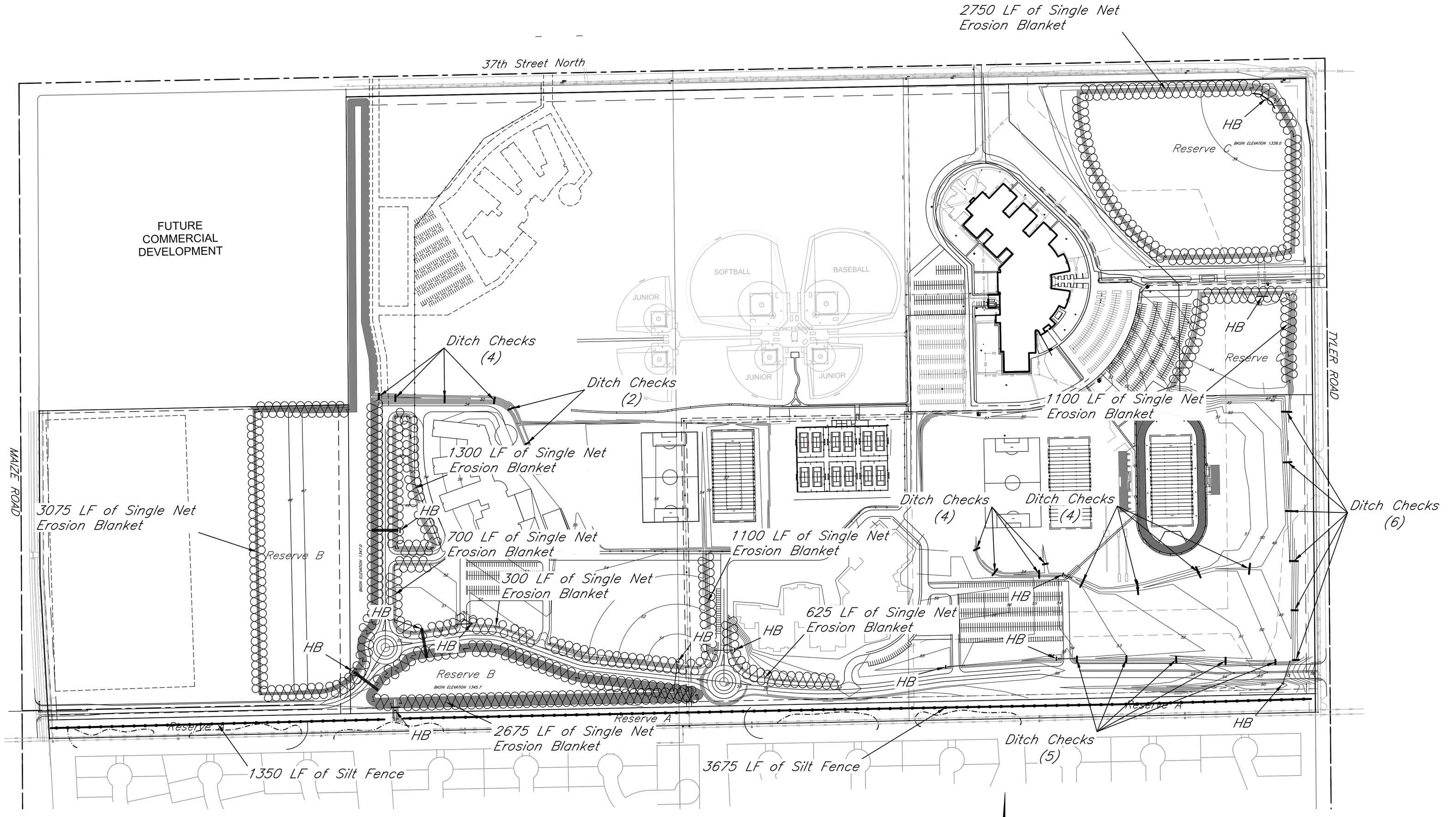
Typical Pond Section

** Elev. 1' above Sediment Basin Bottom

Maize Schools South Campus
Erosion Plan
Wichita, KS

kemiller engineering
516 S. Market,
Wichita, KS 67202
316/264-0242

PROJECT NUMBER			
KEM NO. 07081	FILE erosion	DATE 11/2007	SHEET 1
DESIGN KM	DRAWN NS	REVISED	OF 2



Preliminary
Not for Construction

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

Maize Schools South Campus
Erosion Plan
Wichita,Kansas

kemiller engineering
516 S. Market,
Wichita, KS 67202
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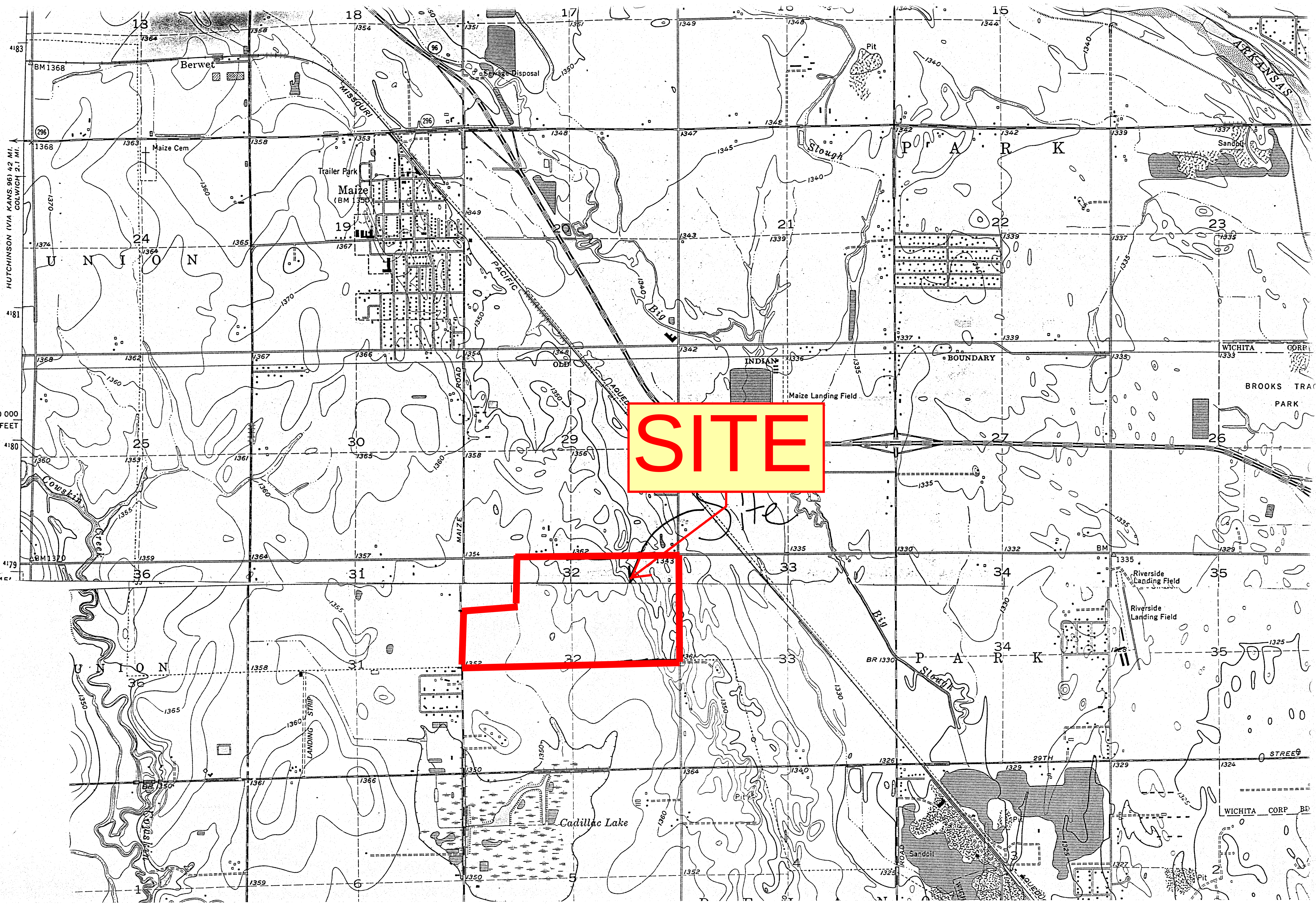
PROJECT NUMBER			
KEM NO. 07081	FILE erosion	DATE 11/2007	SHEET 2
DESIGN KM	DRAWN NS	REVISED	OF 2



SITE
Site
Berwet
Maize
Maize Cem
Trailer Park
Sewage Disposal
MISSOURI
PACIFIC
AQUEDUCT
OLD
ROAD
MAIZE
INDIAN
BOUNDARY
Maize Landing Field
Riverside Landing Field
BROOKS TRACT
PARK
WICHITA CORP
ARKANSAS
Big Slough
Cowskin Creek
Cadillac Lake
LANDING STRIP
29TH
STREET
Sandpit
Pit
U N I O N
P A R K
HUTCHINSON (VIA KANS. 96) 42 MI.
COLWICH 2.1 MI.
400 000 FEET

Appendix B

Public Works, Eng. Div. Storm water checklist

Public Works, Engineering Division
Stormwater Management Subdivision Submittal Checklist

Reviewer:_____ Date:_____

Subdivision Name: Maize South Campus Add. Location: 37th and Maize

Total Land Area Of Ownership: 270 Acres

Type: X Residential _____Commercial _____Industrial _____Recreation _____Municipal _____Other

Applicant: USD 266 Maize Contact: James Baker Phone #: 729-8741

Engineer: K E Miller Eng. PA Contact: Kirk Miller Phone # 264-0242

Please check the appropriate box: I = Included; NA = Non-Applicable; R= Required prior to development

(If "NA" is checked, an explanation must be entered)

	Applicant			Engr	
Tab 1. Project Narrative	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Site Location Map, using USGS Map	X		App A		
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	X		Report		
C. Discussion of offsite conditions	X		Report		
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series	X		App A / App C		
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design	X		Report		
F. Copy of the plat	X		App A		
G. Prelim. four corner lot grading plan (The final grading plan shall be sealed, signed and dated prior to Engineering receiving the final paving and stormwater drain plans.One plan sheet and PDF shall be submitted to the Subdivision Engineer.)	X		App A		
H. Professional Engineer seal, signature and date on cover of report	X				
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover	X				

	Applicant			Engr	
Tab 2. Existing Conditions Runoff Calculations	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)	X		App A		
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)	X		App A		
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)	X		App A		
D. Total Site Area and Total Impervious Area (acres)	X		App A		
E. Benchmarks used for site control	X		App A		
F. Streams, creeks, and waterway labeled		X			
G. Predominant soils from USDA soil surveys, and/or on site soil borings	X		Report/App A		
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted		X	Plan		
I. Location of existing roads, buildings, parking lots and other impervious areas	X		Plan		

Consulting Engineer Initials PB

J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements	X		Plan		
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X		Plan		
L. Flow paths	X		Plan		
M. Location and dimensions of existing channels, bridges or culvert crossings	X		Plan		
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration	X		Plan		
O. Assumed pre-developed runoff curve numbers	X		Plan		
P. Existing time of concentrations used in calculations	X		Plan		
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	X		Plan/Report		
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)	X		Plan		
S. Cross-section data for open channels	X		App. A		
T. Ground water elevations, if applicable		X	Not Required		

	Applicant			Engr	
Tab 3. Post-Development Hydrologic Analysis	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable design storms (2, 5, 10, 25 & 100 year, 24-hour storm events)	X		Plan / App. A		
B. Proposed time of concentrations used in calculations	X		Plan / App. A		
C. Assumed post-developed runoff curve numbers	X		Plan / App. A		
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)	X		Plan / App. A		
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration	X		Plan / App. A		
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities	X		Plan / App. A		
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary	X		Report		
H. Dam safety analysis, where necessary		X	Not Applicable		
I. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)	X		Plan		
J. Design water surface elevations and normal pool elevation for ponds.	X		Plan / App. A		
K. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.	X		Plan		
L. Proposed limits of clearing and grading		X	Includes Entire Site		
M. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	X		Plan		
N. Location of existing and proposed utilities (e.g., water, sewer) and easements	X		Plan		
O. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X		Plan		
P. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings		X	No Downstream Improv		

Consulting Engineer Initials PB

Q. Preliminary selection and location of stormwater controls	X		Plan		
R. Emergency overflow structure's flow path	X		Plan		
S. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)	X		Plan		
T. The 100-year 24-hour HWL delineated on the plan for detention pond	X		Plan		
U. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds		X	Single Lot Plat		
V. Stormwater Management Facilities located within a Reserve	X		Plan / Report		
W. Maintenance of stormwater management facility specified in the platters text as the responsibility of the Homeowner or Business Association	X		Plat		
X. Off-site drainage easements or agreements required		X	KTA approval w/ COW Approvl		

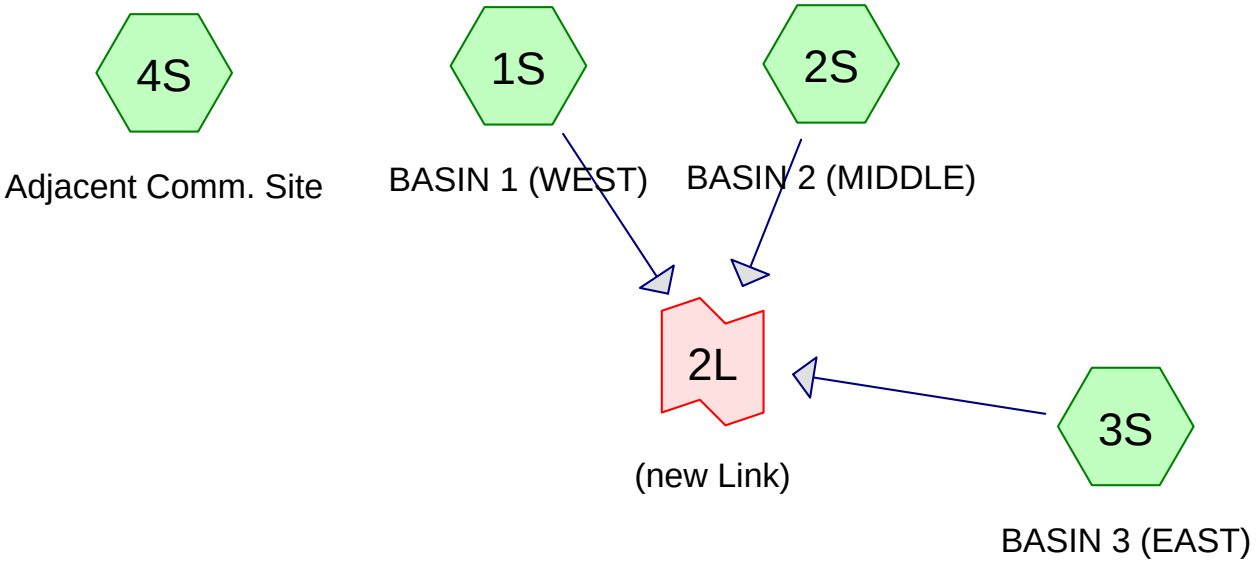
	Applicant			Engr	
Tab 4. Floodplain Submittal	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Provide source of flood profile		X			
B. Nearest base flood elevations		X			
C. Delineation of pre-developed regulatory floodplain/floodway limits		X			
D. Delineation of post-developed regulatory floodplain and floodway limits		X			
E. Floodplain boundary determination per elevation (project limits shown)		X			
F. Provide source of floodway data table and discharges		X			
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions		X			
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions		X			
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)		X			
J. Flood plains and floodways located within a Reserve		X			

	Applicant			Engr	
Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	**I/R**	**NA** X	**Explanation / Location in Plan**	**I/R**	**NA**
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)		X			
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)		X			
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) CLOMR shall be included and approved for fill placed in the regulatory floodway		X			
D. Kansas Department of Transportation		X			
E. Sedgwick County Right-of-way Permit		X			

Consulting Engineer Initials PB

Appendix C

Hydrological Analysis



Subcat Reach Pond Link

Drainage Diagram for PRE DEVELOPMENT rational 2yr
Prepared by {enter your company name here} 1/24/2008

Area Listing (all nodes)

Area (acres)	C	Description (subcats)
347.072	0.24	C Soil Conditions w/ less then 0.4% (1S,2S,3S,4S)
347.072		

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: BASIN 1 (WEST) Runoff Area=154.366 ac Runoff Depth=0.15"
Flow Length=3,760' Slope=0.0350 '/' Tc=296.0 min C=0.24 Runoff=14.25 cfs 1.884 af

Subcatchment 2S: BASIN 2 (MIDDLE) Runoff Area=77.605 ac Runoff Depth=0.24"
Flow Length=2,640' Slope=0.0150 '/' Tc=177.1 min C=0.24 Runoff=11.97 cfs 1.583 af

Subcatchment 3S: BASIN 3 (EAST) Runoff Area=77.299 ac Runoff Depth=0.32"
Flow Length=3,150' Slope=0.0350 '/' Tc=134.4 min C=0.24 Runoff=15.71 cfs 2.078 af

Subcatchment 4S: Adjacent Comm. Site Runoff Area=37.802 ac Runoff Depth=0.45"
Flow Length=1,460' Tc=95.5 min C=0.24 Runoff=10.76 cfs 1.423 af

Link 2L: (new Link) Inflow=41.93 cfs 5.545 af
Primary=41.93 cfs 5.545 af

Total Runoff Area = 347.072 ac Runoff Volume = 6.967 af Average Runoff Depth = 0.24"
100.00% Pervious Area = 347.072 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1S: BASIN 1 (WEST)

5 YEAR 0.27+.02
100 YEAR 0.51+.02

[48] Hint: Peak<CiA due to short duration

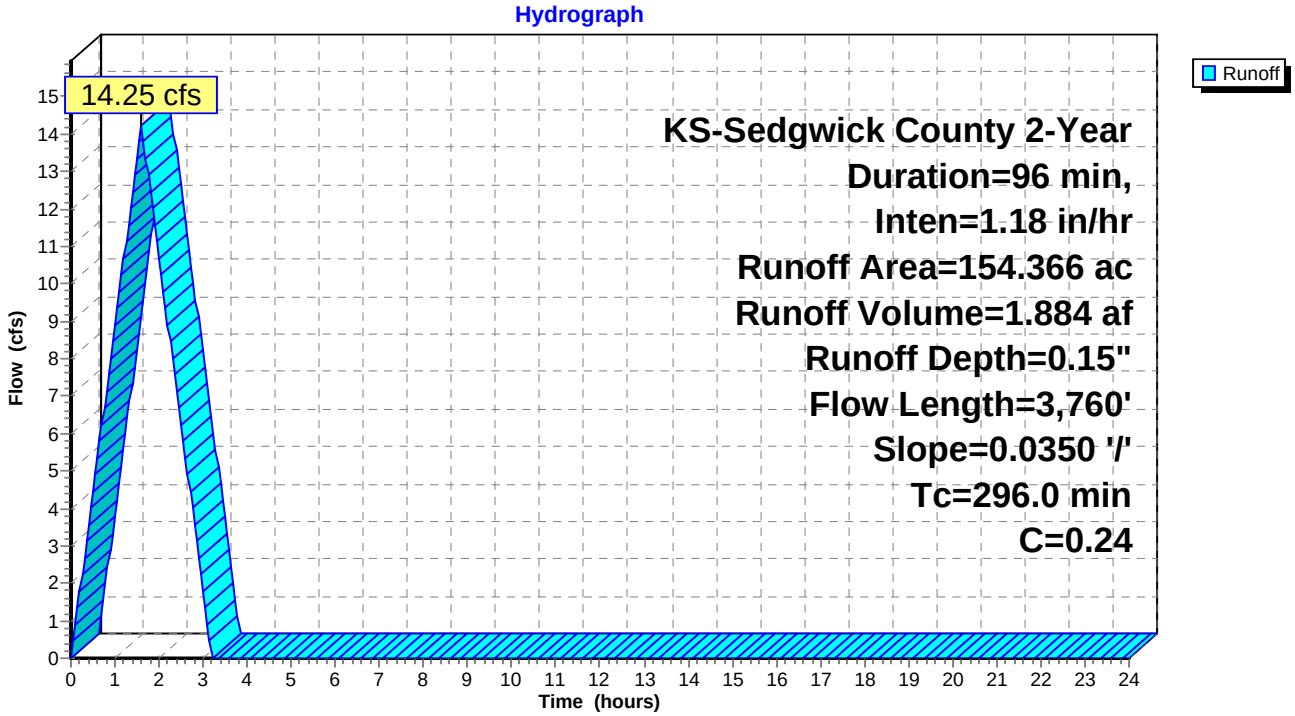
Runoff = 14.25 cfs @ 1.60 hrs, Volume= 1.884 af, Depth= 0.15"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
154.366	0.24	C Soil Conditions w/ less then 0.4%
154.366	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	200	0.0350	0.29		**Sheet Flow,** Range n= 0.130 P2= 3.60"
109.5	2,300		0.35		**Direct Entry,**
175.0	1,260		0.12		**Direct Entry, Flat or ponding ground**
296.0	3,760	Total			

Subcatchment 1S: BASIN 1 (WEST)



Subcatchment 2S: BASIN 2 (MIDDLE)

5 YEAR 0.27+.02
100 YEAR 0.51+.02

[48] Hint: Peak<CiA due to short duration

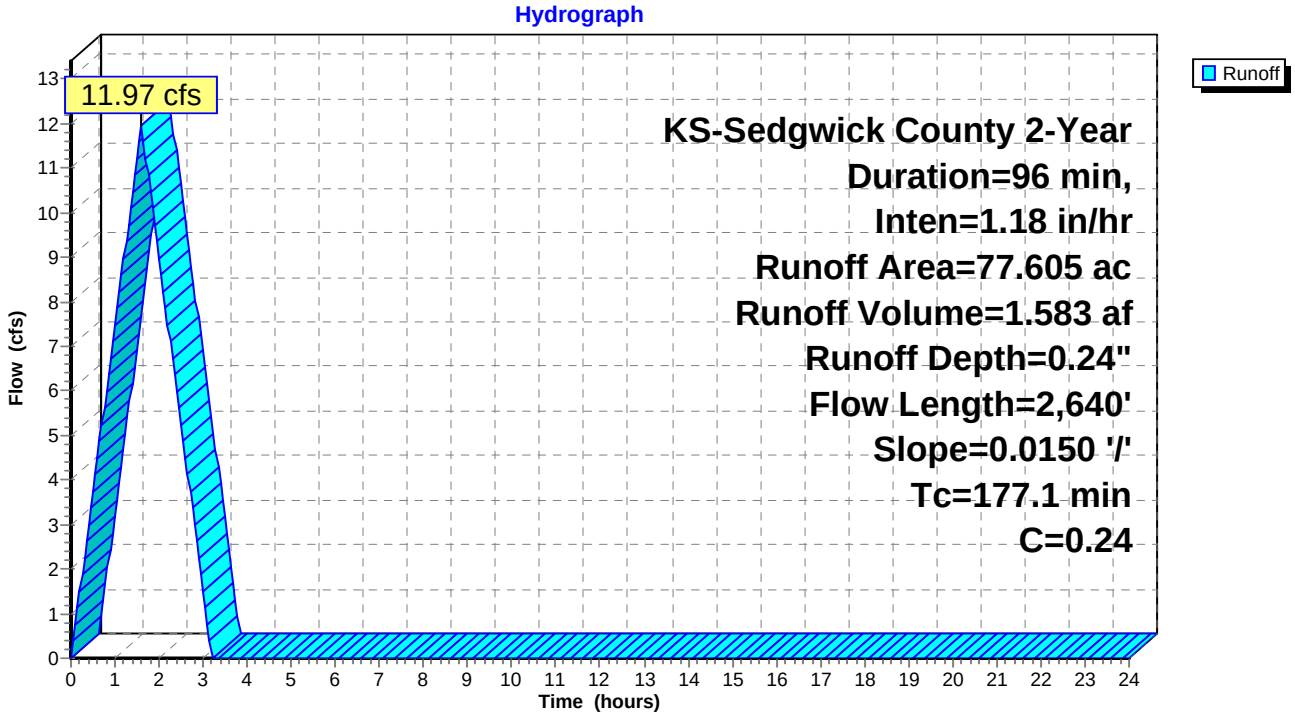
Runoff = 11.97 cfs @ 1.60 hrs, Volume= 1.583 af, Depth= 0.24"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
77.605	0.24	C Soil Conditions w/ less then 0.4%
77.605	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
87.7	2,000		0.38		**Direct Entry,**
73.3	440		0.10		**Direct Entry,**
177.1	2,640	Total			

Subcatchment 2S: BASIN 2 (MIDDLE)



Subcatchment 3S: BASIN 3 (EAST)

5 YEAR 0.27+.02
100 YEAR 0.51+.02

[48] Hint: Peak<CiA due to short duration

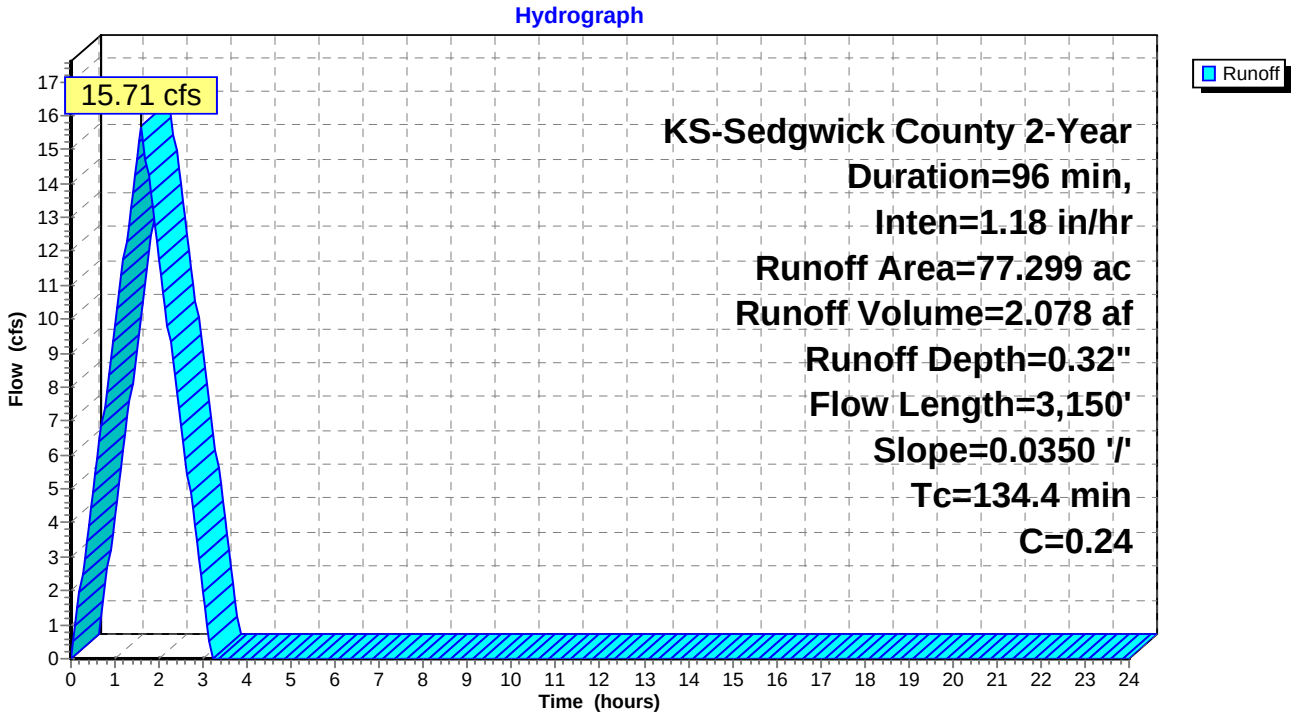
Runoff = 15.71 cfs @ 1.60 hrs, Volume= 2.078 af, Depth= 0.32"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
77.299	0.24	C Soil Conditions w/ less then 0.4%
77.299	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	200	0.0350	0.29		**Sheet Flow,** Range n= 0.130 P2= 3.60"
122.9	2,950		0.40		**Direct Entry,**
134.4	3,150	Total			

Subcatchment 3S: BASIN 3 (EAST)



Subcatchment 4S: Adjacent Comm. Site

5 YEAR .51
100 YEAR .66

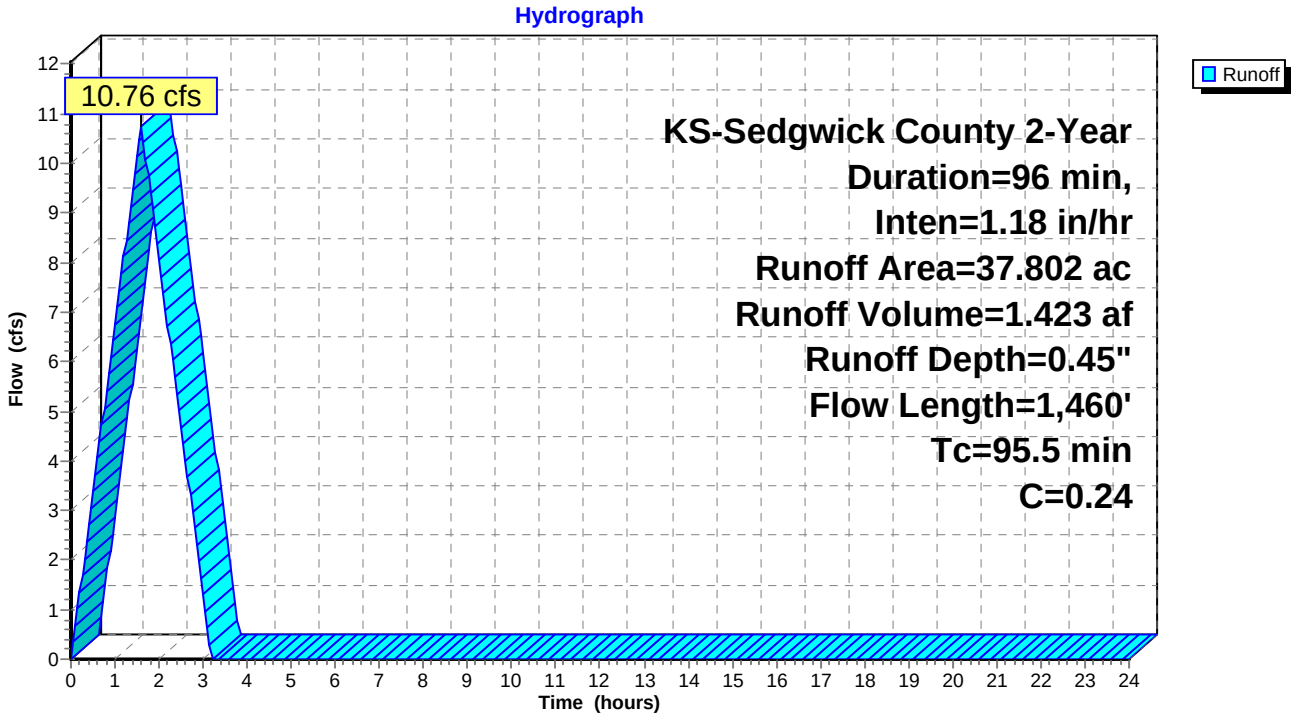
Runoff = 10.76 cfs @ 1.60 hrs, Volume= 1.423 af, Depth= 0.45"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
37.802	0.24	C Soil Conditions w/ less then 0.4%
37.802	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
79.4	1,260	0.0007	0.26		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
95.5	1,460	Total			

Subcatchment 4S: Adjacent Comm. Site

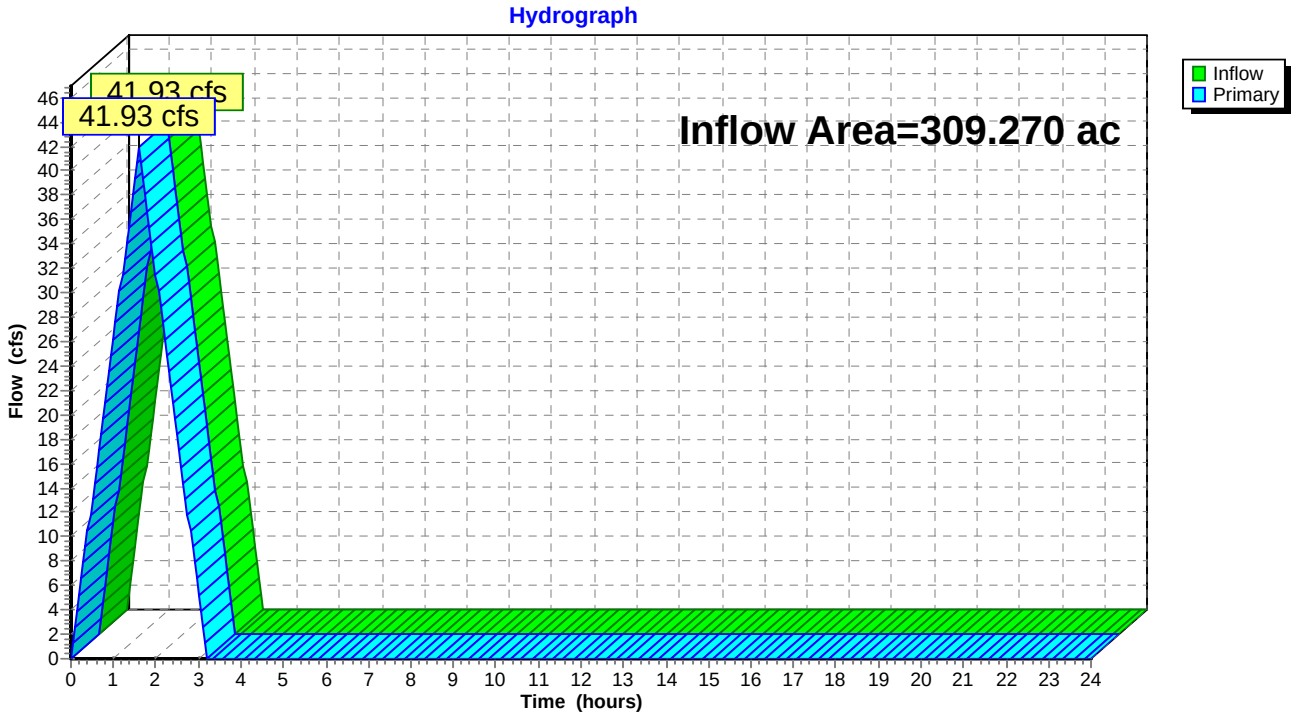


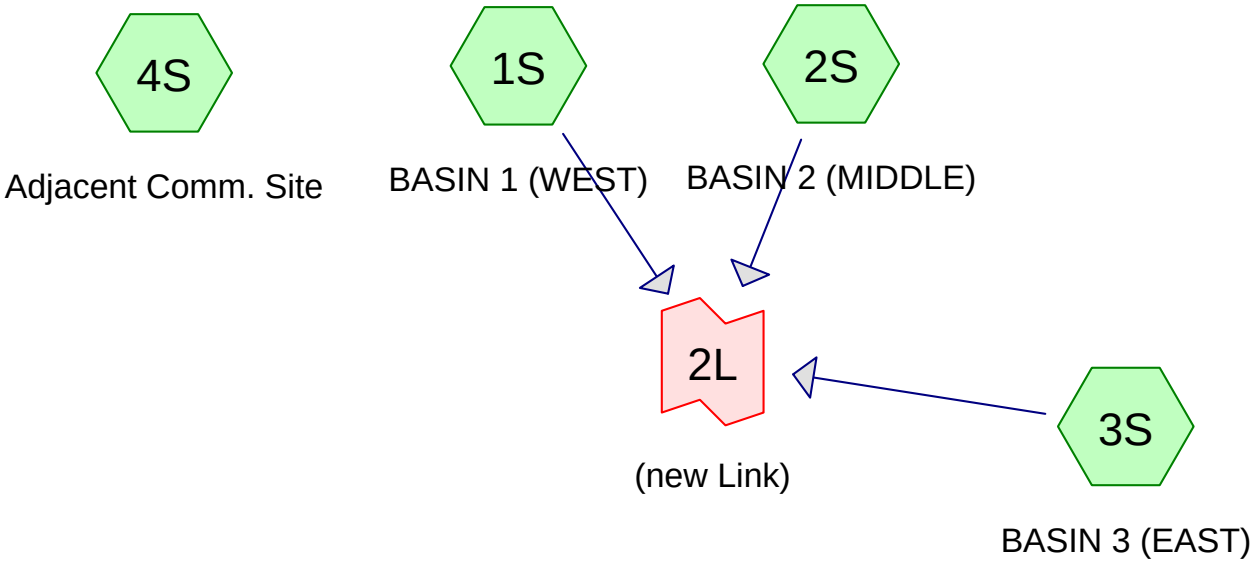
Link 2L: (new Link)

Inflow Area = 309.270 ac, Inflow Depth = 0.22" for 2-Year event
Inflow = 41.93 cfs @ 1.60 hrs, Volume= 5.545 af
Primary = 41.93 cfs @ 1.60 hrs, Volume= 5.545 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: (new Link)





Subcat Reach Pond Link

Drainage Diagram for PRE DEVELOPMENT rational 2yr
Prepared by {enter your company name here} 1/24/2008

Area Listing (all nodes)

Area (acres)	C	Description (subcats)
347.072	0.24	C Soil Conditions w/ less then 0.4% (1S,2S,3S,4S)
347.072		

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: BASIN 1 (WEST) Runoff Area=154.366 ac Runoff Depth=0.15"
Flow Length=3,760' Slope=0.0350 '/' Tc=296.0 min C=0.24 Runoff=14.25 cfs 1.884 af

Subcatchment 2S: BASIN 2 (MIDDLE) Runoff Area=77.605 ac Runoff Depth=0.24"
Flow Length=2,640' Slope=0.0150 '/' Tc=177.1 min C=0.24 Runoff=11.97 cfs 1.583 af

Subcatchment 3S: BASIN 3 (EAST) Runoff Area=77.299 ac Runoff Depth=0.32"
Flow Length=3,150' Slope=0.0350 '/' Tc=134.4 min C=0.24 Runoff=15.71 cfs 2.078 af

Subcatchment 4S: Adjacent Comm. Site Runoff Area=37.802 ac Runoff Depth=0.45"
Flow Length=1,460' Tc=95.5 min C=0.24 Runoff=10.76 cfs 1.423 af

Link 2L: (new Link) Inflow=41.93 cfs 5.545 af
Primary=41.93 cfs 5.545 af

Total Runoff Area = 347.072 ac Runoff Volume = 6.967 af Average Runoff Depth = 0.24"
100.00% Pervious Area = 347.072 ac 0.00% Impervious Area = 0.000 ac

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5 YEAR 0.27+.02
100 YEAR 0.51+.02

[48] Hint: Peak<CiA due to short duration

Runoff = 14.25 cfs @ 1.60 hrs, Volume= 1.884 af, Depth= 0.15"

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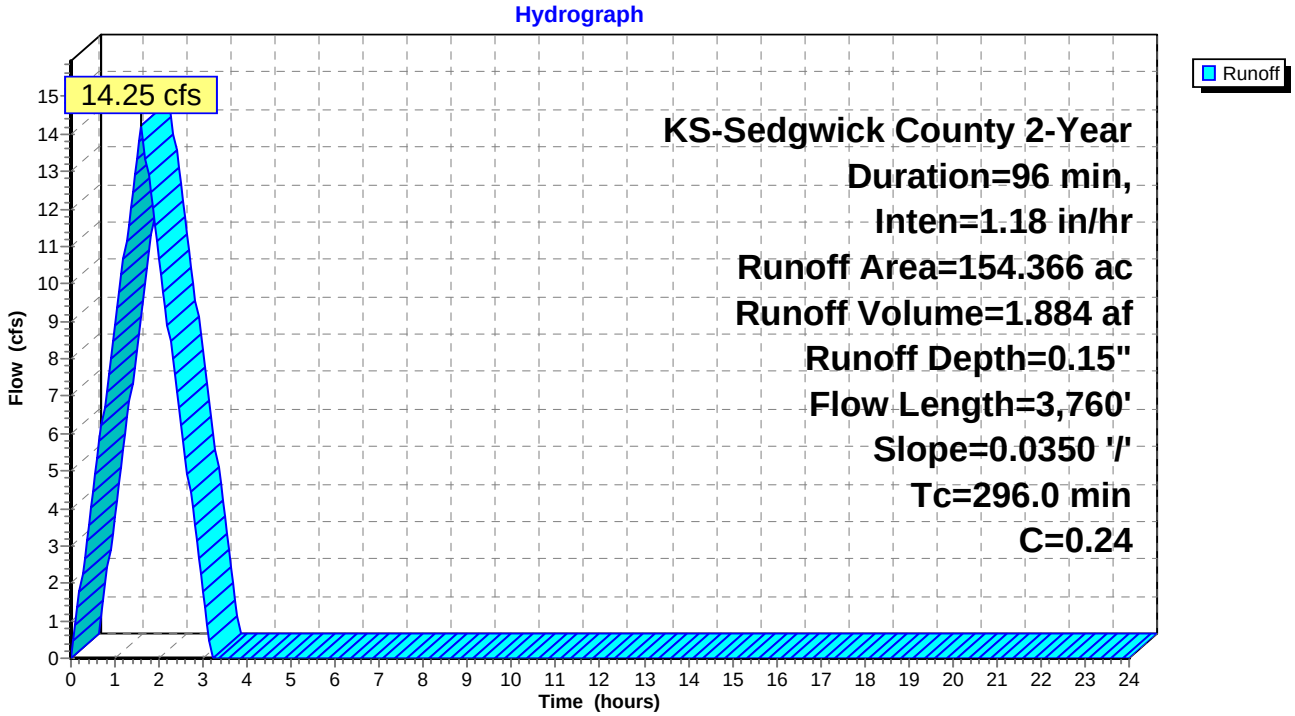
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
154.366	0.24	C Soil Conditions w/ less then 0.4%
154.366	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	200	0.0350	0.29		**Sheet Flow,** Range n= 0.130 P2= 3.60"
109.5	2,300		0.35		**Direct Entry,**
175.0	1,260		0.12		**Direct Entry, Flat or ponding ground**
296.0	3,760	Total			

Subcatchment 1S: BASIN 1 (WEST)



Subcatchment 2S: BASIN 2 (MIDDLE)

5 YEAR 0.27+.02
100 YEAR 0.51+.02

[48] Hint: Peak<CiA due to short duration

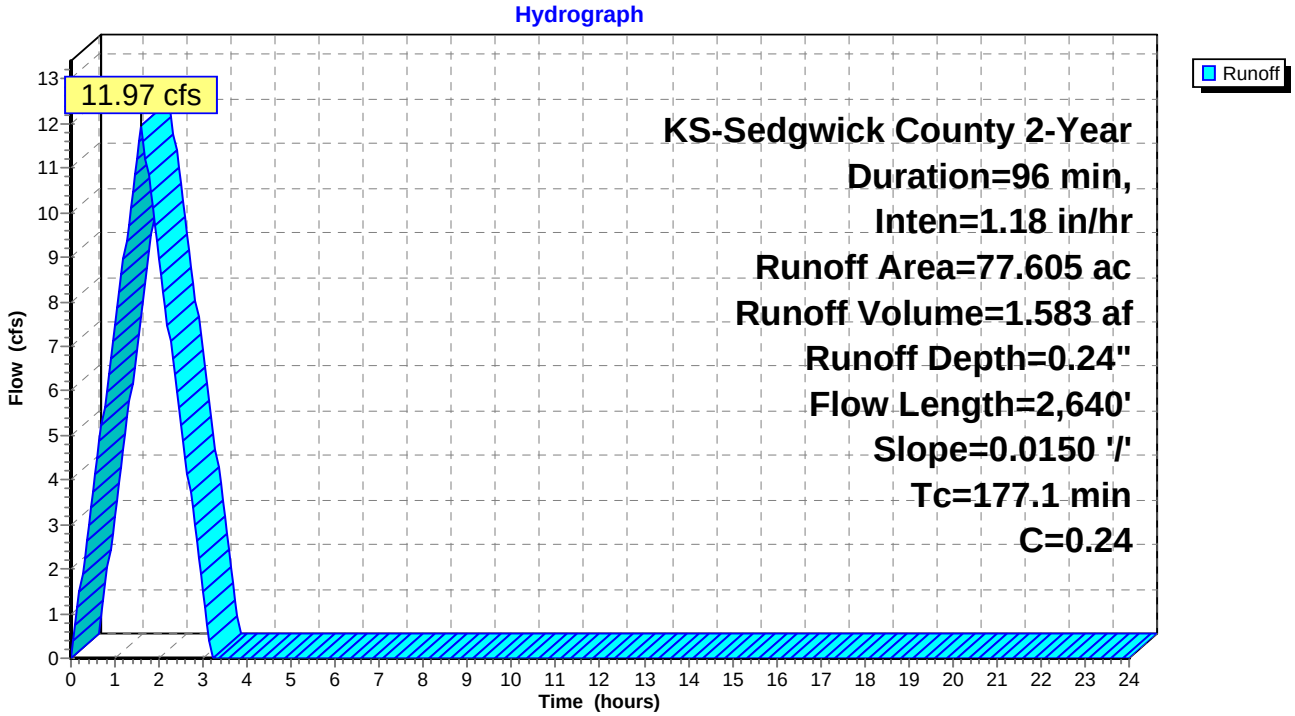
Runoff = 11.97 cfs @ 1.60 hrs, Volume= 1.583 af, Depth= 0.24"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
77.605	0.24	C Soil Conditions w/ less then 0.4%
77.605	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
87.7	2,000		0.38		**Direct Entry,**
73.3	440		0.10		**Direct Entry,**
177.1	2,640	Total			

Subcatchment 2S: BASIN 2 (MIDDLE)



Subcatchment 3S: BASIN 3 (EAST)

5 YEAR 0.27+.02
100 YEAR 0.51+.02

[48] Hint: Peak<CiA due to short duration

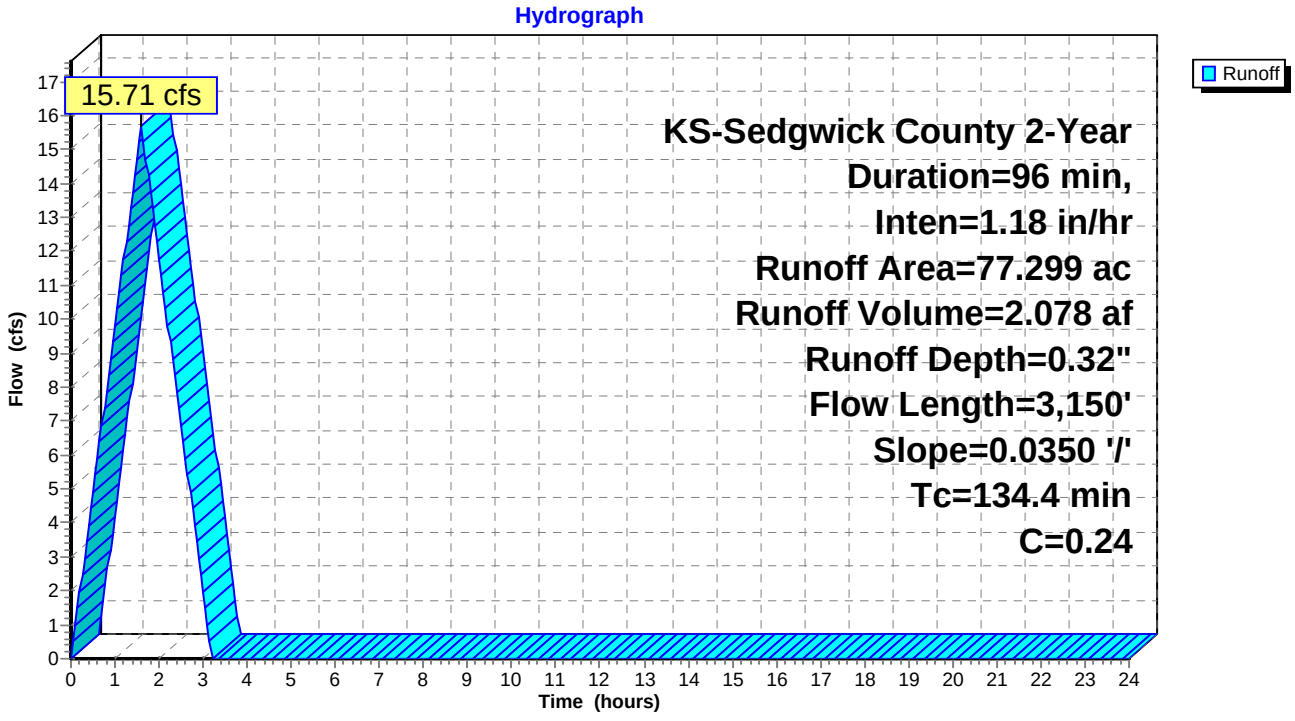
Runoff = 15.71 cfs @ 1.60 hrs, Volume= 2.078 af, Depth= 0.32"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
77.299	0.24	C Soil Conditions w/ less then 0.4%
77.299	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	200	0.0350	0.29		**Sheet Flow,** Range n= 0.130 P2= 3.60"
122.9	2,950		0.40		**Direct Entry,**
134.4	3,150	Total			

Subcatchment 3S: BASIN 3 (EAST)



Subcatchment 4S: Adjacent Comm. Site

5 YEAR .51
100 YEAR .66

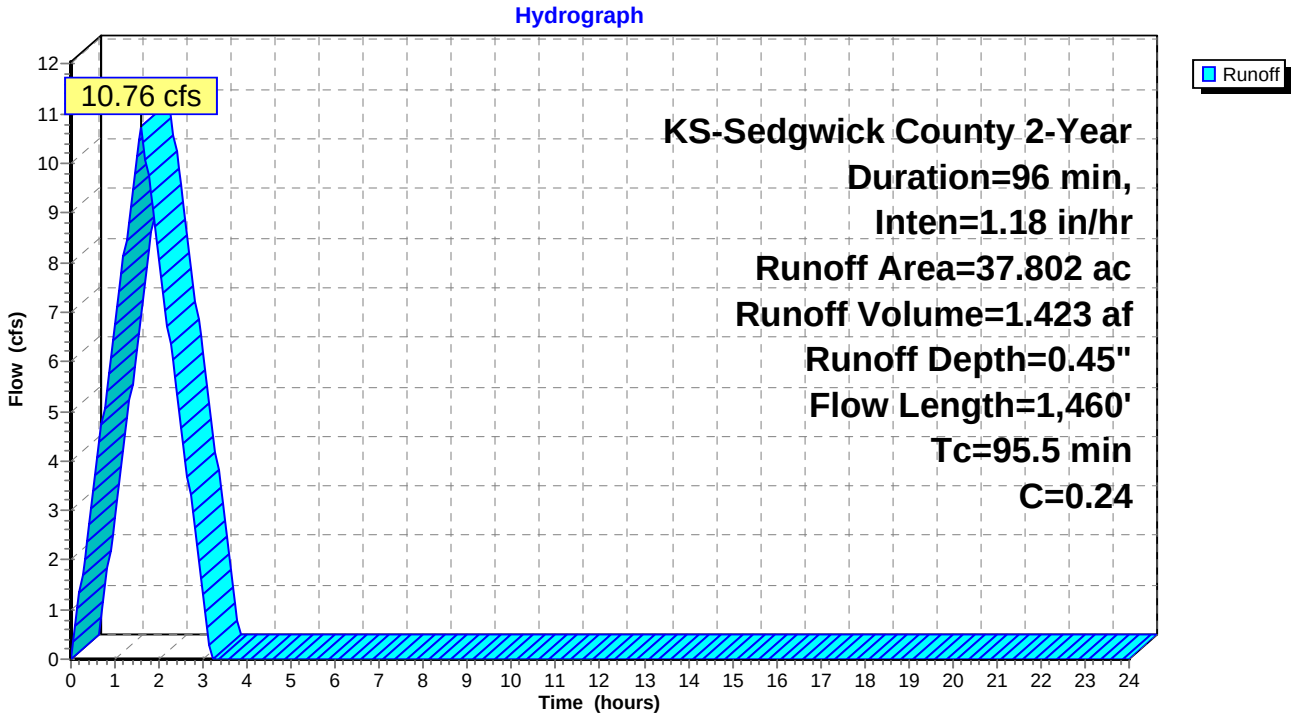
Runoff = 10.76 cfs @ 1.60 hrs, Volume= 1.423 af, Depth= 0.45"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
KS-Sedgwick County 2-Year Duration=96 min, Inten=1.18 in/hr

Area (ac)	C	Description
37.802	0.24	C Soil Conditions w/ less then 0.4%
37.802	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
79.4	1,260	0.0007	0.26		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
95.5	1,460	Total			

Subcatchment 4S: Adjacent Comm. Site

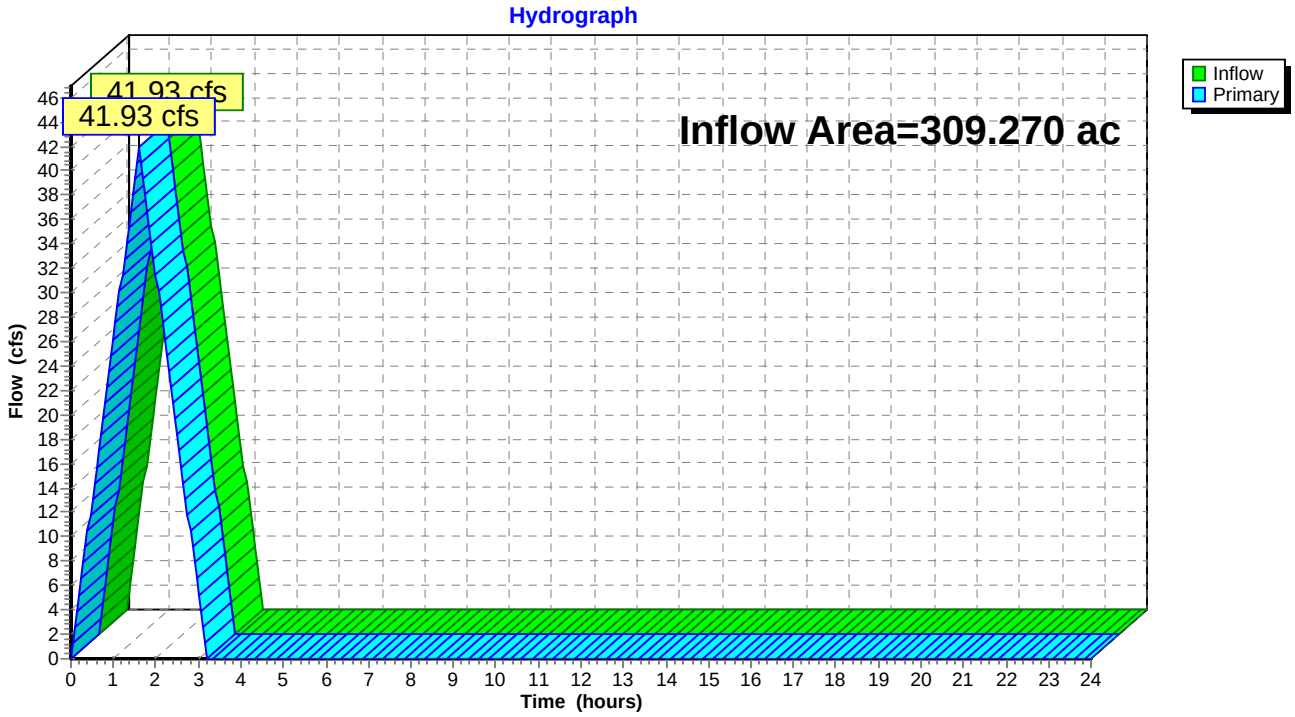


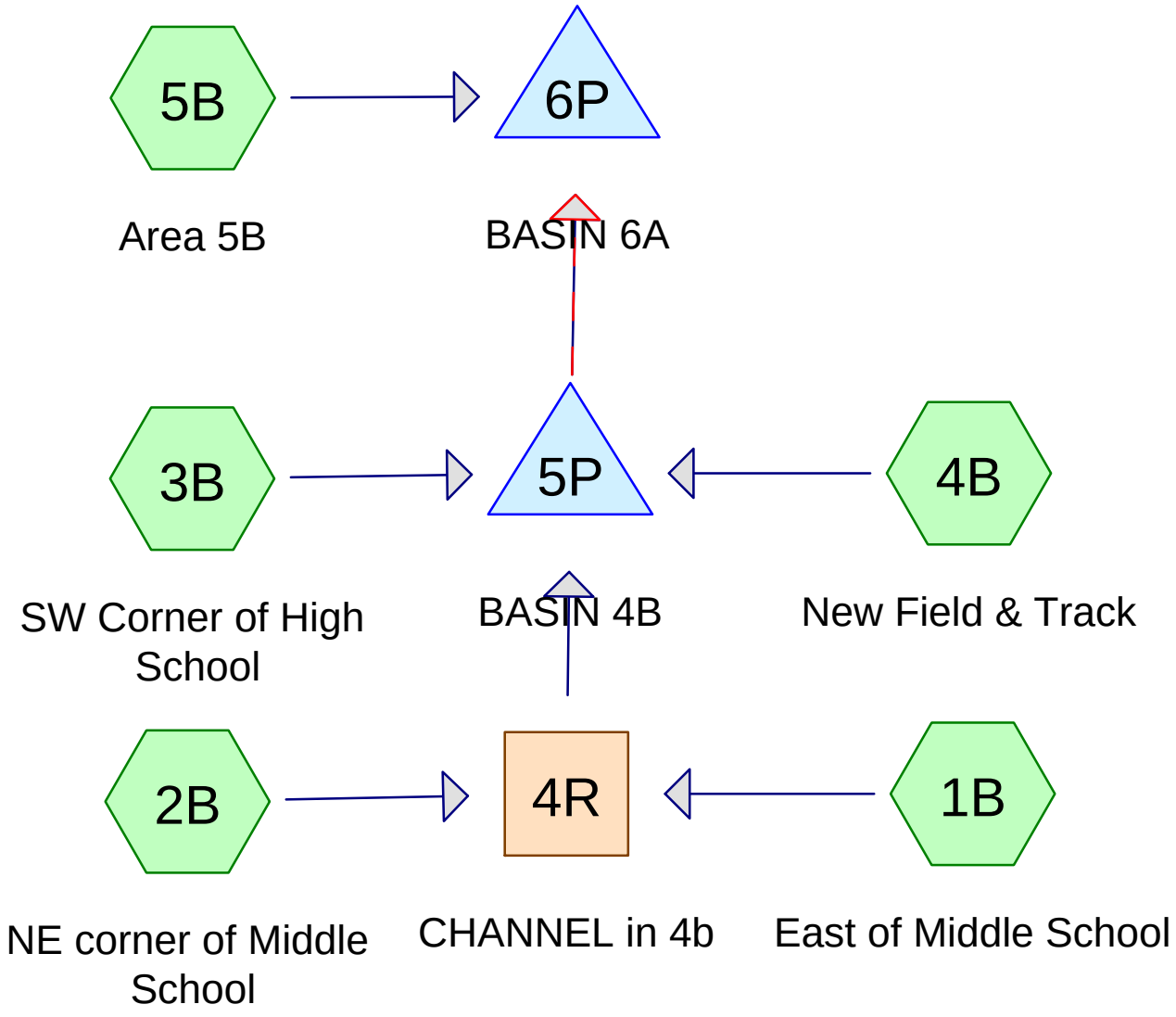
Link 2L: (new Link)

Inflow Area = 309.270 ac, Inflow Depth = 0.22" for 2-Year event
Inflow = 41.93 cfs @ 1.60 hrs, Volume= 5.545 af
Primary = 41.93 cfs @ 1.60 hrs, Volume= 5.545 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: (new Link)





Subcat Reach Pond Link

Drainage Diagram for Post B 2yr

Prepared by {enter your company name here} 1/24/2008

Area Listing (all nodes)

Area (acres)	C	Description (subcats)
22.393	0.24	Detention Area (5B)
25.855	0.24	School Property (4B)
14.623	0.49	C Soil Conditions w/ 1% to 4% (1B)
11.478	0.49	High School (5B)
43.228	0.49	School Property (2B,3B)
117.577		

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1B: East of Middle School Runoff Area=14.623 ac Runoff Depth=1.39"
Flow Length=500' Tc=25.3 min C=0.49 Runoff=2.27 cfs 1.688 af

Subcatchment 2B: NE corner of Middle School Runoff Area=9.408 ac Runoff Depth=1.39"
Flow Length=800' Slope=0.0040 '/' Tc=25.7 min C=0.49 Runoff=1.46 cfs 1.086 af

Subcatchment 3B: SW Corner of High School Runoff Area=33.820 ac Runoff Depth=1.39"
Flow Length=2,000' Slope=0.0040 '/' Tc=39.5 min C=0.49 Runoff=5.25 cfs 3.904 af

Subcatchment 4B: New Field & Track Runoff Area=25.855 ac Runoff Depth=0.68"
Flow Length=400' Slope=0.0040 '/' Tc=15.7 min C=0.24 Runoff=1.97 cfs 1.462 af

Subcatchment 5B: Area 5B Runoff Area=33.871 ac Runoff Depth=0.90"
Flow Length=850' Tc=18.4 min C=0.32 Runoff=3.43 cfs 2.553 af

Reach 4R: CHANNEL in 4b Avg. Depth=0.56' Max Vel=1.48 fps Inflow=3.73 cfs 2.774 af
n=0.026 L=1,200.0' S=0.0037 '/' Capacity=324.84 cfs Outflow=3.73 cfs 2.774 af

Pond 5P: BASIN 4B Peak Elev=1,344.08' Storage=1.929 af Inflow=10.94 cfs 8.139 af
Primary=10.59 cfs 8.139 af Secondary=0.00 cfs 0.000 af Outflow=10.59 cfs 8.139 af

Pond 6P: BASIN 6A Peak Elev=1,341.48' Storage=5.733 af Inflow=14.02 cfs 10.693 af
24.0" x 100.0' Culvert Outflow=7.52 cfs 9.420 af

Total Runoff Area = 117.577 ac Runoff Volume = 10.692 af Average Runoff Depth = 1.09"
100.00% Pervious Area = 117.577 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1B: East of Middle School

5 YEAR .51
100 YEAR .66

---

[70] Warning: Tc<8dt requires smaller dt

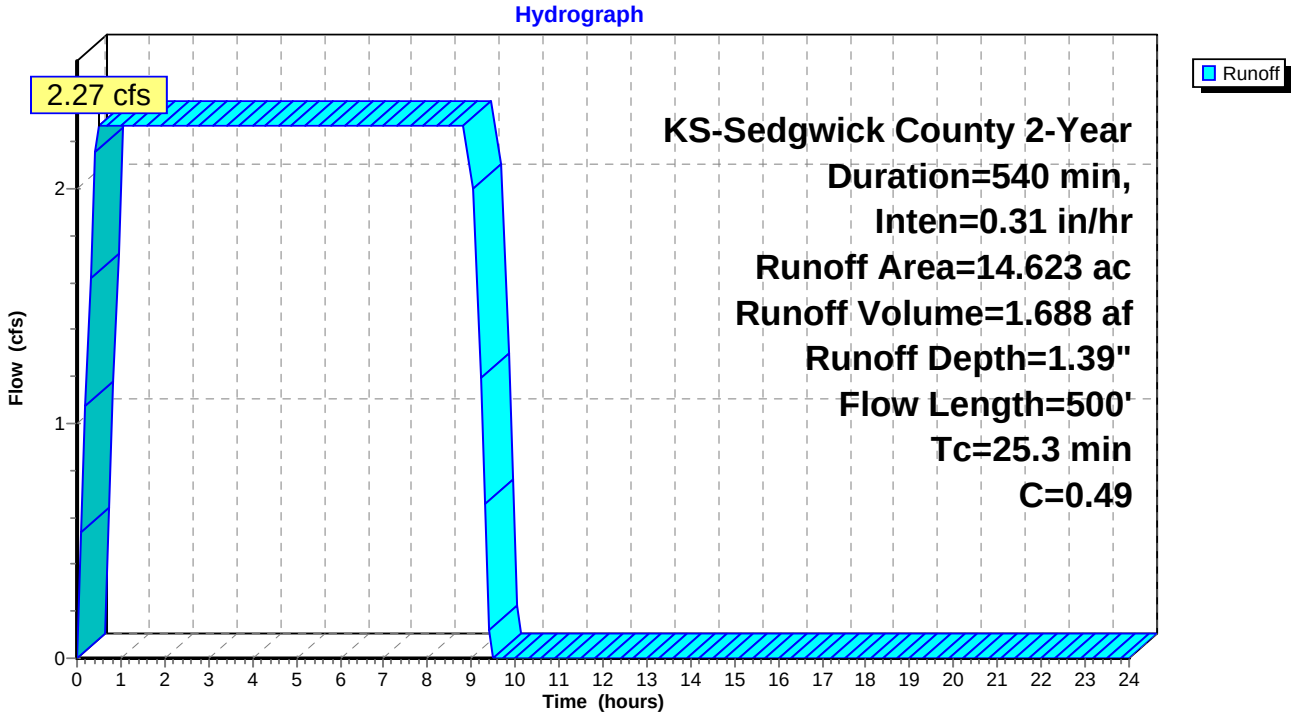
Runoff = 2.27 cfs @ 0.50 hrs, Volume= 1.688 af, Depth= 1.39"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 2-Year Duration=540 min, Inten=0.31 in/hr

Area (ac)	C	Description
14.623	0.49	C Soil Conditions w/ 1% to 4%
14.623	0.49	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
9.2	300	0.0013	0.54		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
25.3	500	Total			

Subcatchment 1B: East of Middle School



Subcatchment 2B: NE corner of Middle School

5 year 0.51
100 year 0.66

---

[70] Warning: Tc<8dt requires smaller dt

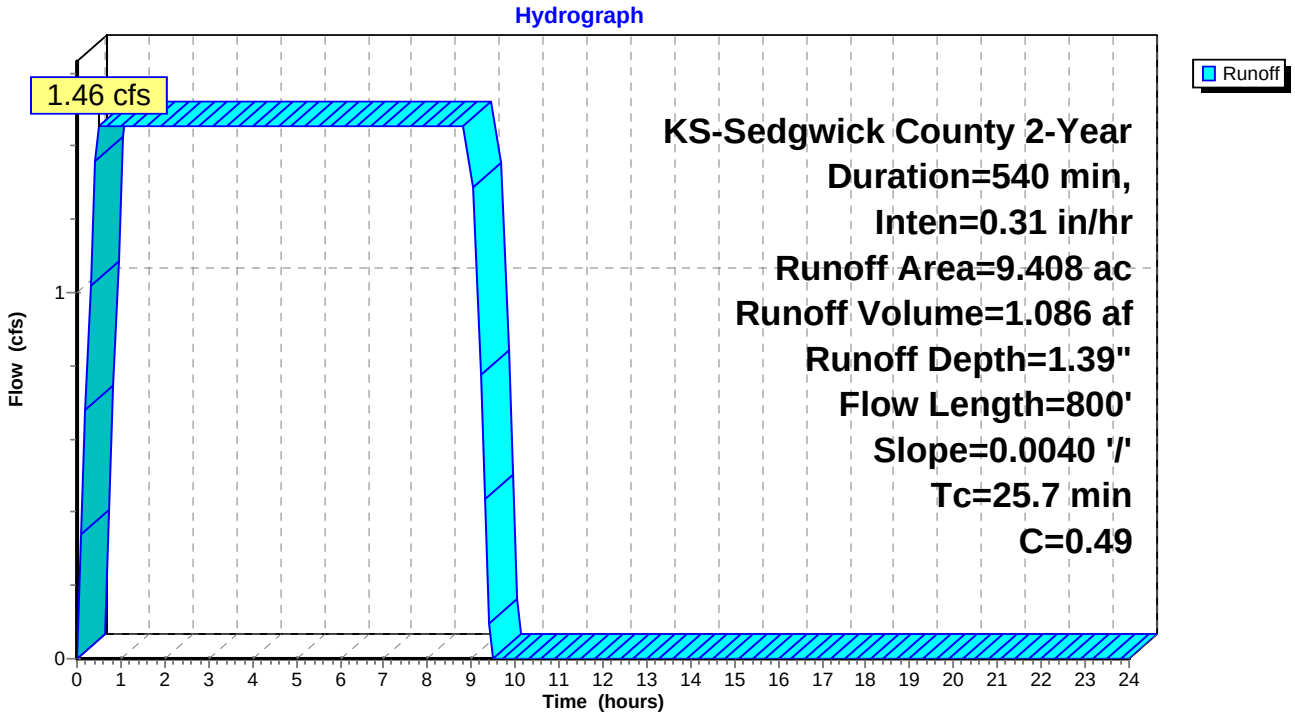
Runoff = 1.46 cfs @ 0.50 hrs, Volume= 1.086 af, Depth= 1.39"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 2-Year Duration=540 min, Inten=0.31 in/hr

Area (ac)	C	Description
9.408	0.49	School Property
9.408	0.49	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
13.0	600		0.77		**Direct Entry, channelized flow**
25.7	800	Total			

Subcatchment 2B: NE corner of Middle School



Subcatchment 3B: SW Corner of High School

5 year 0.51
100 year 0.66

---

[70] Warning: Tc<8dt requires smaller dt

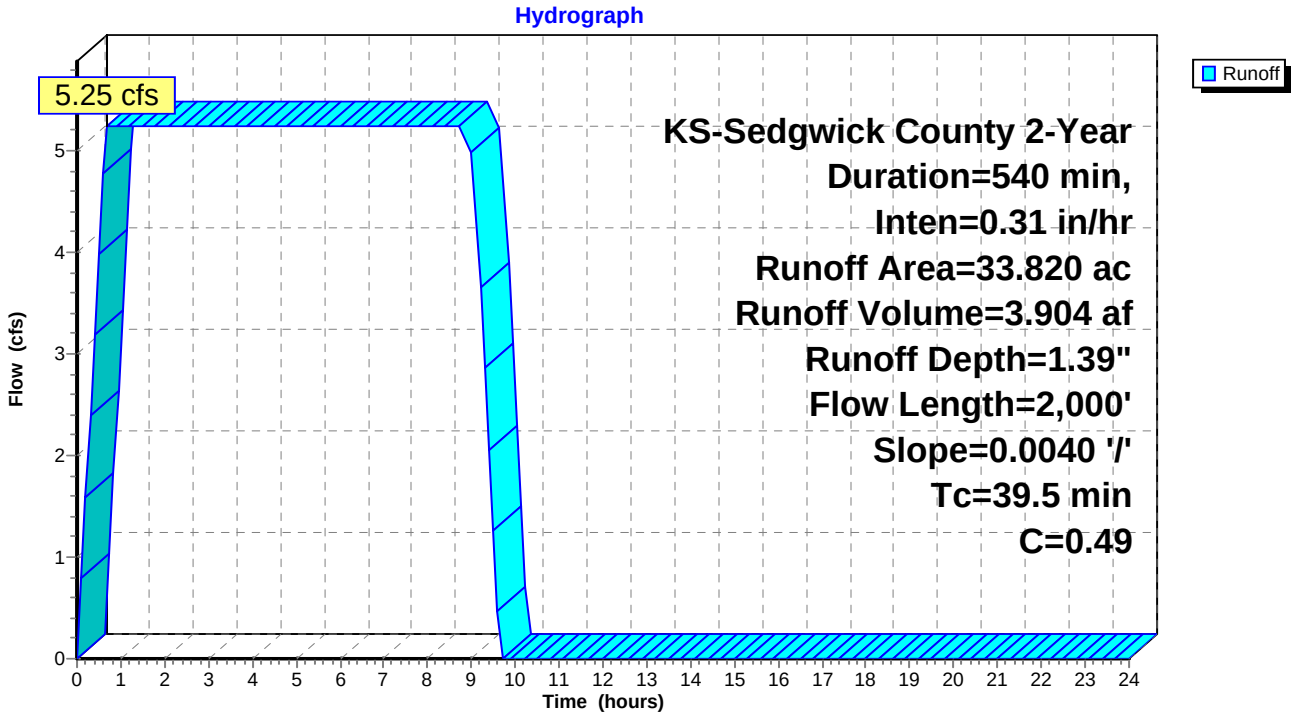
Runoff = 5.25 cfs @ 0.70 hrs, Volume= 3.904 af, Depth= 1.39"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 2-Year Duration=540 min, Inten=0.31 in/hr

Area (ac)	C	Description
33.820	0.49	School Property
33.820	0.49	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
26.8	1,800		1.12		**Direct Entry, channelized flow**
39.5	2,000	Total			

Subcatchment 3B: SW Corner of High School



Subcatchment 4B: New Field & Track

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

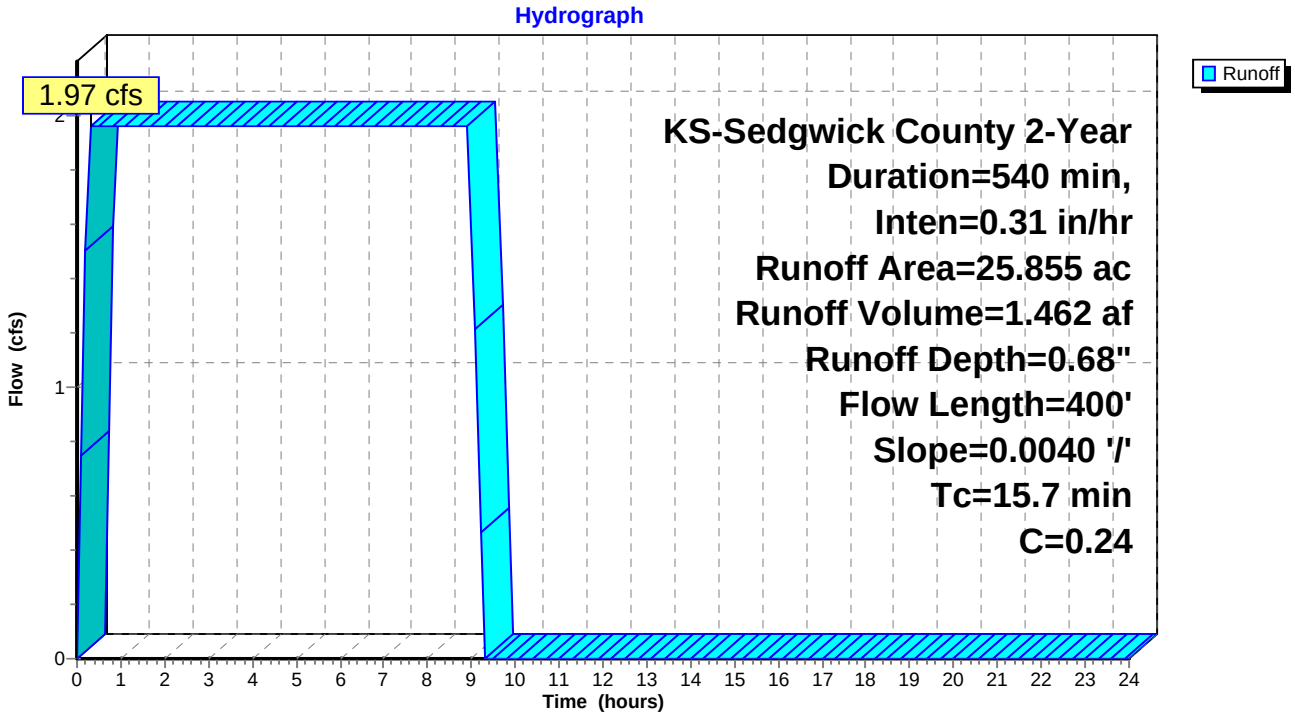
Runoff = 1.97 cfs @ 0.30 hrs, Volume= 1.462 af, Depth= 0.68"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 2-Year Duration=540 min, Inten=0.31 in/hr

Area (ac)	C	Description
25.855	0.24	School Property
25.855	0.24	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
3.0	200		1.12		**Direct Entry, channelized flow**
15.7	400	Total			

Subcatchment 4B: New Field & Track



Subcatchment 5B: Area 5B

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

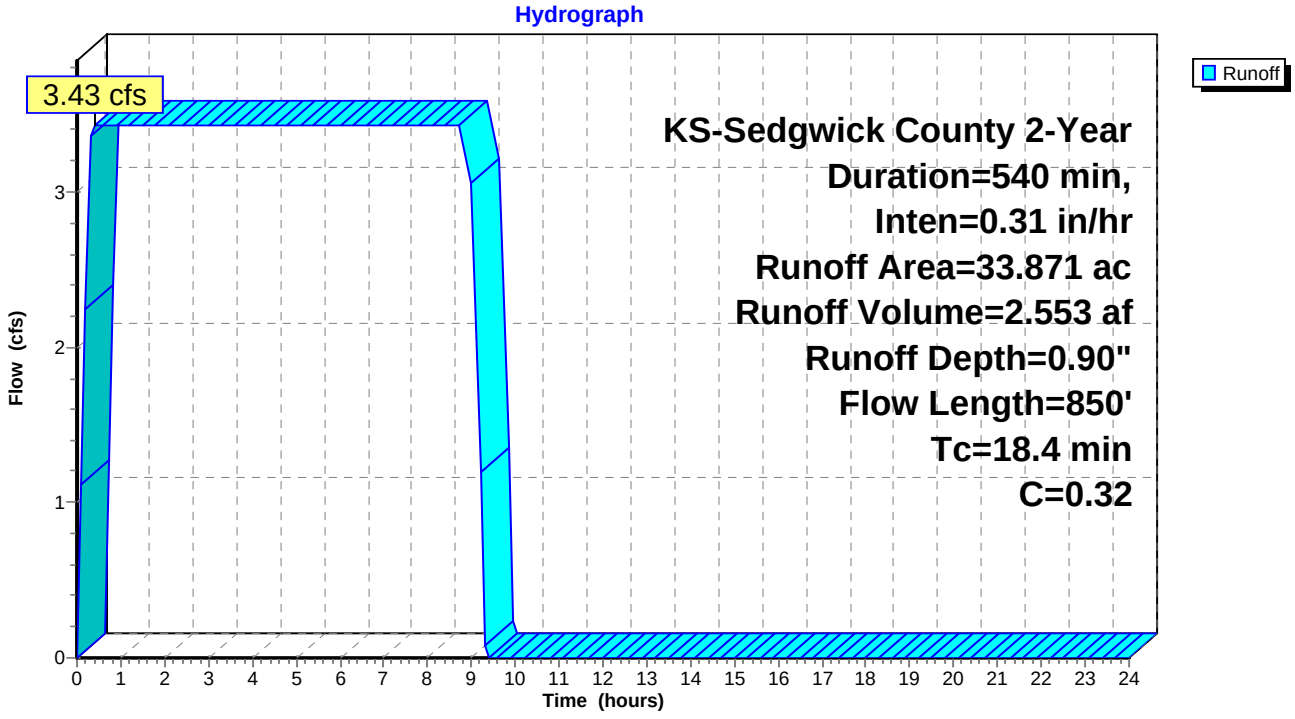
Runoff = 3.43 cfs @ 0.40 hrs, Volume= 2.553 af, Depth= 0.90"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 2-Year Duration=540 min, Inten=0.31 in/hr

Area (ac)	C	Description
22.393	0.24	Detention Area
11.478	0.49	High School
33.871	0.32	Weighted Average
33.871	0.32	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	850		0.77		**Direct Entry, channelized flow**

Subcatchment 5B: Area 5B



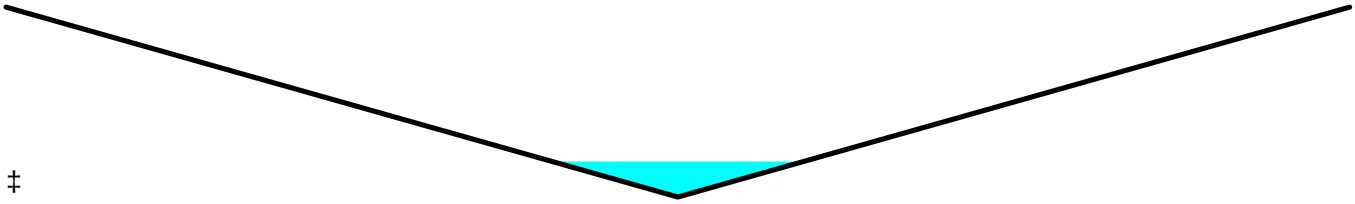
Reach 4R: CHANNEL in 4b

Inflow Area = 24.031 ac, Inflow Depth = 1.39" for 2-Year event
Inflow = 3.73 cfs @ 0.50 hrs, Volume= 2.774 af
Outflow = 3.73 cfs @ 6.30 hrs, Volume= 2.774 af, Atten= 0%, Lag= 348.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Max. Velocity= 1.48 fps, Min. Travel Time= 13.5 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 23.9 min

Peak Storage= 3,029 cf @ 6.30 hrs, Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 324.84 cfs

0.00' x 3.00' deep channel, n= 0.026
Side Slope Z-value= 8.0 '/' Top Width= 48.00'
Length= 1,200.0' Slope= 0.0037 '/'
Inlet Invert= 1,349.40', Outlet Invert= 1,345.00'



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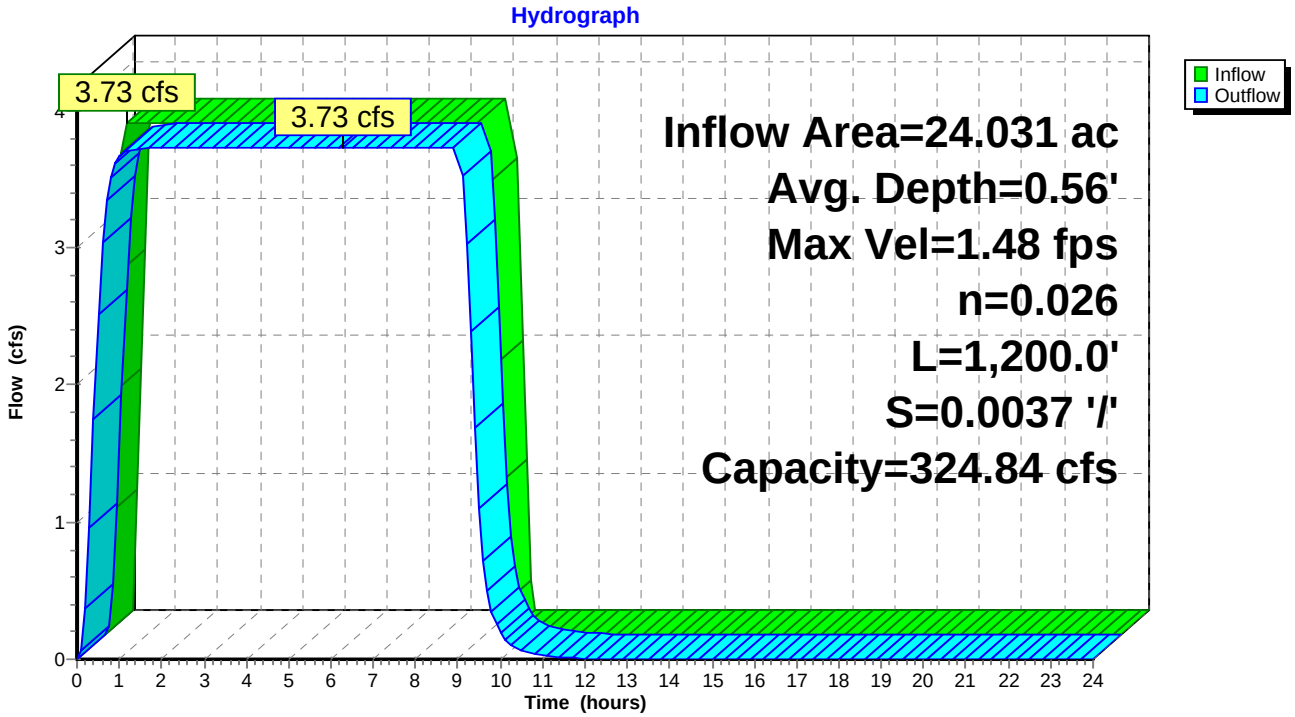
Reach 4R: CHANNEL in 4b



Pond 5P: BASIN 4B

Inflow Area = 83.706 ac, Inflow Depth = 1.17" for 2-Year event
Inflow = 10.94 cfs @ 6.30 hrs, Volume= 8.139 af
Outflow = 10.59 cfs @ 8.99 hrs, Volume= 8.139 af, Atten= 3%, Lag= 161.5 min
Primary = 10.59 cfs @ 8.99 hrs, Volume= 8.139 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 1,344.08' @ 8.99 hrs Surf.Area= 3.311 ac Storage= 1.929 af

Plug-Flow detention time= 120.5 min calculated for 8.106 af (100% of inflow)
Center-of-Mass det. time= 121.4 min (411.5 - 290.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,343.00'	18.975 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

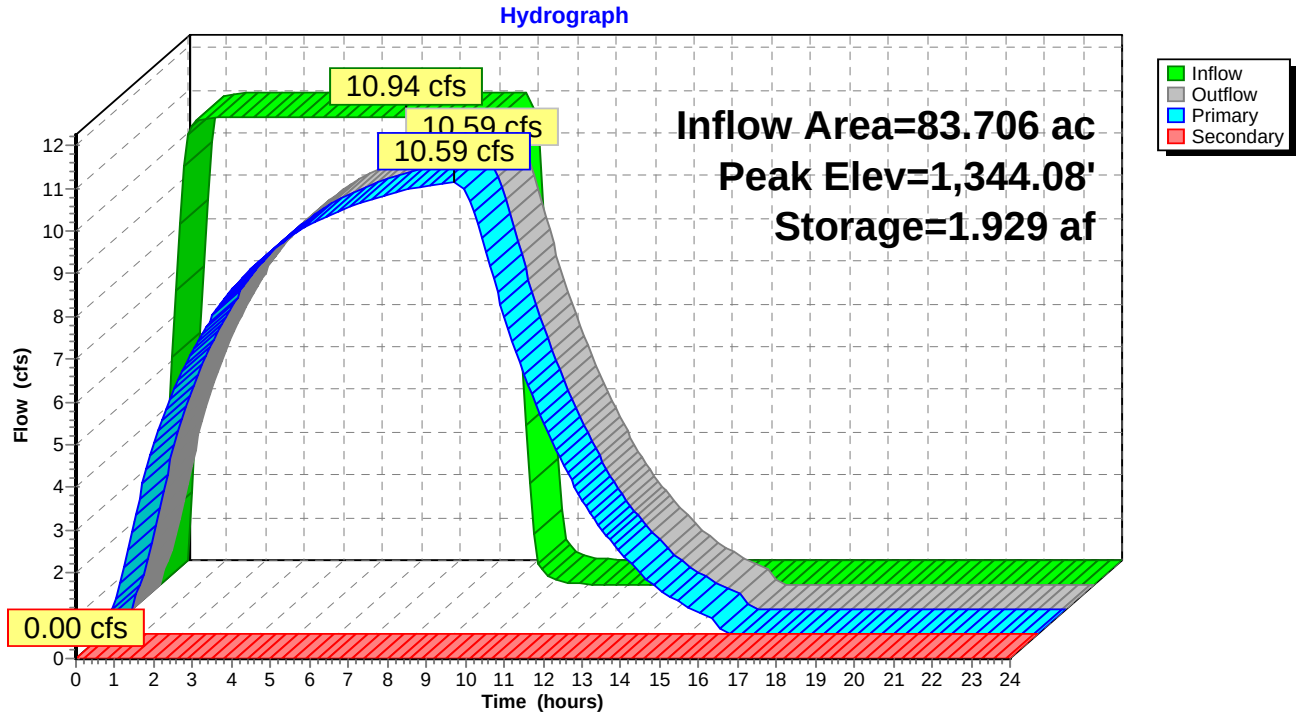
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,343.00	0.115	0.000	0.000
1,344.00	3.230	1.672	1.672
1,345.00	4.256	3.743	5.415
1,346.00	4.568	4.412	9.827
1,347.00	4.568	4.568	14.395
1,348.00	4.591	4.579	18.975

Device	Routing	Invert	Outlet Devices
#1	Primary	1,342.80'	**24.0" x 128.0' long Culvert X 2.00** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,342.50' S= 0.0023 '/' Cc= 0.900 n= 0.013
#2	Secondary	1,347.00'	**200.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 5.0' Crest Height

Primary OutFlow Max=10.59 cfs @ 8.99 hrs HW=1,344.08' TW=1,341.46' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 10.59 cfs @ 3.56 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,343.00' TW=1,340.40' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: BASIN 4B



Pond 6P: BASIN 6A

Inflow Area = 117.577 ac, Inflow Depth = 1.09" for 2-Year event
Inflow = 14.02 cfs @ 9.00 hrs, Volume= 10.693 af
Outflow = 7.52 cfs @ 10.27 hrs, Volume= 9.420 af, Atten= 46%, Lag= 76.1 min
Primary = 7.52 cfs @ 10.27 hrs, Volume= 9.420 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 1,341.48' @ 10.27 hrs Surf.Area= 13.845 ac Storage= 5.733 af

Plug-Flow detention time= 398.3 min calculated for 9.381 af (88% of inflow)
Center-of-Mass det. time= 355.4 min (735.3 - 379.9)

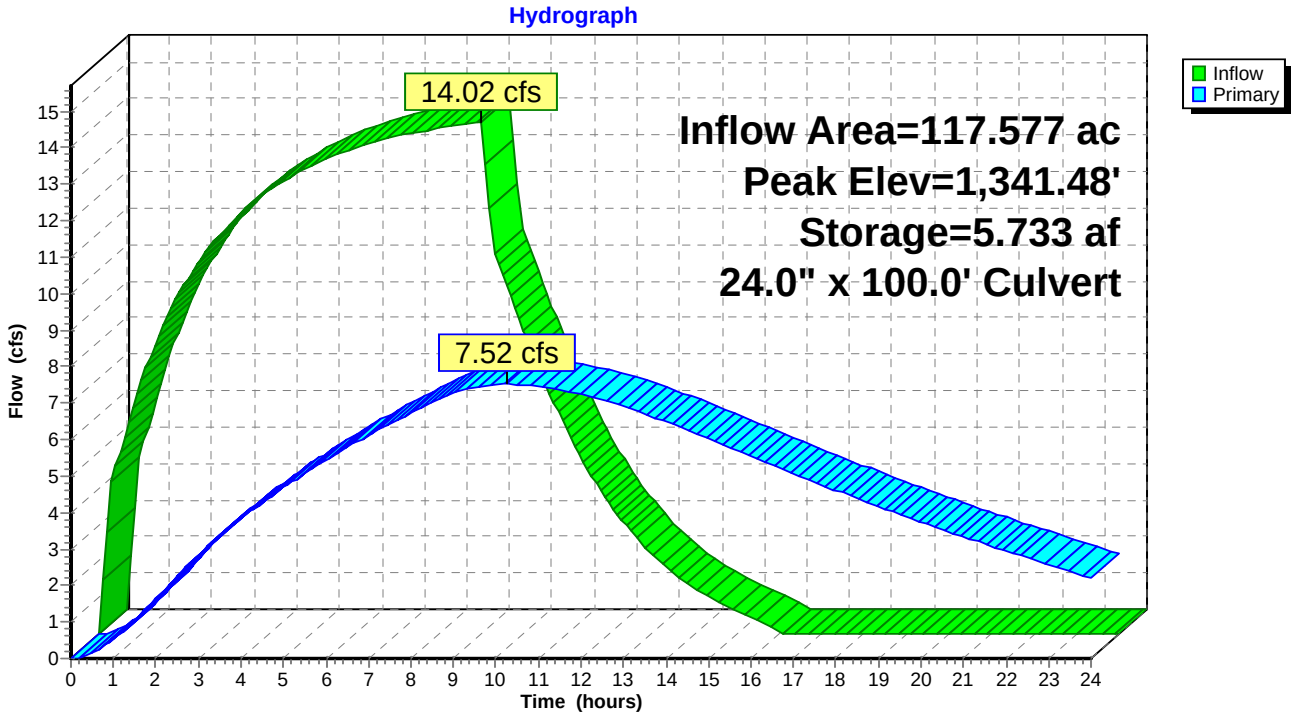
Volume	Invert	Avail.Storage	Storage Description
#1	1,340.40'	40.987 af	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 2

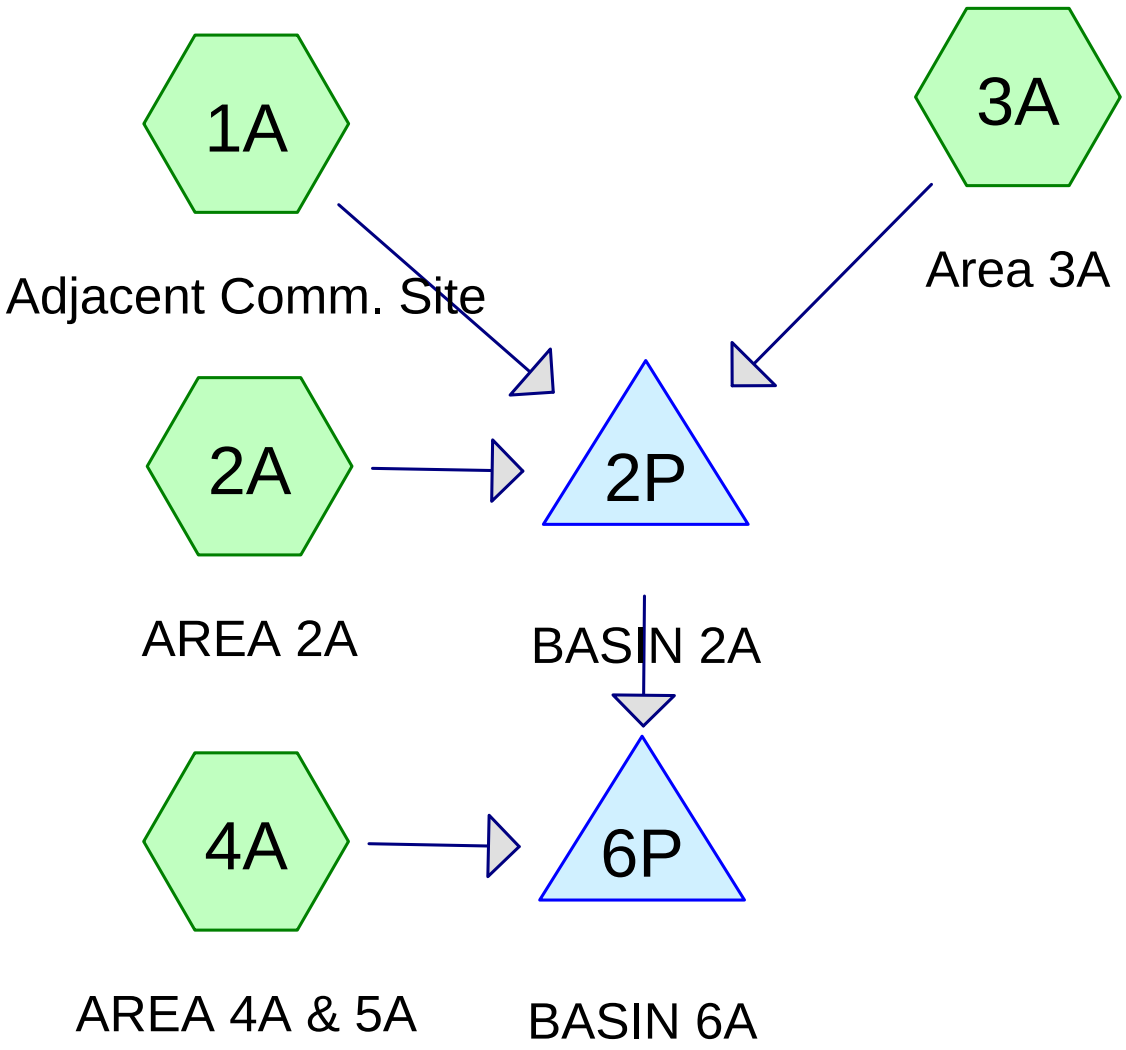
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,340.40	0.115	0.000	0.000
1,341.00	2.196	0.693	0.693
1,342.00	12.112	7.154	7.847
1,343.00	13.180	12.646	20.493

Device	Routing	Invert	Outlet Devices
#1	Primary	1,340.40'	**24.0" x 100.0' long Culvert X 2.00** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,340.20' S= 0.0020 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=7.52 cfs @ 10.27 hrs HW=1,341.48' (Free Discharge)
1=Culvert (Barrel Controls 7.52 cfs @ 3.16 fps)

Pond 6P: BASIN 6A





Subcat Reach Pond Link

Drainage Diagram for Post A 100Yr

Prepared by {enter your company name here} 1/24/2008

Area Listing (all nodes)

Area (acres)	C	Description (subcats)
30.980	0.51	Wetland Area (2A,4A)
106.642	0.66	C Soil Conditions w/ less then 0.4% (1A,2A,4A)
59.870	0.66	School Property (3A)
197.492		

Time span=0.00-48.00 hrs, dt=0.25 hrs, 193 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1A: Adjacent Comm. Site Runoff Area=37.802 ac Runoff Depth=4.90"
Flow Length=1,460' Tc=95.5 min C=0.66 Runoff=11.85 cfs 15.430 af

Subcatchment 2A: AREA 2A Runoff Area=42.040 ac Runoff Depth=4.30"
Flow Length=1,000' Tc=82.8 min C=0.58 Runoff=11.59 cfs 15.080 af

Subcatchment 3A: Area 3A Runoff Area=59.870 ac Runoff Depth=4.90"
Flow Length=1,600' Slope=0.0040 '/' Tc=43.0 min C=0.66 Runoff=18.77 cfs 24.438 af

Subcatchment 4A: AREA 4A & 5A Runoff Area=57.780 ac Runoff Depth=4.68"
Flow Length=1,000' Tc=82.8 min C=0.63 Runoff=17.30 cfs 22.513 af

Pond 2P: BASIN 2A Peak Elev=1,350.06' Storage=28.263 af Inflow=42.21 cfs 54.949 af
36.0" x 80.0' Culvert Outflow=37.81 cfs 49.453 af

Pond 6P: BASIN 6A Peak Elev=1,349.69' Storage=182,978 cf Inflow=55.46 cfs 71.966 af
Outflow=54.51 cfs 71.737 af

Total Runoff Area = 197.492 ac Runoff Volume = 77.462 af Average Runoff Depth = 4.71"
100.00% Pervious Area = 197.492 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1A: Adjacent Comm. Site

5 YEAR .51
100 YEAR .66

[70] Warning: Tc<8dt requires smaller dt

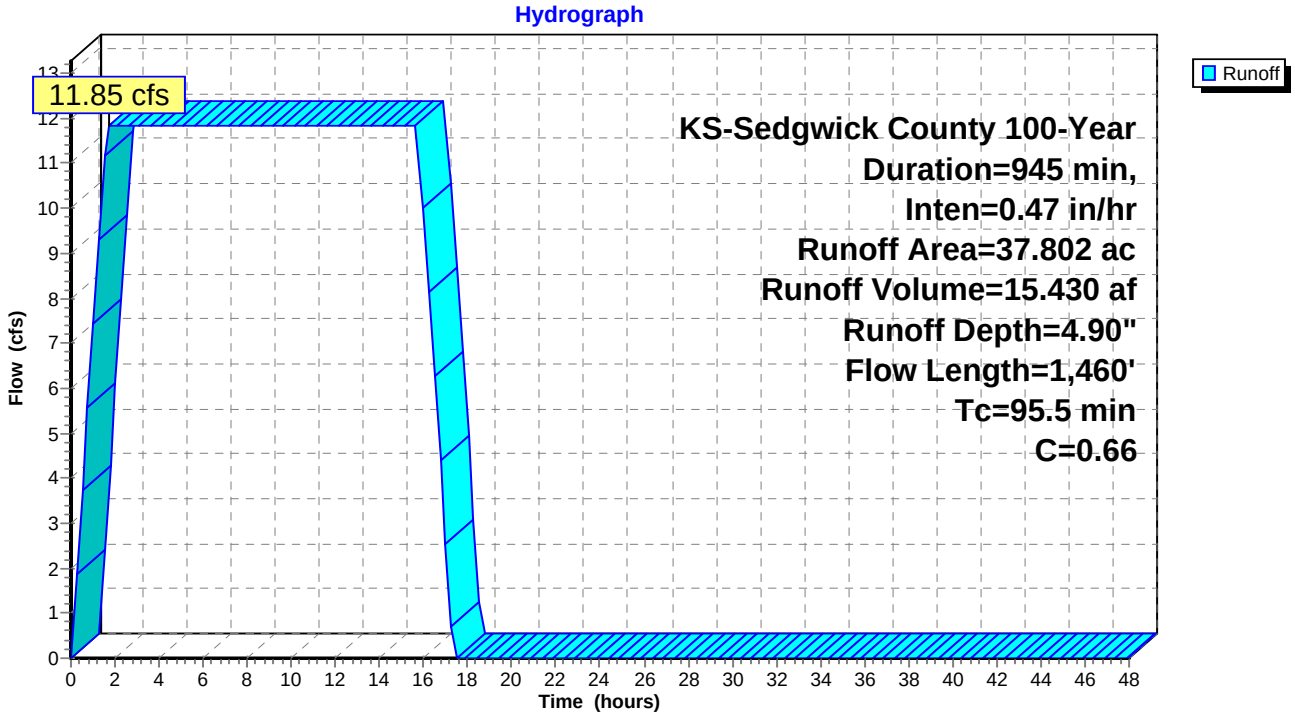
Runoff = 11.85 cfs @ 1.75 hrs, Volume= 15.430 af, Depth= 4.90"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 100-Year Duration=945 min, Inten=0.47 in/hr

Area (ac)	C	Description
37.802	0.66	C Soil Conditions w/ less then 0.4%
37.802	0.66	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
79.4	1,260	0.0007	0.26		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
95.5	1,460	Total			

Subcatchment 1A: Adjacent Comm. Site



Subcatchment 2A: AREA 2A

5 YEAR .51
100 YEAR .66

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[70] Warning: Tc<8dt requires smaller dt

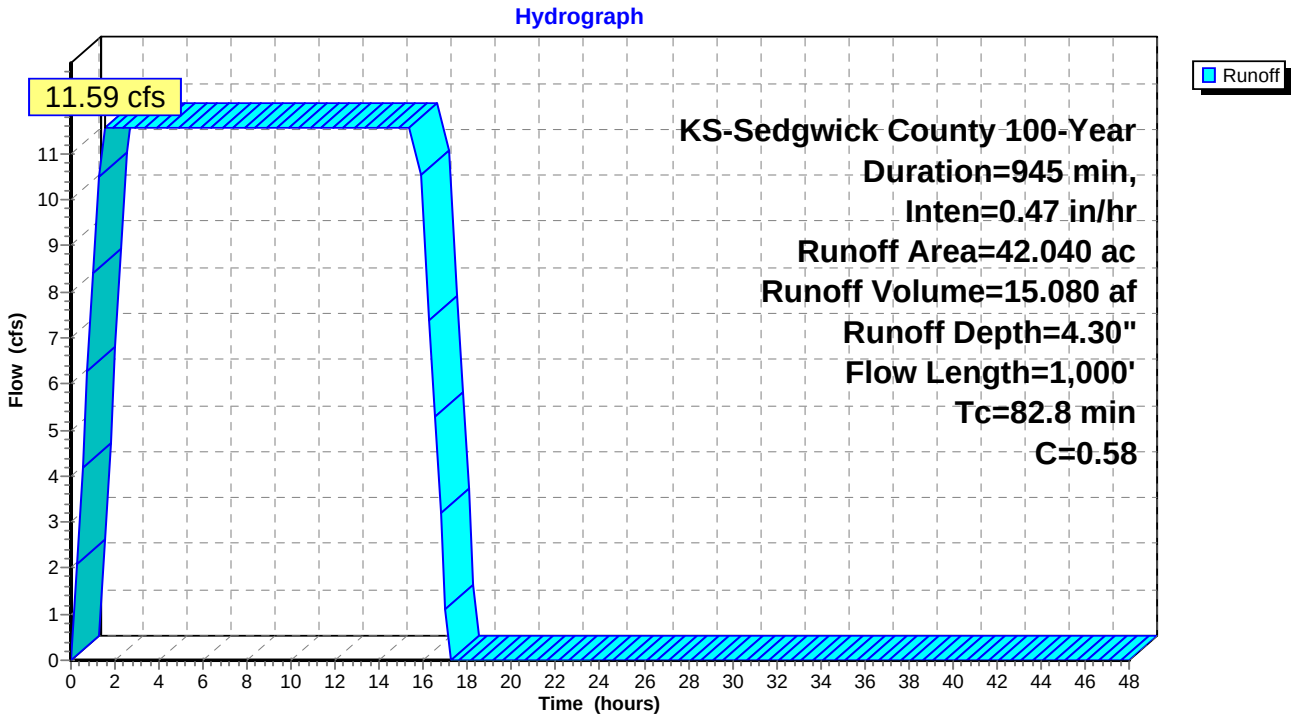
Runoff = 11.59 cfs @ 1.50 hrs, Volume= 15.080 af, Depth= 4.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 100-Year Duration=945 min, Inten=0.47 in/hr

Area (ac)	C	Description
20.970	0.66	C Soil Conditions w/ less then 0.4%
21.070	0.51	Wetland Area
42.040	0.58	Weighted Average
42.040	0.58	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
66.7	800	0.0004	0.20		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
82.8	1,000	Total			

Subcatchment 2A: AREA 2A



Subcatchment 3A: Area 3A

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

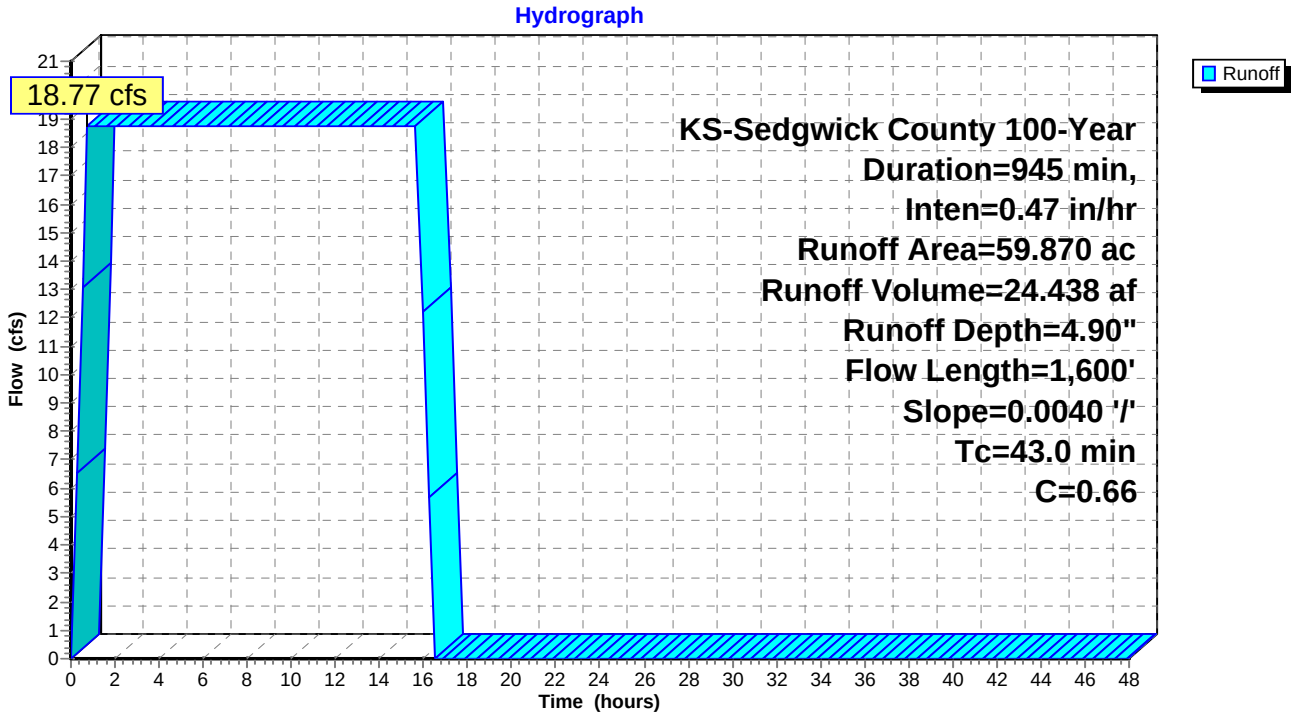
Runoff = 18.77 cfs @ 0.75 hrs, Volume= 24.438 af, Depth= 4.90"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 100-Year Duration=945 min, Inten=0.47 in/hr

Area (ac)	C	Description
59.870	0.66	School Property
59.870	0.66	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
30.3	1,400		0.77		**Direct Entry, channelized flow**
43.0	1,600	Total			

Subcatchment 3A: Area 3A



Subcatchment 4A: AREA 4A & 5A

5 YEAR .51
100 YEAR .66

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[70] Warning: Tc<8dt requires smaller dt

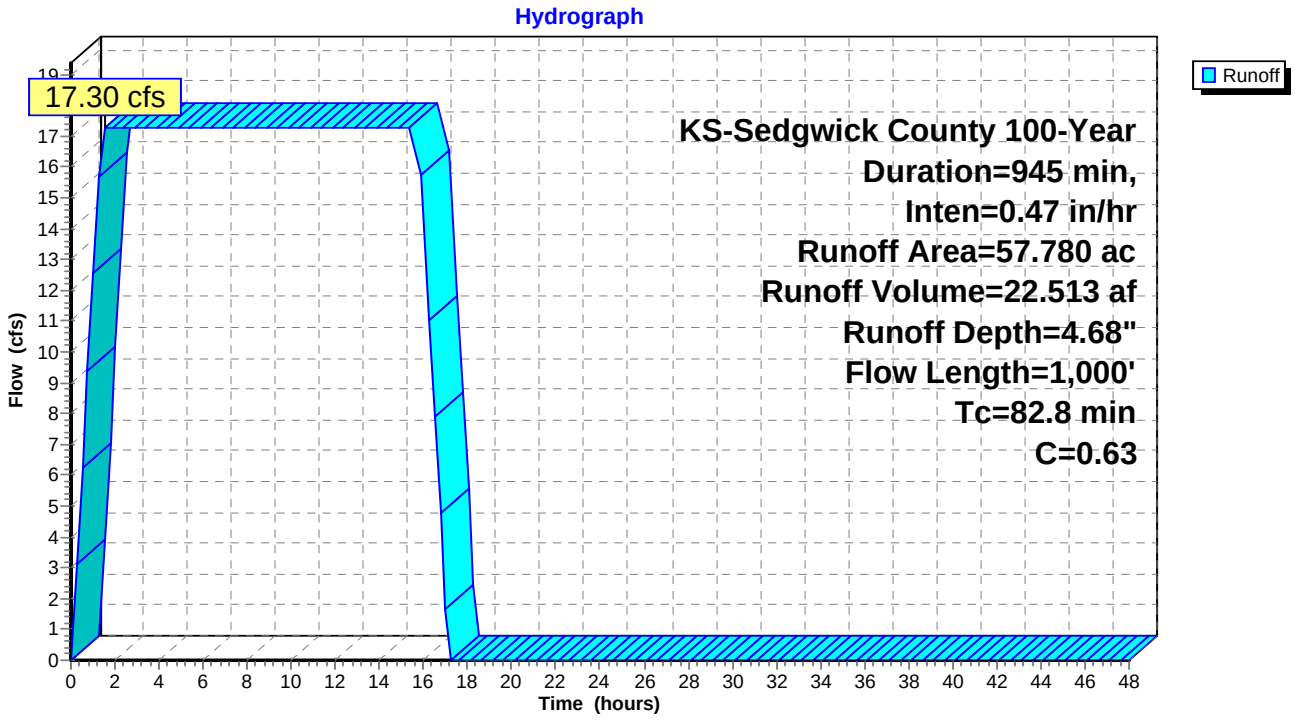
Runoff = 17.30 cfs @ 1.50 hrs, Volume= 22.513 af, Depth= 4.68"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 100-Year Duration=945 min, Inten=0.47 in/hr

Area (ac)	C	Description
47.870	0.66	C Soil Conditions w/ less then 0.4%
9.910	0.51	Wetland Area
57.780	0.63	Weighted Average
57.780	0.63	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
66.7	800	0.0004	0.20		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
82.8	1,000	Total			

Subcatchment 4A: AREA 4A & 5A



Pond 2P: BASIN 2A

Inflow Area = 139.712 ac, Inflow Depth = 4.72" for 100-Year event
Inflow = 42.21 cfs @ 1.75 hrs, Volume= 54.949 af
Outflow = 37.81 cfs @ 15.73 hrs, Volume= 49.453 af, Atten= 10%, Lag= 839.0 min
Primary = 37.81 cfs @ 15.73 hrs, Volume= 49.453 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
Peak Elev= 1,350.06' @ 15.84 hrs Surf.Area= 14.253 ac Storage= 28.263 af

Plug-Flow detention time= 564.9 min calculated for 49.197 af (90% of inflow)
Center-of-Mass det. time= 524.8 min (1,031.9 - 507.1)

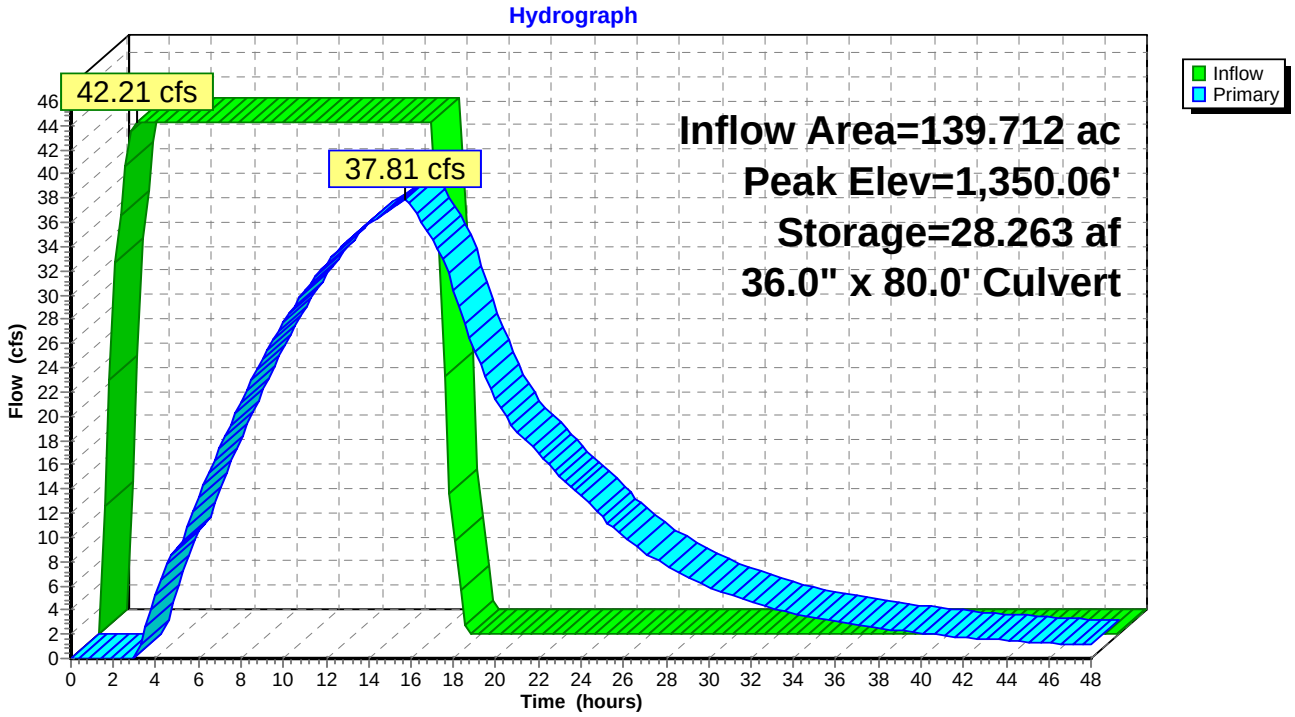
Volume	Invert	Avail.Storage	Storage Description
#1	1,347.50'	104.061 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,347.50	4.551	0.000	0.000
1,348.00	7.211	2.940	2.940
1,349.00	13.683	10.447	13.387
1,350.00	14.219	13.951	27.339
1,351.00	14.757	14.488	41.827
1,352.00	15.299	15.028	56.854
1,353.00	15.823	15.561	72.415
1,355.00	15.823	31.646	104.061

Device	Routing	Invert	Outlet Devices
#1	Primary	1,348.00'	**36.0" x 80.0' long Culvert X 3.00** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,347.50' S= 0.0063 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=37.56 cfs @ 15.73 hrs HW=1,350.06' TW=1,349.69' (Dynamic Tailwater)
1=Culvert (Outlet Controls 37.56 cfs @ 3.41 fps)

Pond 2P: BASIN 2A



Pond 6P: BASIN 6A

[80] Warning: Exceeded Pond 2P by 0.18' @ 2.00 hrs (1.45 cfs 0.259 af)

Inflow Area = 197.492 ac, Inflow Depth > 4.37" for 100-Year event
Inflow = 55.46 cfs @ 15.64 hrs, Volume= 71.966 af
Outflow = 54.51 cfs @ 15.73 hrs, Volume= 71.737 af, Atten= 2%, Lag= 5.1 min
Primary = 54.51 cfs @ 15.73 hrs, Volume= 71.737 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
Peak Elev= 1,349.69' @ 15.73 hrs Surf.Area= 124,767 sf Storage= 182,978 cf

Plug-Flow detention time= 68.0 min calculated for 71.737 af (100% of inflow)
Center-of-Mass det. time= 61.9 min (931.8 - 870.0)

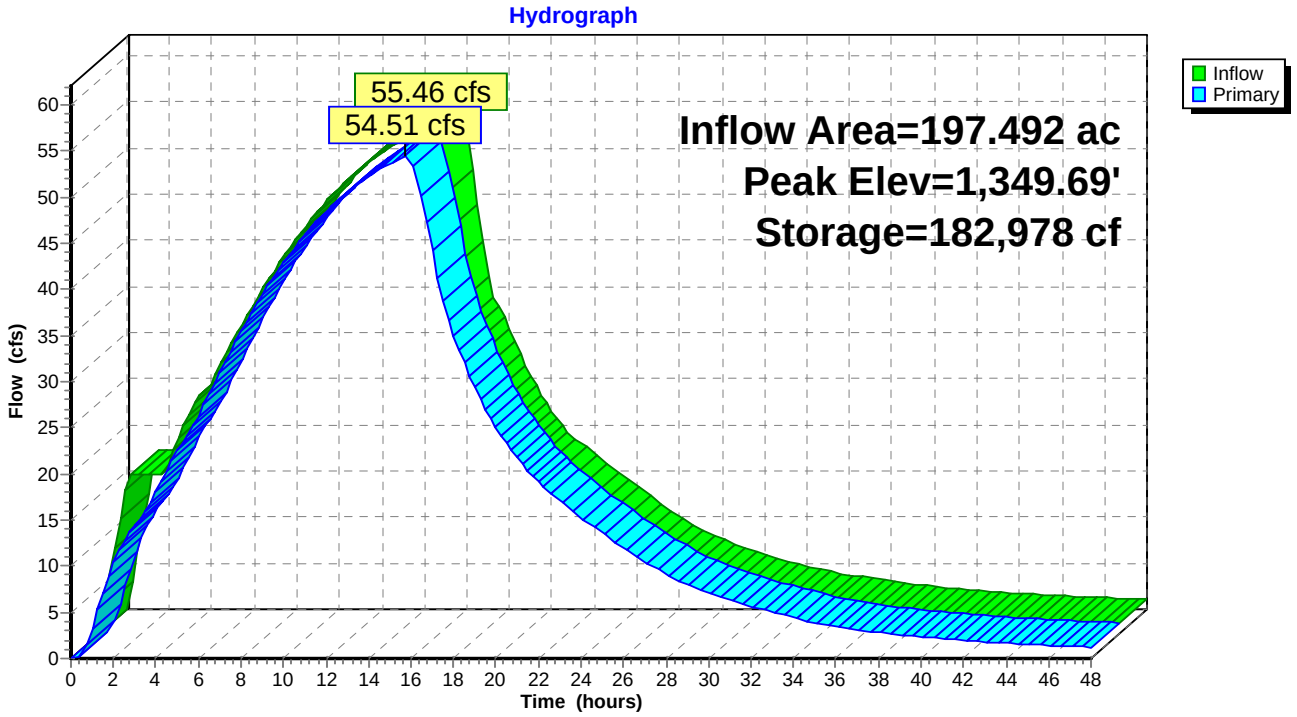
Volume	Invert	Avail.Storage	Storage Description
#1	1,347.50'	669,987 cf	**Custom Stage Data (Prismatic)** Listed below

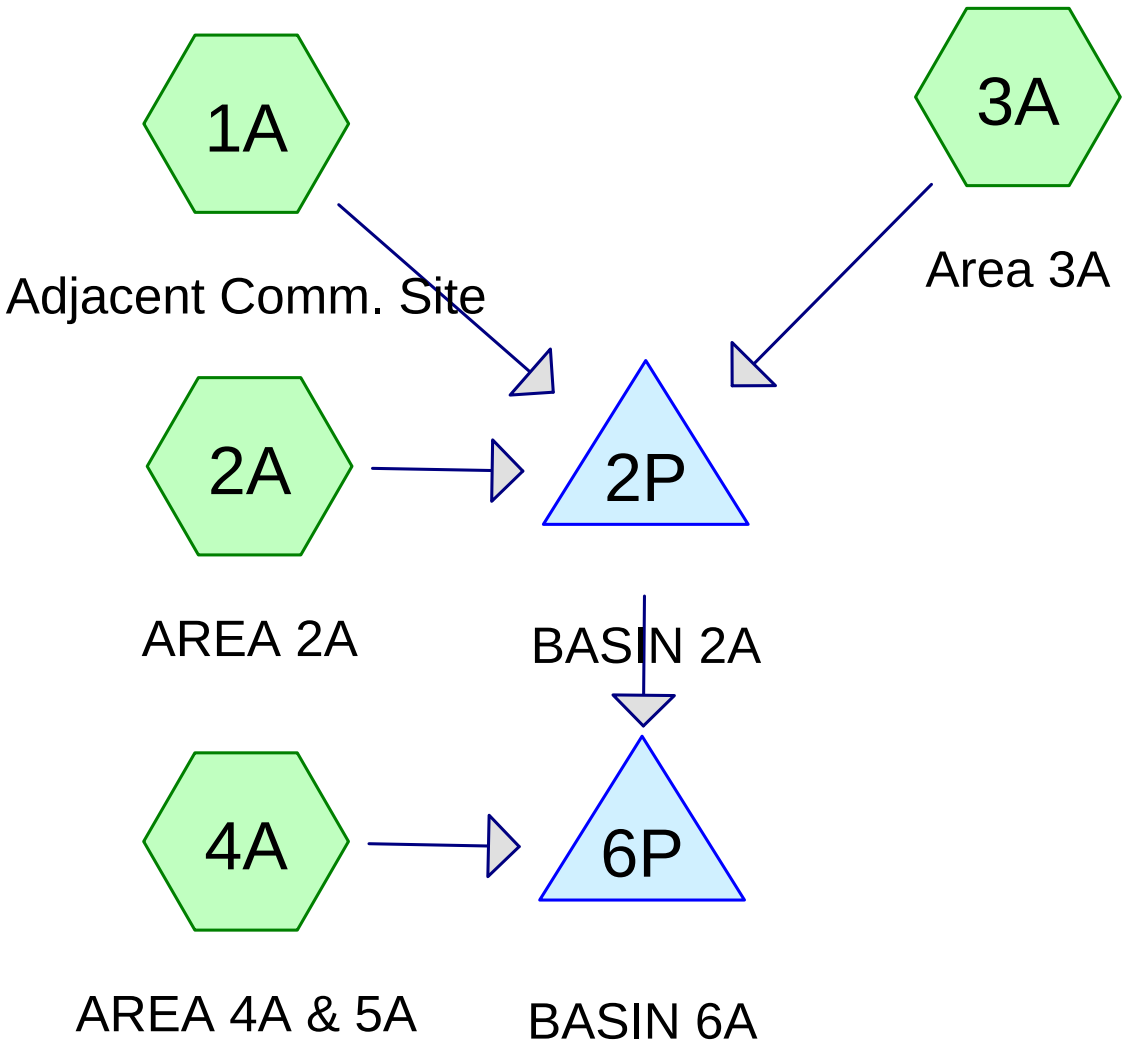
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,347.50	47,337	0	0
1,348.00	49,288	24,156	24,156
1,349.00	103,884	76,586	100,742
1,350.00	134,101	118,993	219,735
1,351.00	145,542	139,822	359,556
1,352.00	155,186	150,364	509,920
1,353.00	164,948	160,067	669,987

Device	Routing	Invert	Outlet Devices
#1	Primary	1,347.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 6.0' Crest Height
#2	Primary	1,349.00'	**8.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=54.48 cfs @ 15.73 hrs HW=1,349.69' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 39.45 cfs @ 5.06 fps)
2=Sharp-Crested Rectangular Weir (Weir Controls 15.03 cfs @ 2.77 fps)

Pond 6P: BASIN 6A





Subcat Reach Pond Link

Drainage Diagram for Post A 5Yr

Prepared by {enter your company name here} 1/24/2008

Area Listing (all nodes)

Area (acres)	C	Description (subcats)
30.980	0.27	Wetland Area (2A,4A)
106.642	0.51	C Soil Conditions w/ less then 0.4% (1A,2A,4A)
59.870	0.51	School Property (3A)
197.492		

Time span=0.00-48.00 hrs, dt=0.25 hrs, 193 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1A: Adjacent Comm. Site Runoff Area=37.802 ac Runoff Depth=2.22"
Flow Length=1,460' Tc=95.5 min C=0.51 Runoff=5.36 cfs 6.978 af

Subcatchment 2A: AREA 2A Runoff Area=42.040 ac Runoff Depth=1.69"
Flow Length=1,000' Tc=82.8 min C=0.39 Runoff=4.56 cfs 5.935 af

Subcatchment 3A: Area 3A Runoff Area=59.870 ac Runoff Depth=2.22"
Flow Length=1,600' Slope=0.0040 '/' Tc=43.0 min C=0.51 Runoff=8.49 cfs 11.052 af

Subcatchment 4A: AREA 4A & 5A Runoff Area=57.780 ac Runoff Depth=2.04"
Flow Length=1,000' Tc=82.8 min C=0.47 Runoff=7.55 cfs 9.830 af

Pond 2P: BASIN 2A Peak Elev=1,349.15' Storage=15.519 af Inflow=18.41 cfs 23.965 af
36.0" x 80.0' Culvert Outflow=13.55 cfs 18.923 af

Pond 6P: BASIN 6A Peak Elev=1,348.88' Storage=91,659 cf Inflow=21.06 cfs 28.753 af
Outflow=20.33 cfs 28.577 af

Total Runoff Area = 197.492 ac Runoff Volume = 33.795 af Average Runoff Depth = 2.05"
100.00% Pervious Area = 197.492 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1A: Adjacent Comm. Site

5 YEAR .51
100 YEAR .66

[70] Warning: Tc<8dt requires smaller dt

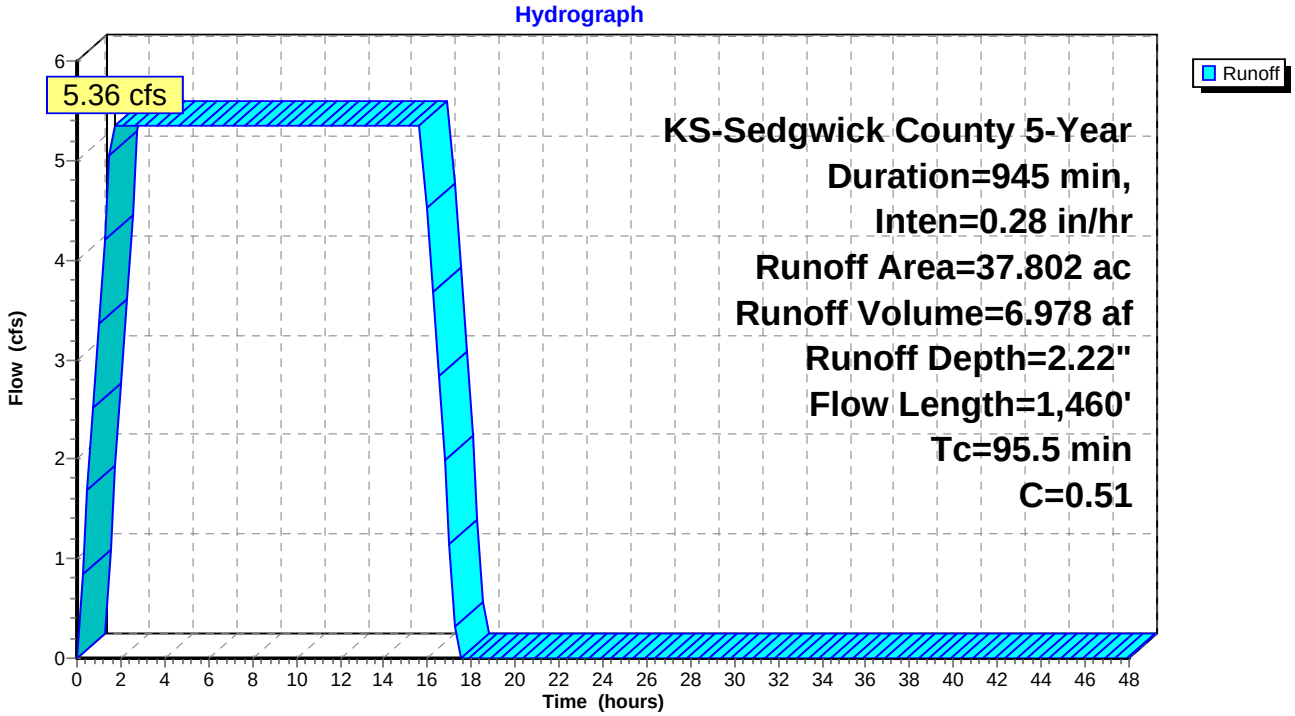
Runoff = 5.36 cfs @ 1.75 hrs, Volume= 6.978 af, Depth= 2.22"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 5-Year Duration=945 min, Inten=0.28 in/hr

Area (ac)	C	Description
37.802	0.51	C Soil Conditions w/ less then 0.4%
37.802	0.51	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
79.4	1,260	0.0007	0.26		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
95.5	1,460	Total			

Subcatchment 1A: Adjacent Comm. Site



Subcatchment 2A: AREA 2A

5 YEAR .51
100 YEAR .66

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[70] Warning: Tc<8dt requires smaller dt

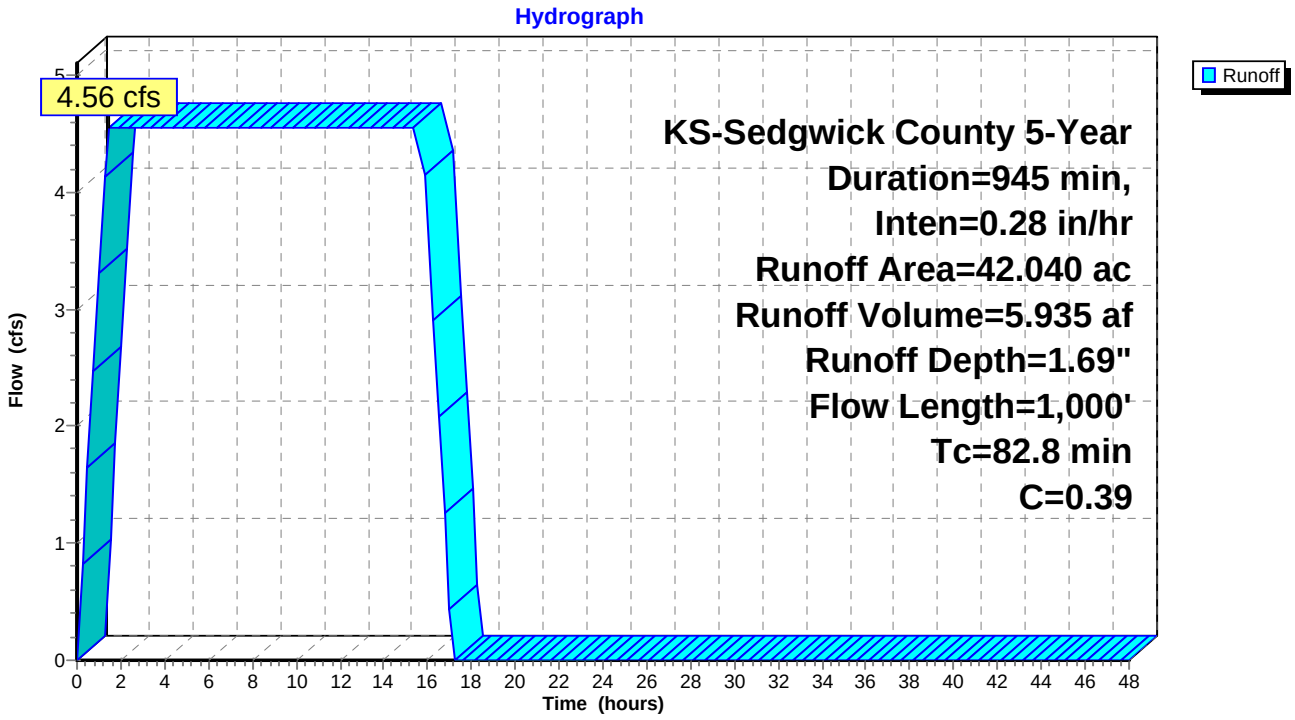
Runoff = 4.56 cfs @ 1.50 hrs, Volume= 5.935 af, Depth= 1.69"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 5-Year Duration=945 min, Inten=0.28 in/hr

Area (ac)	C	Description
20.970	0.51	C Soil Conditions w/ less then 0.4%
21.070	0.27	Wetland Area
42.040	0.39	Weighted Average
42.040	0.39	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
66.7	800	0.0004	0.20		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
82.8	1,000	Total			

Subcatchment 2A: AREA 2A



Subcatchment 3A: Area 3A

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

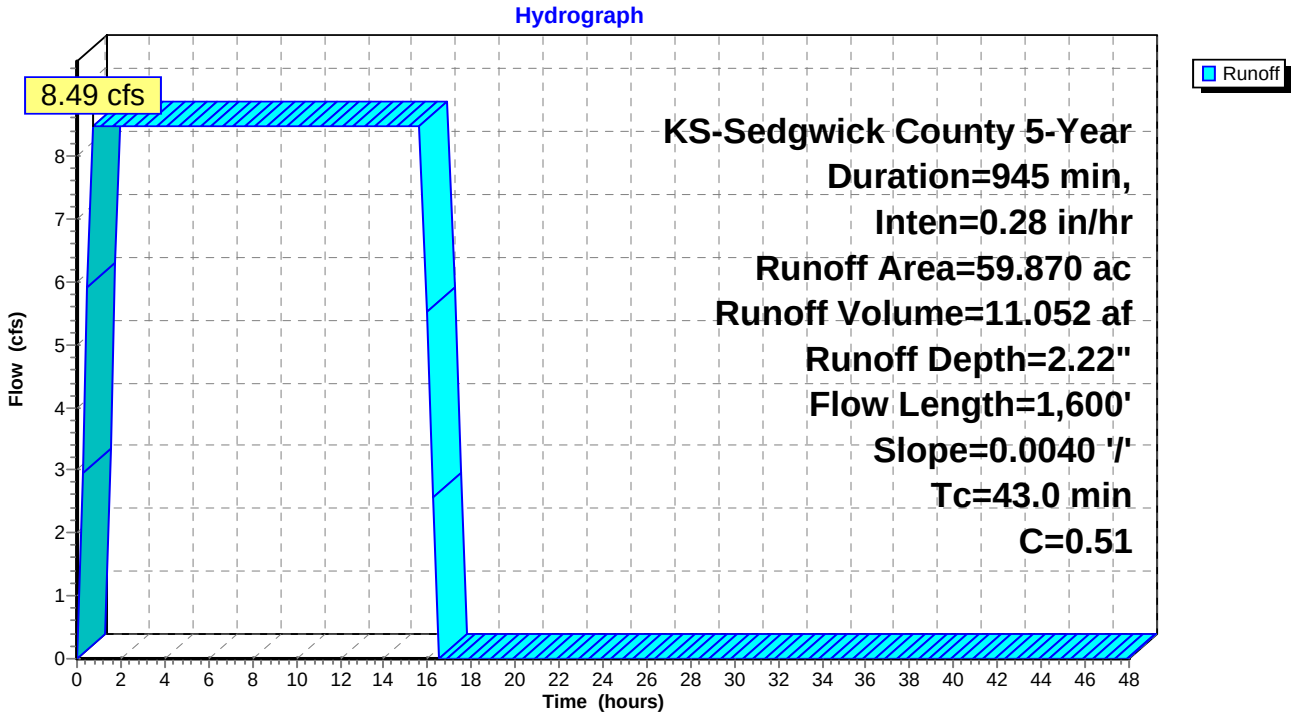
Runoff = 8.49 cfs @ 0.75 hrs, Volume= 11.052 af, Depth= 2.22"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 5-Year Duration=945 min, Inten=0.28 in/hr

Area (ac)	C	Description
59.870	0.51	School Property
59.870	0.51	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
30.3	1,400		0.77		**Direct Entry, channelized flow**
43.0	1,600	Total			

Subcatchment 3A: Area 3A



Subcatchment 4A: AREA 4A & 5A

5 YEAR .51
100 YEAR .66

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[70] Warning: Tc<8dt requires smaller dt

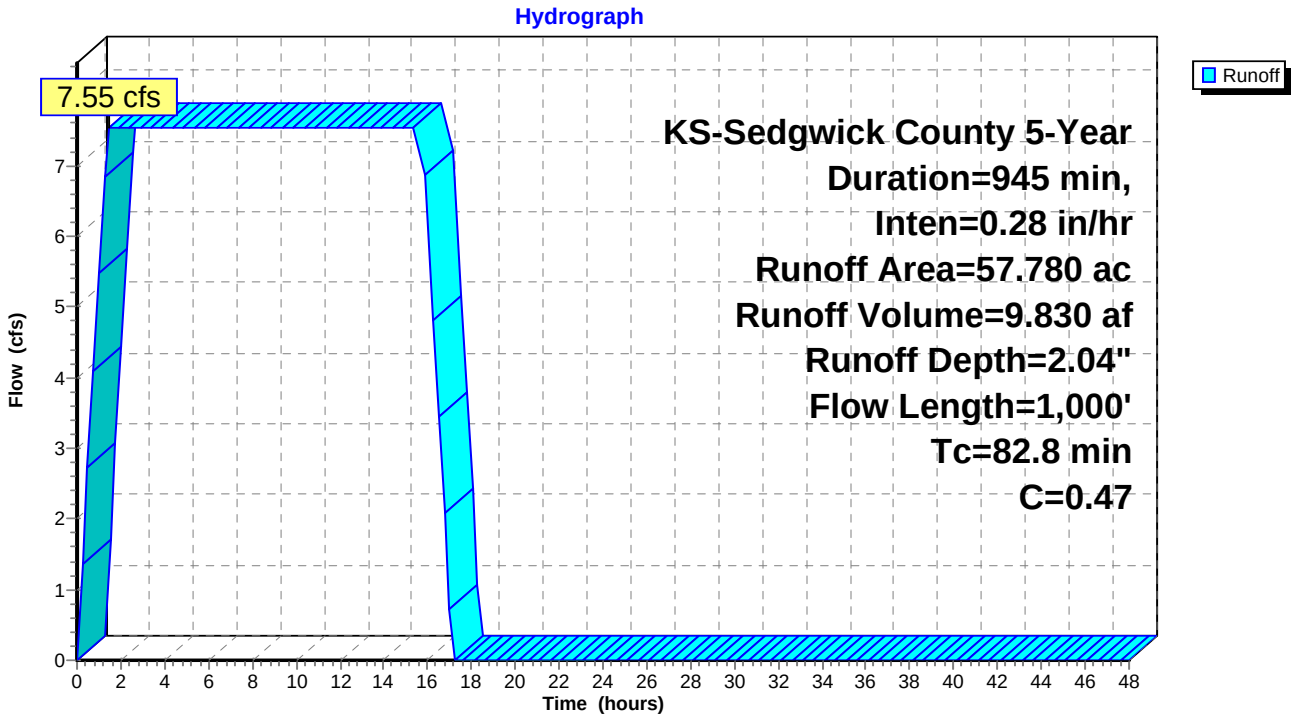
Runoff = 7.55 cfs @ 1.50 hrs, Volume= 9.830 af, Depth= 2.04"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 5-Year Duration=945 min, Inten=0.28 in/hr

Area (ac)	C	Description
47.870	0.51	C Soil Conditions w/ less then 0.4%
9.910	0.27	Wetland Area
57.780	0.47	Weighted Average
57.780	0.47	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
66.7	800	0.0004	0.20		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
82.8	1,000	Total			

Subcatchment 4A: AREA 4A & 5A



Pond 2P: BASIN 2A

Inflow Area = 139.712 ac, Inflow Depth = 2.06" for 5-Year event
Inflow = 18.41 cfs @ 1.75 hrs, Volume= 23.965 af
Outflow = 13.55 cfs @ 17.43 hrs, Volume= 18.923 af, Atten= 26%, Lag= 940.7 min
Primary = 13.55 cfs @ 17.43 hrs, Volume= 18.923 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
Peak Elev= 1,349.15' @ 16.02 hrs Surf.Area= 13.765 ac Storage= 15.519 af

Plug-Flow detention time= 739.7 min calculated for 18.923 af (79% of inflow)
Center-of-Mass det. time= 640.5 min (1,147.4 - 506.9)

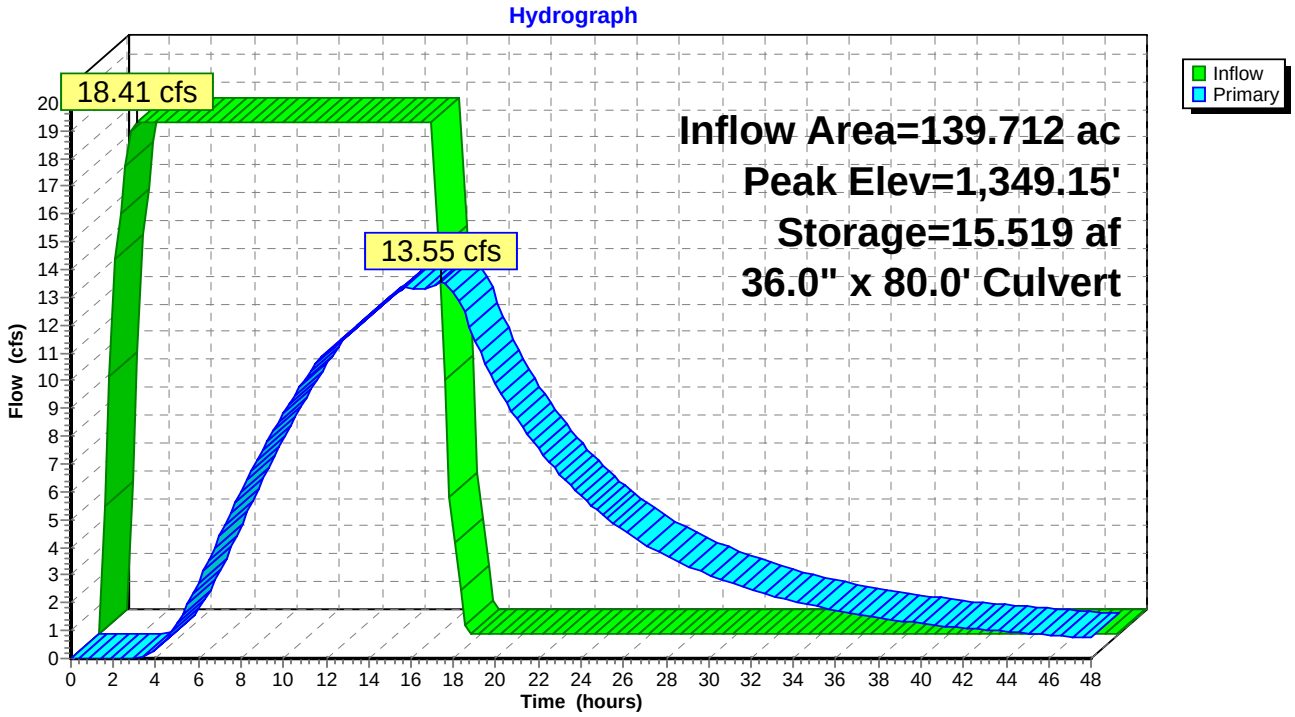
Volume	Invert	Avail.Storage	Storage Description
#1	1,347.50'	104.061 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,347.50	4.551	0.000	0.000
1,348.00	7.211	2.940	2.940
1,349.00	13.683	10.447	13.387
1,350.00	14.219	13.951	27.339
1,351.00	14.757	14.488	41.827
1,352.00	15.299	15.028	56.854
1,353.00	15.823	15.561	72.415
1,355.00	15.823	31.646	104.061

Device	Routing	Invert	Outlet Devices
#1	Primary	1,348.00'	**36.0" x 80.0' long Culvert X 3.00** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,347.50' S= 0.0063 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=14.26 cfs @ 17.43 hrs HW=1,349.08' TW=1,348.69' (Dynamic Tailwater)
1=Culvert (Outlet Controls 14.26 cfs @ 3.09 fps)

Pond 2P: BASIN 2A



Pond 6P: BASIN 6A

[80] Warning: Exceeded Pond 2P by 0.13' @ 2.00 hrs (0.00 cfs 0.003 af)

Inflow Area = 197.492 ac, Inflow Depth > 1.75" for 5-Year event
Inflow = 21.06 cfs @ 15.65 hrs, Volume= 28.753 af
Outflow = 20.33 cfs @ 15.85 hrs, Volume= 28.577 af, Atten= 3%, Lag= 12.3 min
Primary = 20.33 cfs @ 15.85 hrs, Volume= 28.577 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
Peak Elev= 1,348.88' @ 15.85 hrs Surf.Area= 97,409 sf Storage= 91,659 cf

Plug-Flow detention time= 84.1 min calculated for 28.429 af (99% of inflow)
Center-of-Mass det. time= 73.1 min (1,004.0 - 930.9)

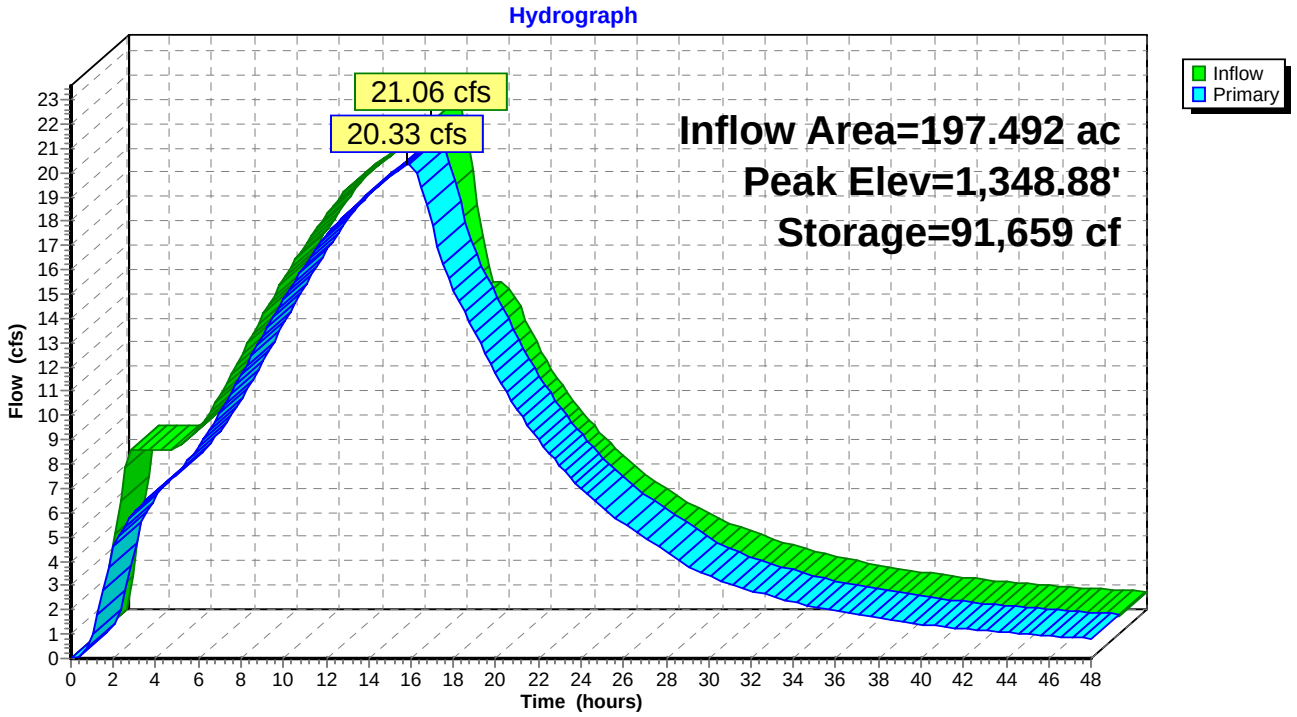
Volume	Invert	Avail.Storage	Storage Description
#1	1,347.50'	669,987 cf	**Custom Stage Data (Prismatic)** Listed below

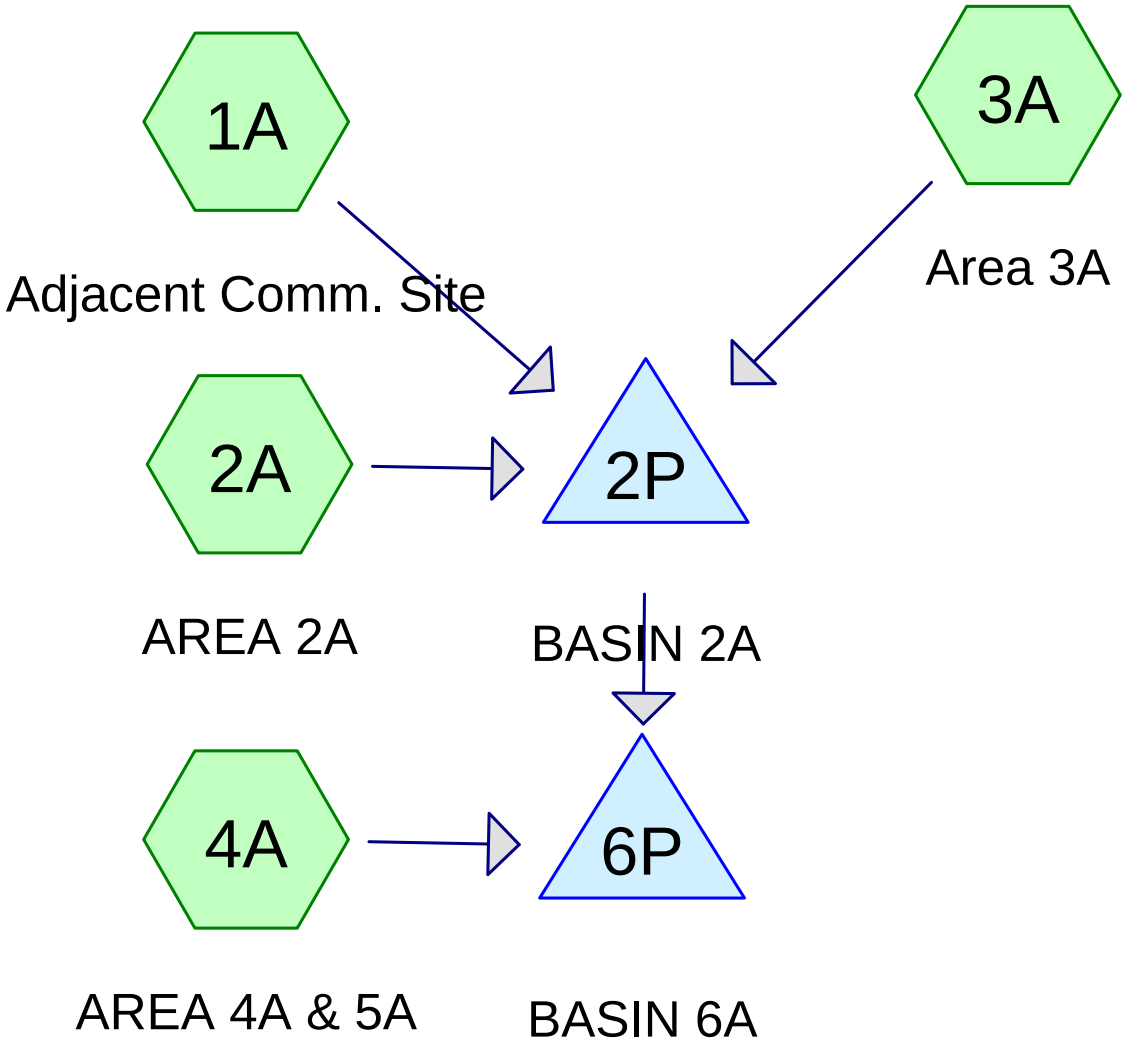
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,347.50	47,337	0	0
1,348.00	49,288	24,156	24,156
1,349.00	103,884	76,586	100,742
1,350.00	134,101	118,993	219,735
1,351.00	145,542	139,822	359,556
1,352.00	155,186	150,364	509,920
1,353.00	164,948	160,067	669,987

Device	Routing	Invert	Outlet Devices
#1	Primary	1,347.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 6.0' Crest Height
#2	Primary	1,349.00'	**8.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=20.31 cfs @ 15.85 hrs HW=1,348.88' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 20.31 cfs @ 3.95 fps)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 6P: BASIN 6A





Subcat Reach Pond Link

Drainage Diagram for Post A 2Yr

Prepared by {enter your company name here} 1/24/2008

Area Listing (all nodes)

Area (acres)	C	Description (subcats)
30.980	0.24	Wetland Area (2A,4A)
106.642	0.49	C Soil Conditions w/ less then 0.4% (1A,2A,4A)
59.870	0.49	School Property (3A)
197.492		

Time span=0.00-48.00 hrs, dt=0.25 hrs, 193 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1A: Adjacent Comm. Site Runoff Area=37.802 ac Runoff Depth=1.59"
Flow Length=1,460' Tc=95.5 min C=0.49 Runoff=3.85 cfs 5.008 af

Subcatchment 2A: AREA 2A Runoff Area=42.040 ac Runoff Depth=1.17"
Flow Length=1,000' Tc=82.8 min C=0.36 Runoff=3.14 cfs 4.092 af

Subcatchment 3A: Area 3A Runoff Area=59.870 ac Runoff Depth=1.59"
Flow Length=1,600' Slope=0.0040 '/' Tc=43.0 min C=0.49 Runoff=6.09 cfs 7.931 af

Subcatchment 4A: AREA 4A & 5A Runoff Area=57.780 ac Runoff Depth=1.46"
Flow Length=1,000' Tc=82.8 min C=0.45 Runoff=5.40 cfs 7.030 af

Pond 2P: BASIN 2A Peak Elev=1,348.88' Storage=12.083 af Inflow=13.08 cfs 17.031 af
36.0" x 80.0' Culvert Outflow=9.12 cfs 12.167 af

Pond 6P: BASIN 6A Peak Elev=1,348.56' Storage=67,192 cf Inflow=14.57 cfs 19.197 af
Outflow=13.85 cfs 19.041 af

Total Runoff Area = 197.492 ac Runoff Volume = 24.061 af Average Runoff Depth = 1.46"
100.00% Pervious Area = 197.492 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1A: Adjacent Comm. Site

5 YEAR .51
100 YEAR .66

[70] Warning: Tc<8dt requires smaller dt

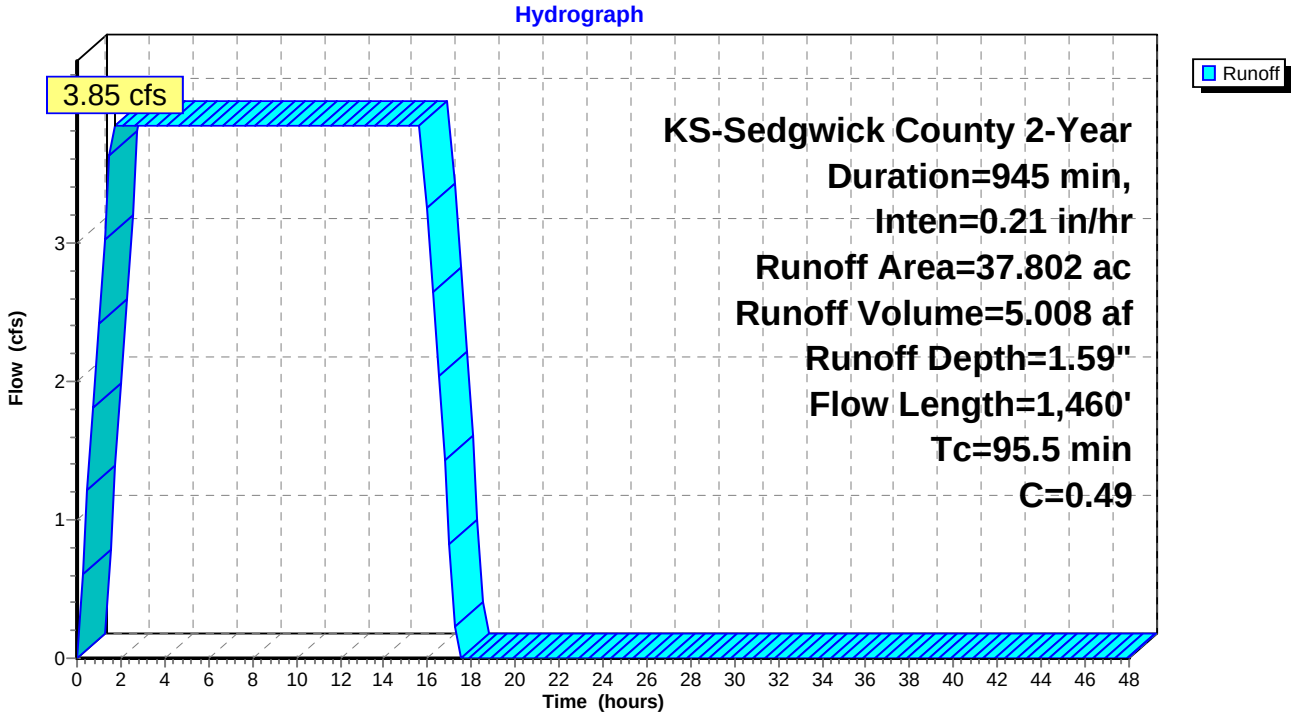
Runoff = 3.85 cfs @ 1.75 hrs, Volume= 5.008 af, Depth= 1.59"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 2-Year Duration=945 min, Inten=0.21 in/hr

Area (ac)	C	Description
37.802	0.49	C Soil Conditions w/ less then 0.4%
37.802	0.49	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
79.4	1,260	0.0007	0.26		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
95.5	1,460	Total			

Subcatchment 1A: Adjacent Comm. Site



Subcatchment 2A: AREA 2A

5 YEAR .51
100 YEAR .66

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[70] Warning: Tc<8dt requires smaller dt

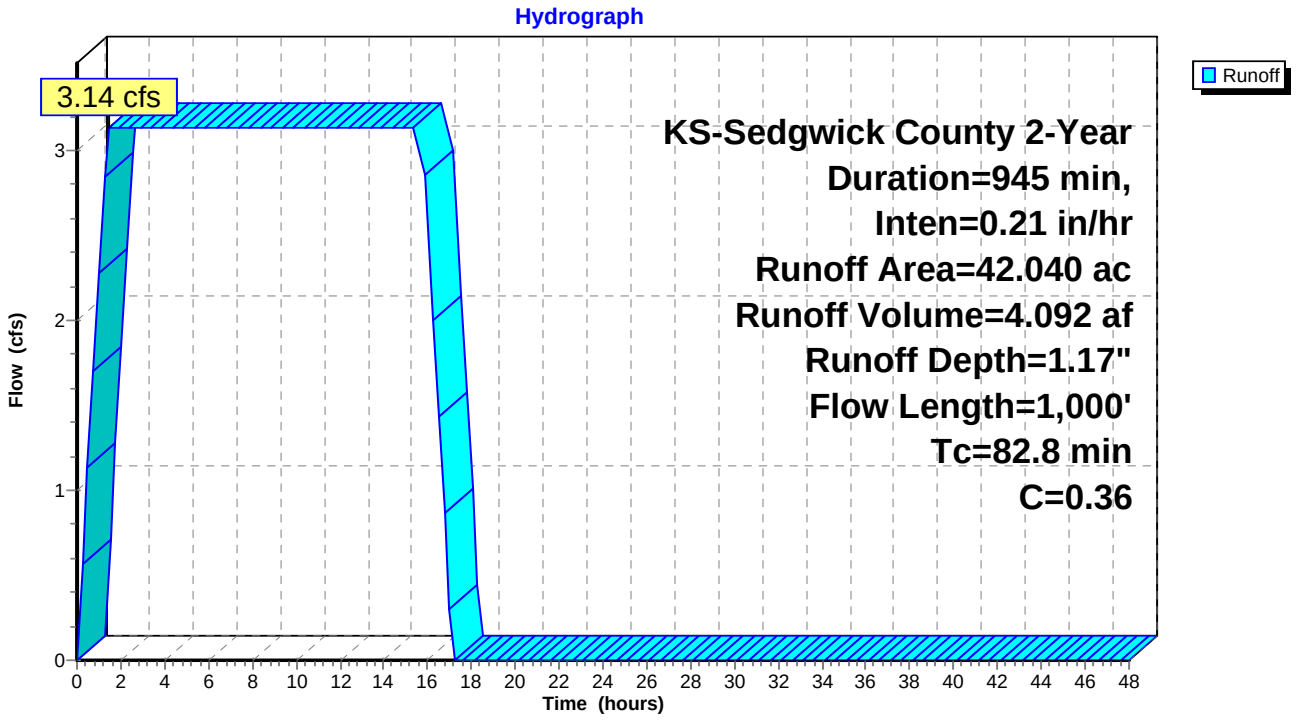
Runoff = 3.14 cfs @ 1.50 hrs, Volume= 4.092 af, Depth= 1.17"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 2-Year Duration=945 min, Inten=0.21 in/hr

Area (ac)	C	Description
20.970	0.49	C Soil Conditions w/ less then 0.4%
21.070	0.24	Wetland Area
42.040	0.36	Weighted Average
42.040	0.36	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
66.7	800	0.0004	0.20		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
82.8	1,000	Total			

Subcatchment 2A: AREA 2A



Subcatchment 3A: Area 3A

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

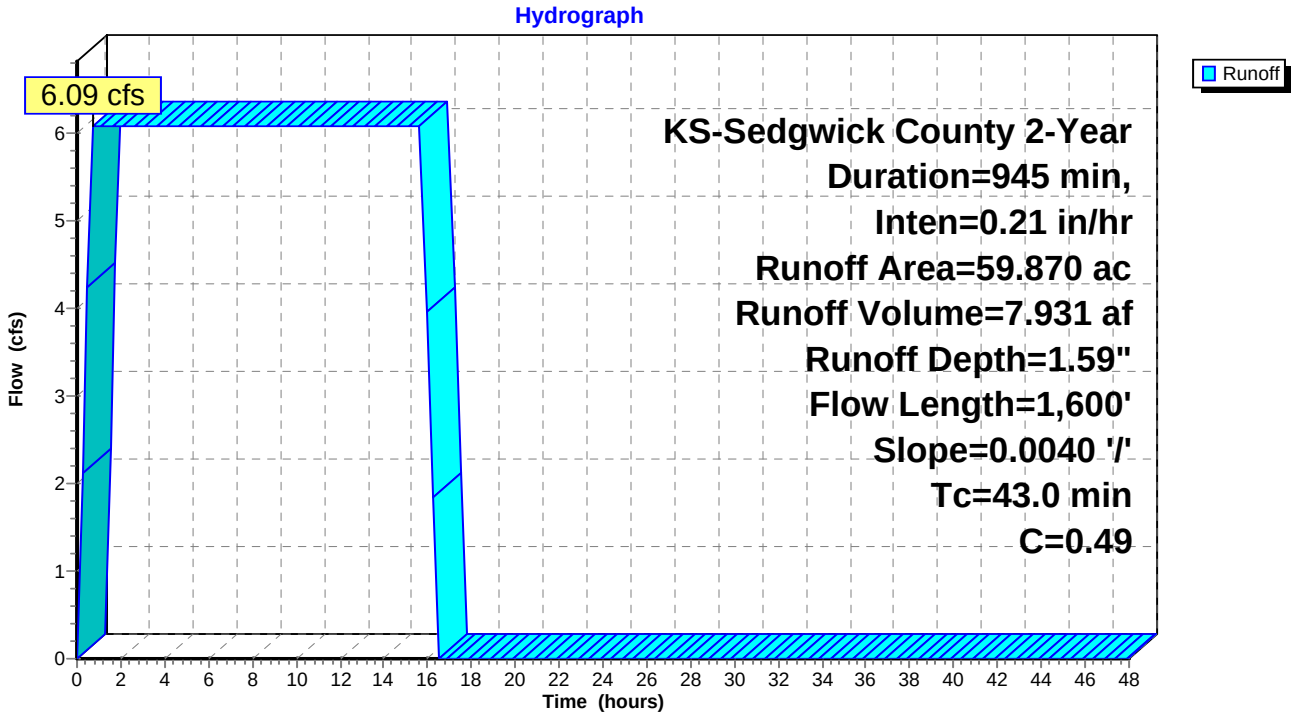
Runoff = 6.09 cfs @ 0.75 hrs, Volume= 7.931 af, Depth= 1.59"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 2-Year Duration=945 min, Inten=0.21 in/hr

Area (ac)	C	Description
59.870	0.49	School Property
59.870	0.49	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
30.3	1,400		0.77		**Direct Entry, channelized flow**
43.0	1,600	Total			

Subcatchment 3A: Area 3A



Subcatchment 4A: AREA 4A & 5A

5 YEAR .51
100 YEAR .66

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[70] Warning: Tc<8dt requires smaller dt

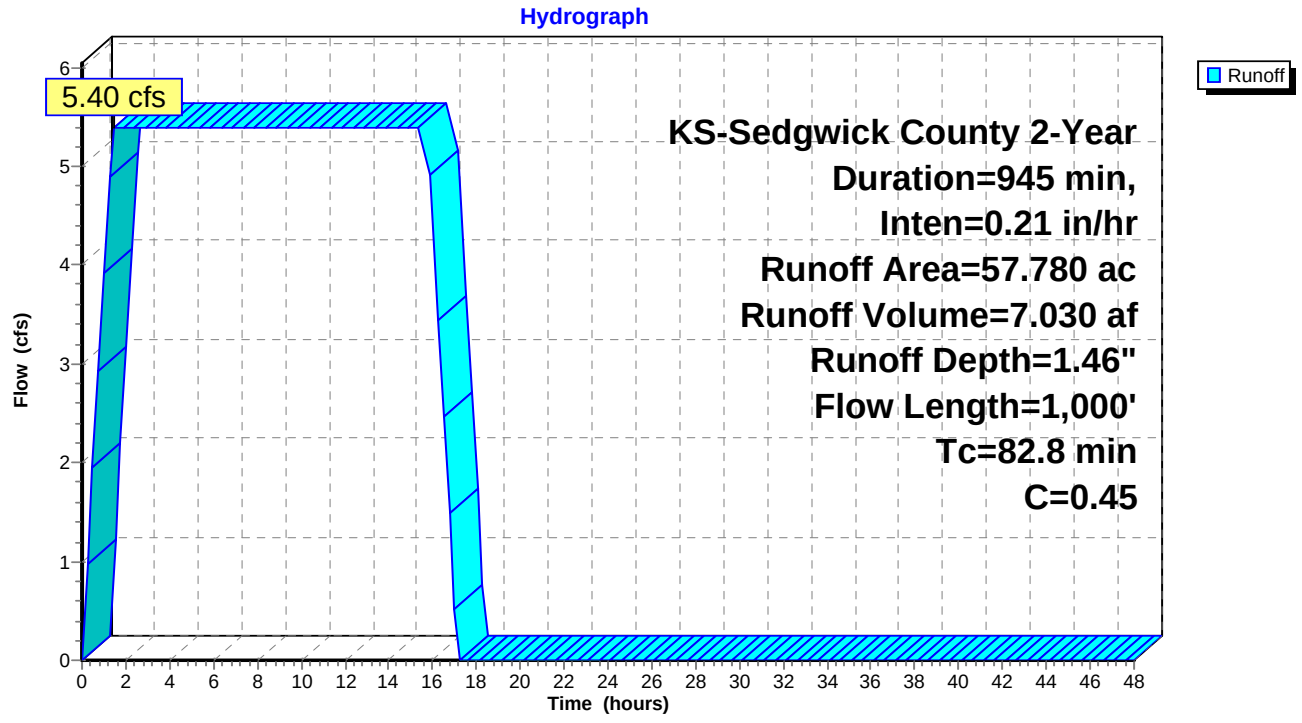
Runoff = 5.40 cfs @ 1.50 hrs, Volume= 7.030 af, Depth= 1.46"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
KS-Sedgwick County 2-Year Duration=945 min, Inten=0.21 in/hr

Area (ac)	C	Description
47.870	0.49	C Soil Conditions w/ less then 0.4%
9.910	0.24	Wetland Area
57.780	0.45	Weighted Average
57.780	0.45	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
66.7	800	0.0004	0.20		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
82.8	1,000	Total			

Subcatchment 4A: AREA 4A & 5A



Pond 2P: BASIN 2A

Inflow Area = 139.712 ac, Inflow Depth = 1.46" for 2-Year event
Inflow = 13.08 cfs @ 1.75 hrs, Volume= 17.031 af
Outflow = 9.12 cfs @ 15.93 hrs, Volume= 12.167 af, Atten= 30%, Lag= 851.0 min
Primary = 9.12 cfs @ 15.93 hrs, Volume= 12.167 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
Peak Elev= 1,348.88' @ 16.05 hrs Surf.Area= 12.875 ac Storage= 12.083 af

Plug-Flow detention time= 832.8 min calculated for 12.104 af (71% of inflow)
Center-of-Mass det. time= 705.0 min (1,211.8 - 506.8)

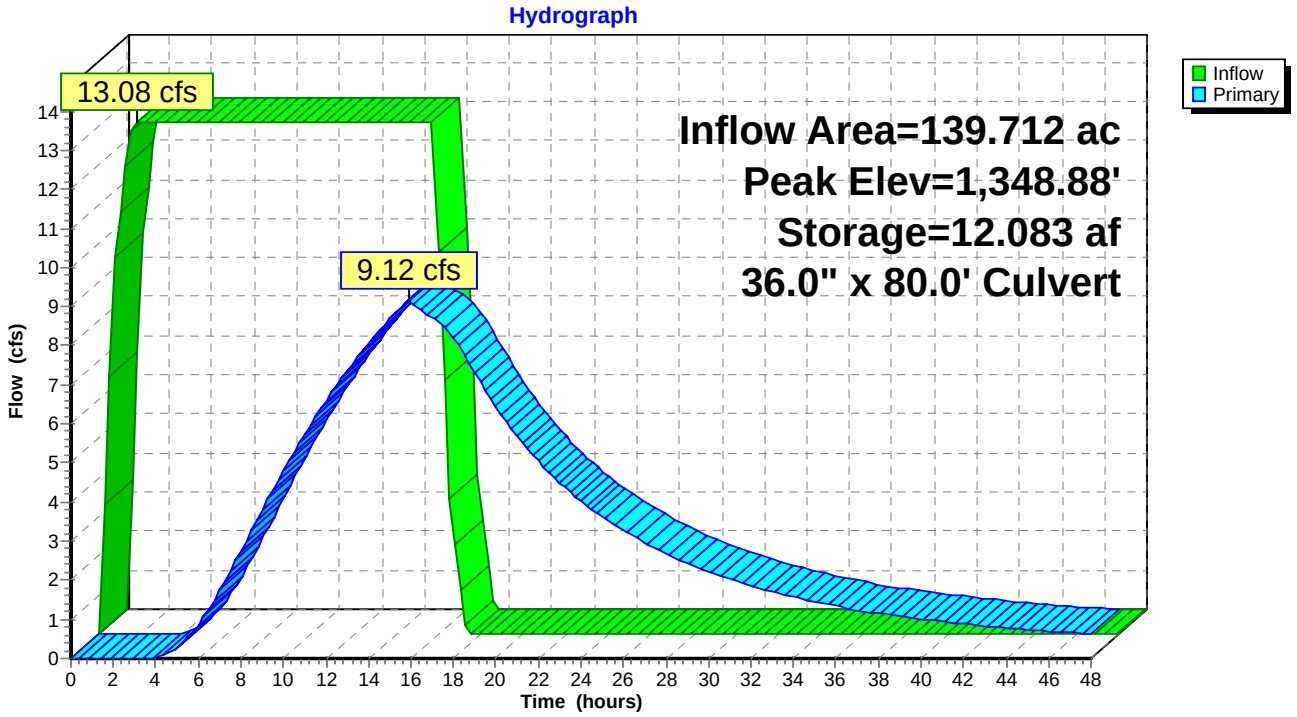
Volume	Invert	Avail.Storage	Storage Description
#1	1,347.50'	104.061 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,347.50	4.551	0.000	0.000
1,348.00	7.211	2.940	2.940
1,349.00	13.683	10.447	13.387
1,350.00	14.219	13.951	27.339
1,351.00	14.757	14.488	41.827
1,352.00	15.299	15.028	56.854
1,353.00	15.823	15.561	72.415
1,355.00	15.823	31.646	104.061

Device	Routing	Invert	Outlet Devices
#1	Primary	1,348.00'	**36.0" x 80.0' long Culvert X 3.00** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,347.50' S= 0.0063 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=9.05 cfs @ 15.93 hrs HW=1,348.87' TW=1,348.56' (Dynamic Tailwater)
1=Culvert (Outlet Controls 9.05 cfs @ 2.64 fps)

Pond 2P: BASIN 2A



Pond 6P: BASIN 6A

[80] Warning: Exceeded Pond 2P by 0.01' @ 3.25 hrs (0.00 cfs 0.000 af)

Inflow Area = 197.492 ac, Inflow Depth > 1.17" for 2-Year event
Inflow = 14.57 cfs @ 15.66 hrs, Volume= 19.197 af
Outflow = 13.85 cfs @ 15.93 hrs, Volume= 19.041 af, Atten= 5%, Lag= 16.3 min
Primary = 13.85 cfs @ 15.93 hrs, Volume= 19.041 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.25 hrs
Peak Elev= 1,348.56' @ 15.93 hrs Surf.Area= 79,967 sf Storage= 67,192 cf

Plug-Flow detention time= 90.3 min calculated for 18.943 af (99% of inflow)
Center-of-Mass det. time= 75.7 min (1,032.1 - 956.4)

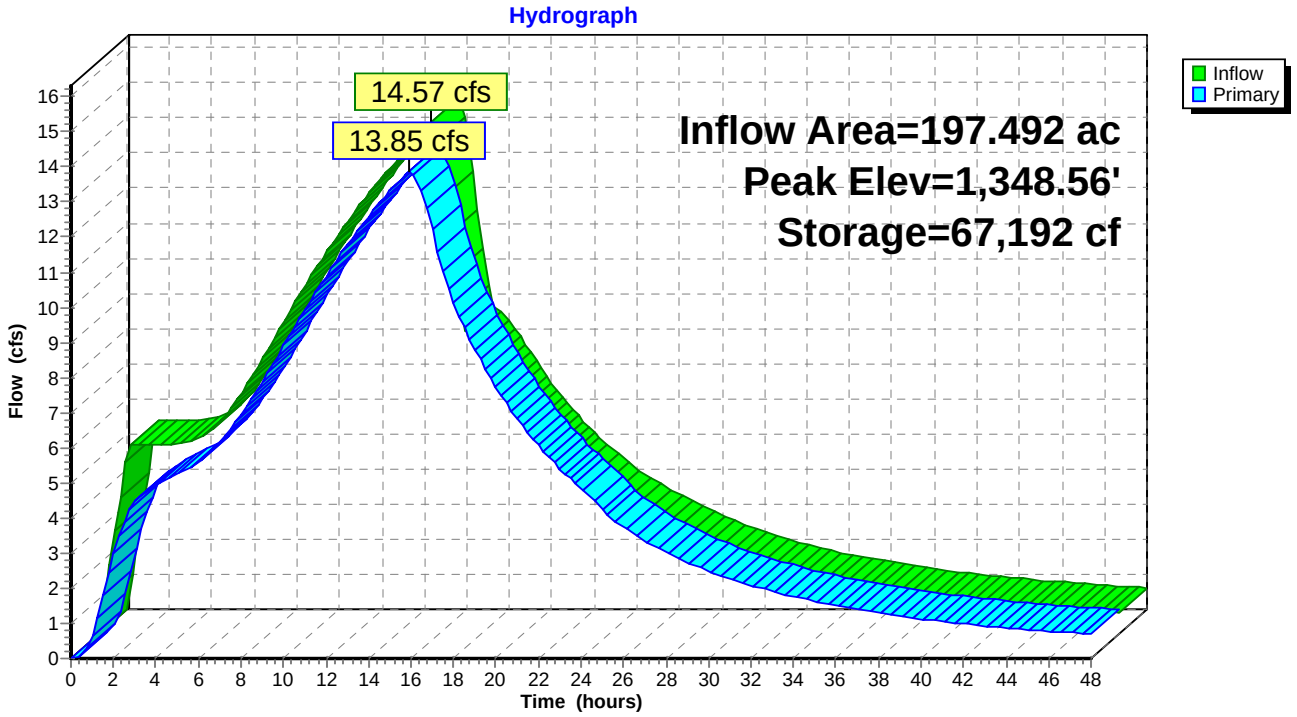
Volume	Invert	Avail.Storage	Storage Description
#1	1,347.50'	669,987 cf	**Custom Stage Data (Prismatic)** Listed below

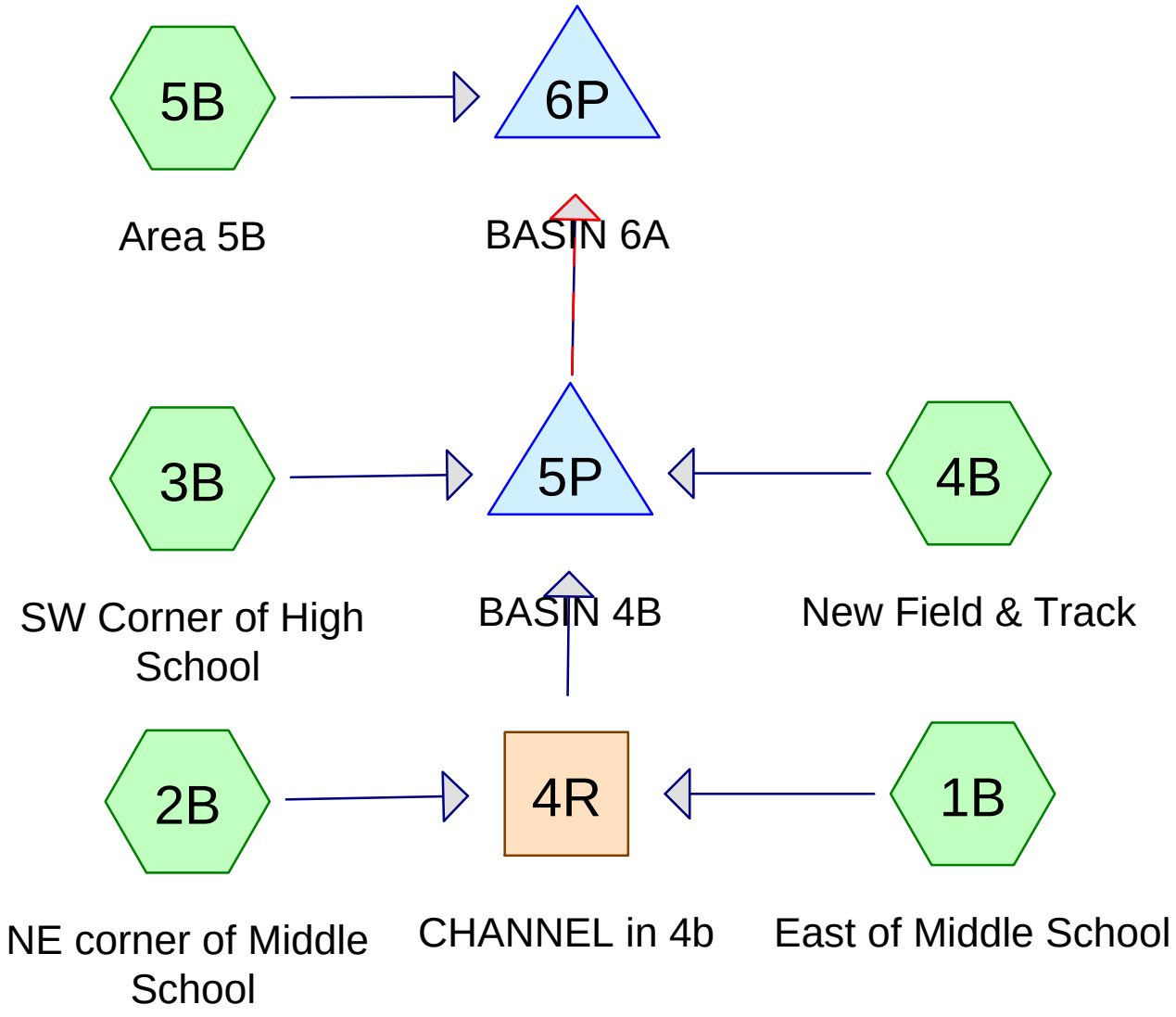
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,347.50	47,337	0	0
1,348.00	49,288	24,156	24,156
1,349.00	103,884	76,586	100,742
1,350.00	134,101	118,993	219,735
1,351.00	145,542	139,822	359,556
1,352.00	155,186	150,364	509,920
1,353.00	164,948	160,067	669,987

Device	Routing	Invert	Outlet Devices
#1	Primary	1,347.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 6.0' Crest Height
#2	Primary	1,349.00'	**8.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=13.83 cfs @ 15.93 hrs HW=1,348.56' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 13.83 cfs @ 3.44 fps)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 6P: BASIN 6A





Subcat Reach Pond Link

Drainage Diagram for Post B 5yr

Prepared by {enter your company name here} 1/24/2008

Area Listing (all nodes)

Area (acres)	C	Description (subcats)
22.393	0.27	Detention Area (5B)
25.855	0.27	School Property (4B)
14.623	0.51	C Soil Conditions w/ 1% to 4% (1B)
11.478	0.51	High School (5B)
43.228	0.51	School Property (2B,3B)
117.577		

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1B: East of Middle School Runoff Area=14.623 ac Runoff Depth=1.96"
Flow Length=500' Tc=25.3 min C=0.51 Runoff=3.05 cfs 2.394 af

Subcatchment 2B: NE corner of Middle School Runoff Area=9.408 ac Runoff Depth=1.96"
Flow Length=800' Slope=0.0040 '/' Tc=25.7 min C=0.51 Runoff=1.96 cfs 1.540 af

Subcatchment 3B: SW Corner of High School Runoff Area=33.820 ac Runoff Depth=1.96"
Flow Length=2,000' Slope=0.0040 '/' Tc=39.5 min C=0.51 Runoff=7.05 cfs 5.537 af

Subcatchment 4B: New Field & Track Runoff Area=25.855 ac Runoff Depth=1.04"
Flow Length=400' Slope=0.0040 '/' Tc=15.7 min C=0.27 Runoff=2.85 cfs 2.241 af

Subcatchment 5B: Area 5B Runoff Area=33.871 ac Runoff Depth=1.35"
Flow Length=850' Tc=18.4 min C=0.35 Runoff=4.85 cfs 3.805 af

Reach 4R: CHANNEL in 4b Avg. Depth=0.63' Max Vel=1.59 fps Inflow=5.01 cfs 3.934 af
n=0.026 L=1,200.0' S=0.0037 '/' Capacity=324.84 cfs Outflow=5.01 cfs 3.934 af

Pond 5P: BASIN 4B Peak Elev=1,344.33' Storage=2.803 af Inflow=14.92 cfs 11.712 af
Primary=14.48 cfs 11.712 af Secondary=0.00 cfs 0.000 af Outflow=14.48 cfs 11.712 af

Pond 6P: BASIN 6A Peak Elev=1,341.65' Storage=8.488 af Inflow=19.33 cfs 15.518 af
24.0" x 100.0' Culvert Outflow=9.94 cfs 13.087 af

Total Runoff Area = 117.577 ac Runoff Volume = 15.517 af Average Runoff Depth = 1.58"
100.00% Pervious Area = 117.577 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1B: East of Middle School

5 YEAR .51
100 YEAR .66

[70] Warning: Tc<8dt requires smaller dt

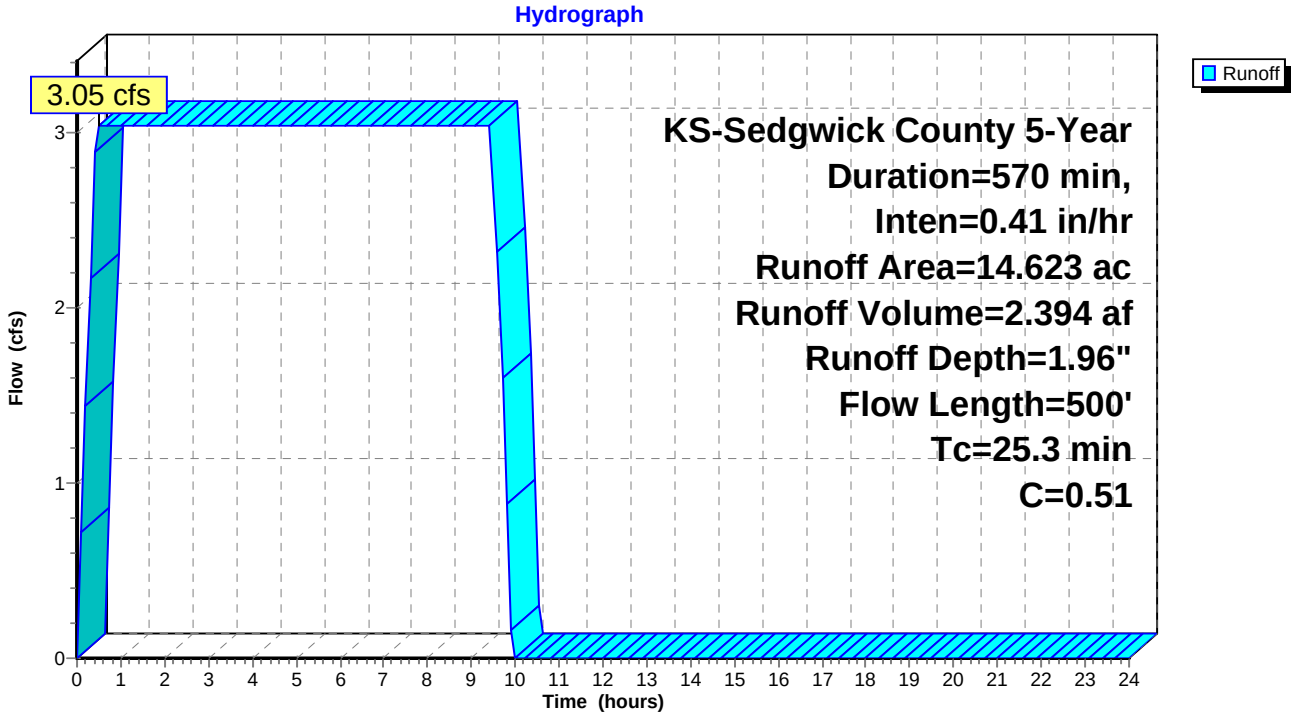
Runoff = 3.05 cfs @ 0.50 hrs, Volume= 2.394 af, Depth= 1.96"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 5-Year Duration=570 min, Inten=0.41 in/hr

Area (ac)	C	Description
14.623	0.51	C Soil Conditions w/ 1% to 4%
14.623	0.51	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0150	0.21		**Sheet Flow,** Range n= 0.130 P2= 3.60"
9.2	300	0.0013	0.54		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
25.3	500	Total			

Subcatchment 1B: East of Middle School



Subcatchment 2B: NE corner of Middle School

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

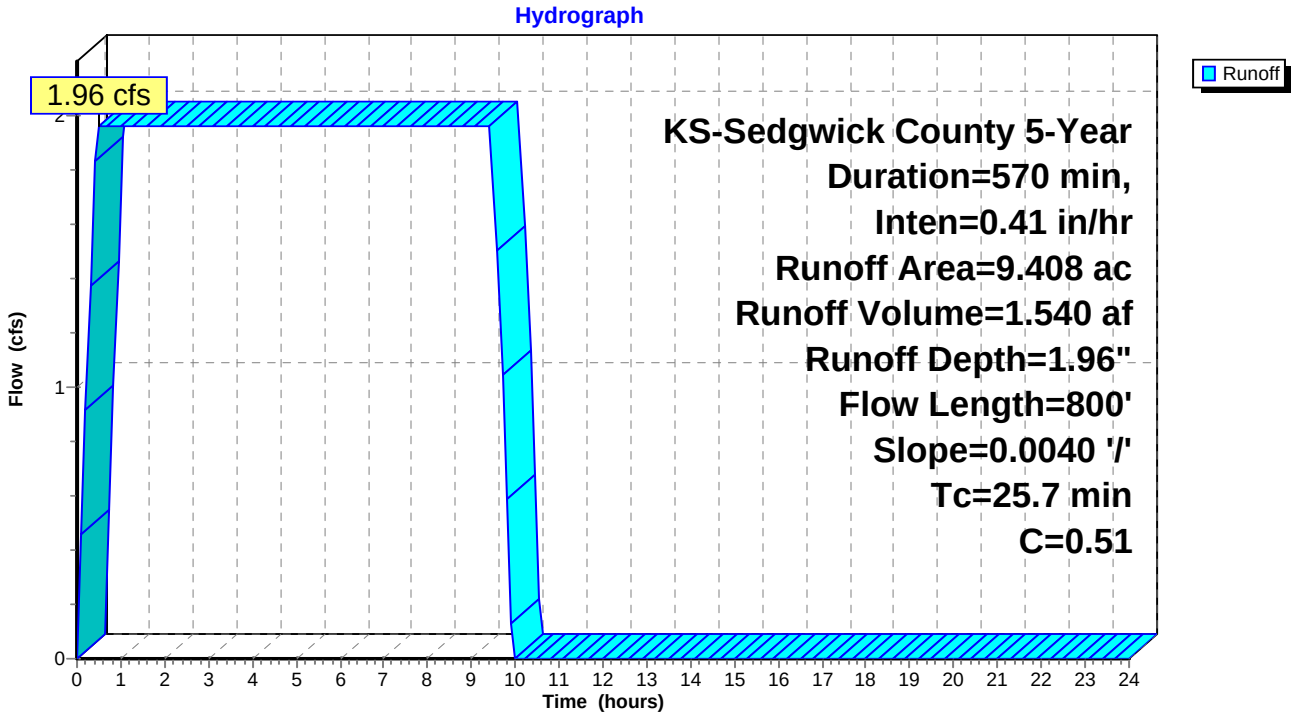
Runoff = 1.96 cfs @ 0.50 hrs, Volume= 1.540 af, Depth= 1.96"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 5-Year Duration=570 min, Inten=0.41 in/hr

Area (ac)	C	Description
9.408	0.51	School Property
9.408	0.51	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
13.0	600		0.77		**Direct Entry, channelized flow**
25.7	800	Total			

Subcatchment 2B: NE corner of Middle School



Subcatchment 3B: SW Corner of High School

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

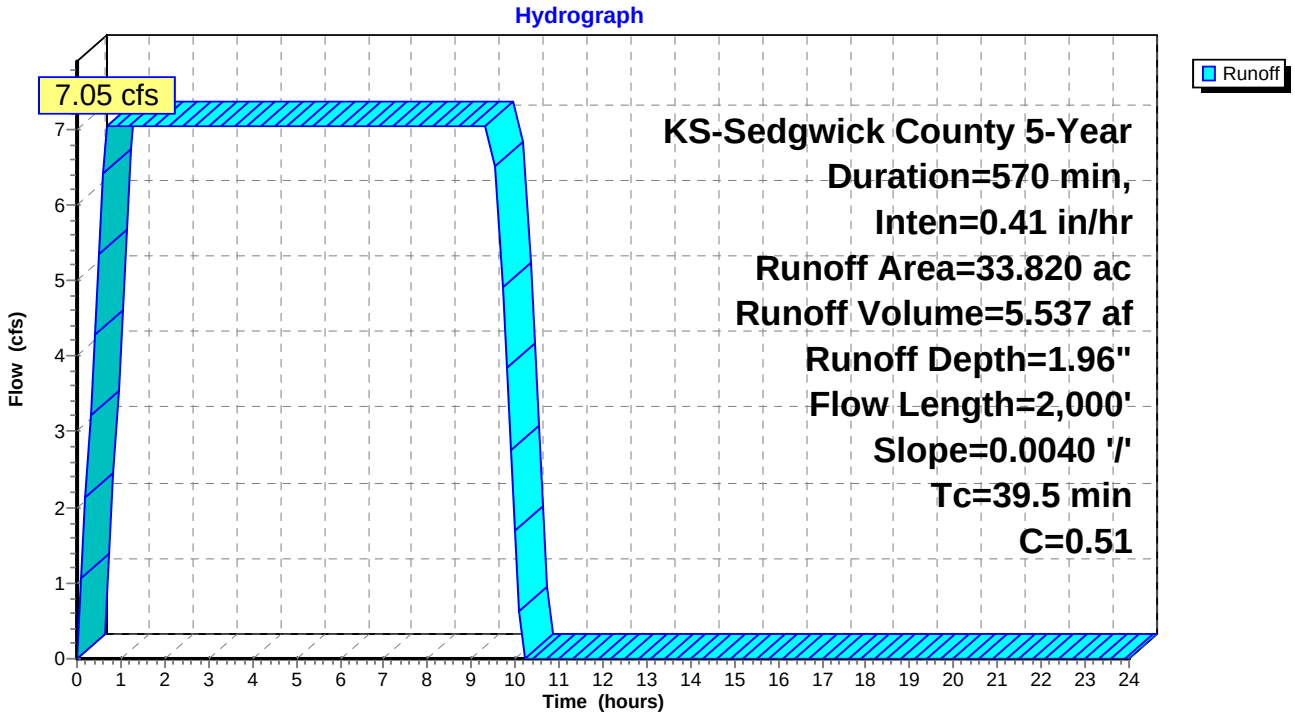
Runoff = 7.05 cfs @ 0.70 hrs, Volume= 5.537 af, Depth= 1.96"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 5-Year Duration=570 min, Inten=0.41 in/hr

Area (ac)	C	Description
33.820	0.51	School Property
33.820	0.51	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
26.8	1,800		1.12		**Direct Entry, channelized flow**
39.5	2,000	Total			

Subcatchment 3B: SW Corner of High School



Subcatchment 4B: New Field & Track

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

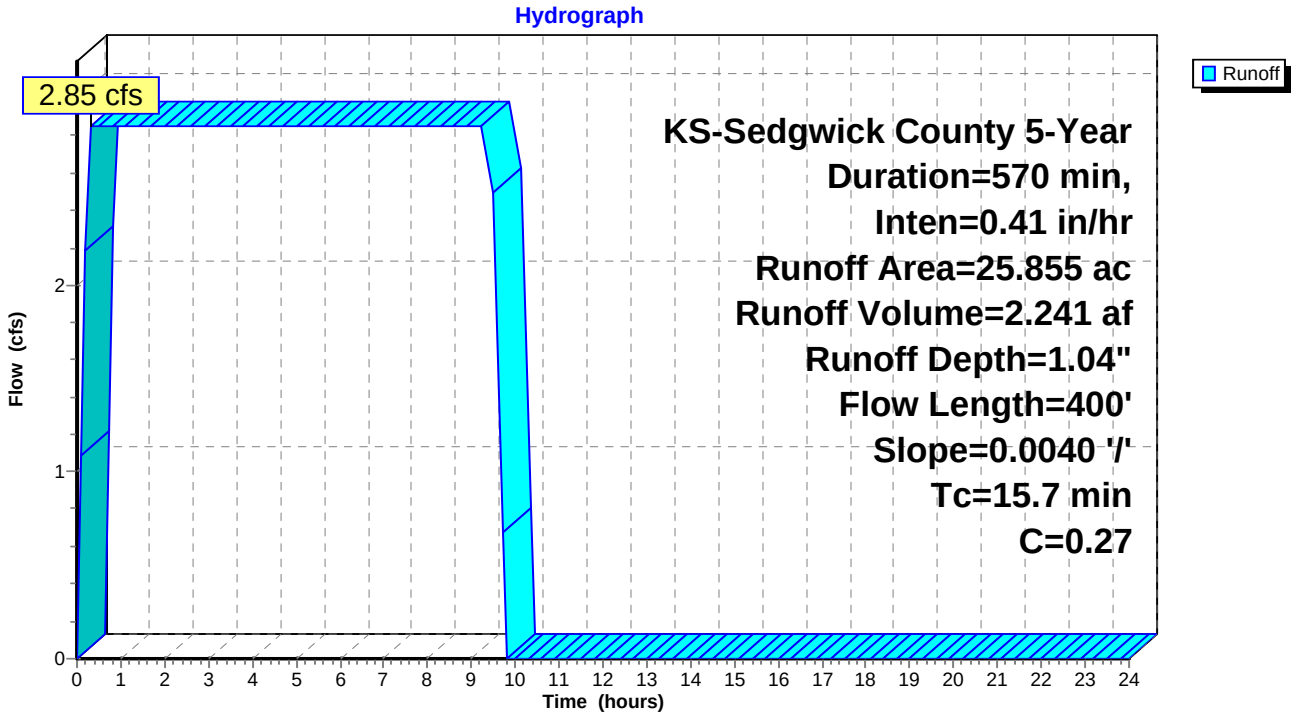
Runoff = 2.85 cfs @ 0.30 hrs, Volume= 2.241 af, Depth= 1.04"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 5-Year Duration=570 min, Inten=0.41 in/hr

Area (ac)	C	Description
25.855	0.27	School Property
25.855	0.27	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	200	0.0040	0.26		**Sheet Flow, field and sports area** Fallow n= 0.050 P2= 3.60"
3.0	200		1.12		**Direct Entry, channelized flow**
15.7	400	Total			

Subcatchment 4B: New Field & Track



Subcatchment 5B: Area 5B

5 year 0.51
100 year 0.66

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[70] Warning: Tc<8dt requires smaller dt

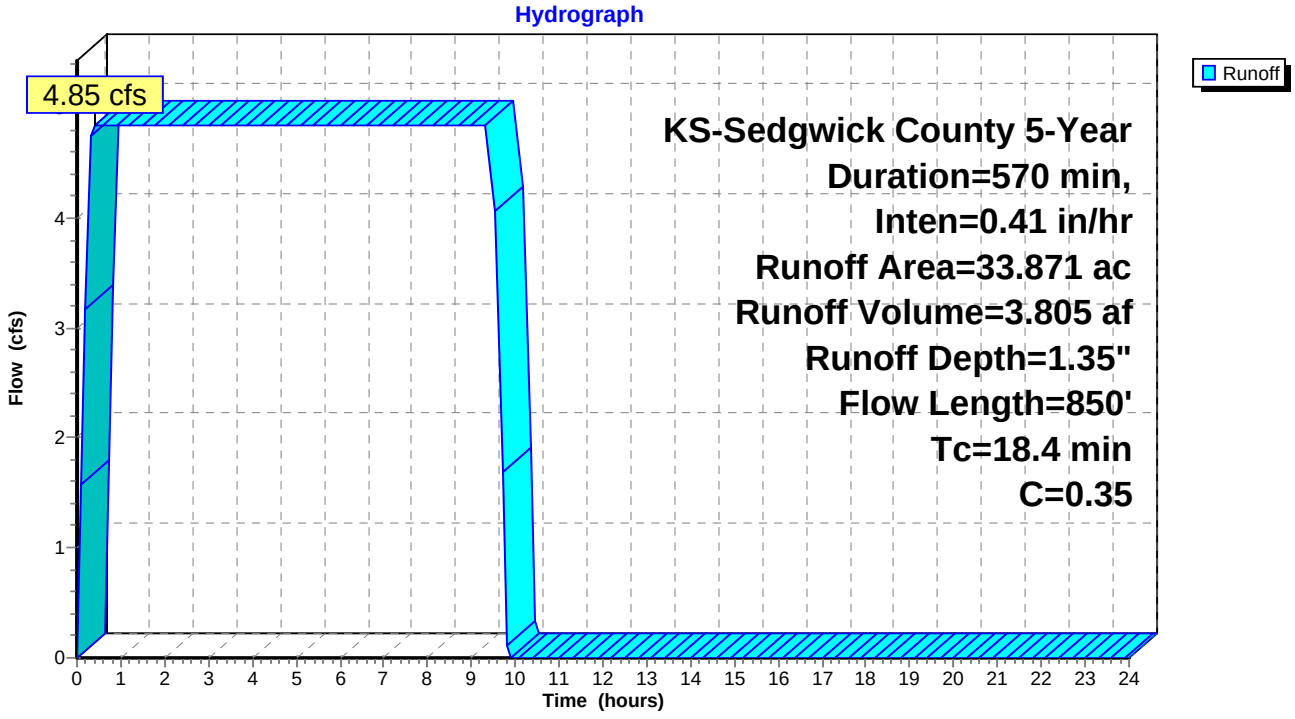
Runoff = 4.85 cfs @ 0.40 hrs, Volume= 3.805 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
KS-Sedgwick County 5-Year Duration=570 min, Inten=0.41 in/hr

Area (ac)	C	Description
22.393	0.27	Detention Area
11.478	0.51	High School
33.871	0.35	Weighted Average
33.871	0.35	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	850		0.77		**Direct Entry, channelized flow**

Subcatchment 5B: Area 5B



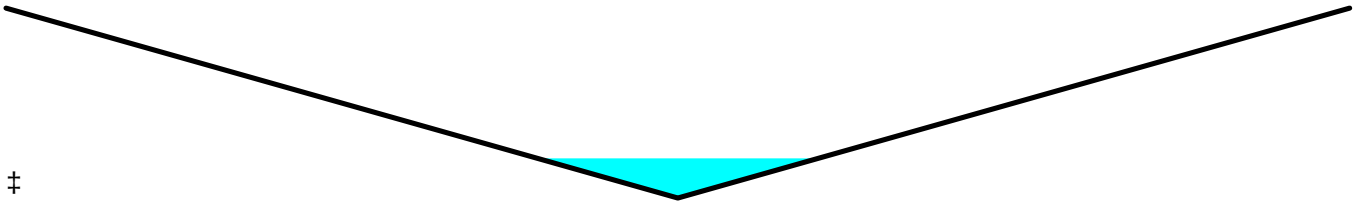
Reach 4R: CHANNEL in 4b

Inflow Area = 24.031 ac, Inflow Depth = 1.96" for 5-Year event
Inflow = 5.01 cfs @ 0.50 hrs, Volume= 3.934 af
Outflow = 5.01 cfs @ 5.90 hrs, Volume= 3.934 af, Atten= 0%, Lag= 324.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 12.6 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 22.0 min

Peak Storage= 3,781 cf @ 5.90 hrs, Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 324.84 cfs

0.00' x 3.00' deep channel, n= 0.026
Side Slope Z-value= 8.0 '/' Top Width= 48.00'
Length= 1,200.0' Slope= 0.0037 '/'
Inlet Invert= 1,349.40', Outlet Invert= 1,345.00'



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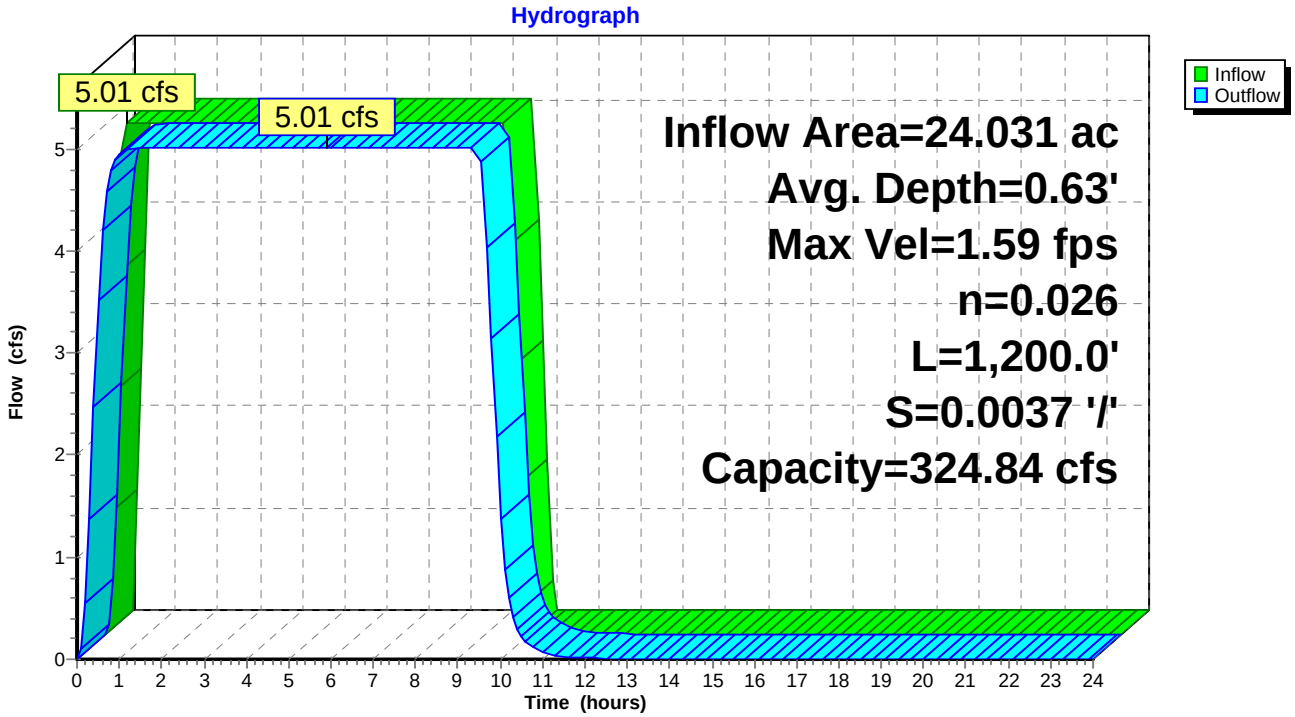
Reach 4R: CHANNEL in 4b



Pond 5P: BASIN 4B

Inflow Area = 83.706 ac, Inflow Depth = 1.68" for 5-Year event
Inflow = 14.92 cfs @ 5.90 hrs, Volume= 11.712 af
Outflow = 14.48 cfs @ 9.49 hrs, Volume= 11.712 af, Atten= 3%, Lag= 215.2 min
Primary = 14.48 cfs @ 9.49 hrs, Volume= 11.712 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 1,344.33' @ 9.49 hrs Surf.Area= 3.571 ac Storage= 2.803 af

Plug-Flow detention time= 129.5 min calculated for 11.663 af (100% of inflow)
Center-of-Mass det. time= 130.6 min (435.1 - 304.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1,343.00'	18.975 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

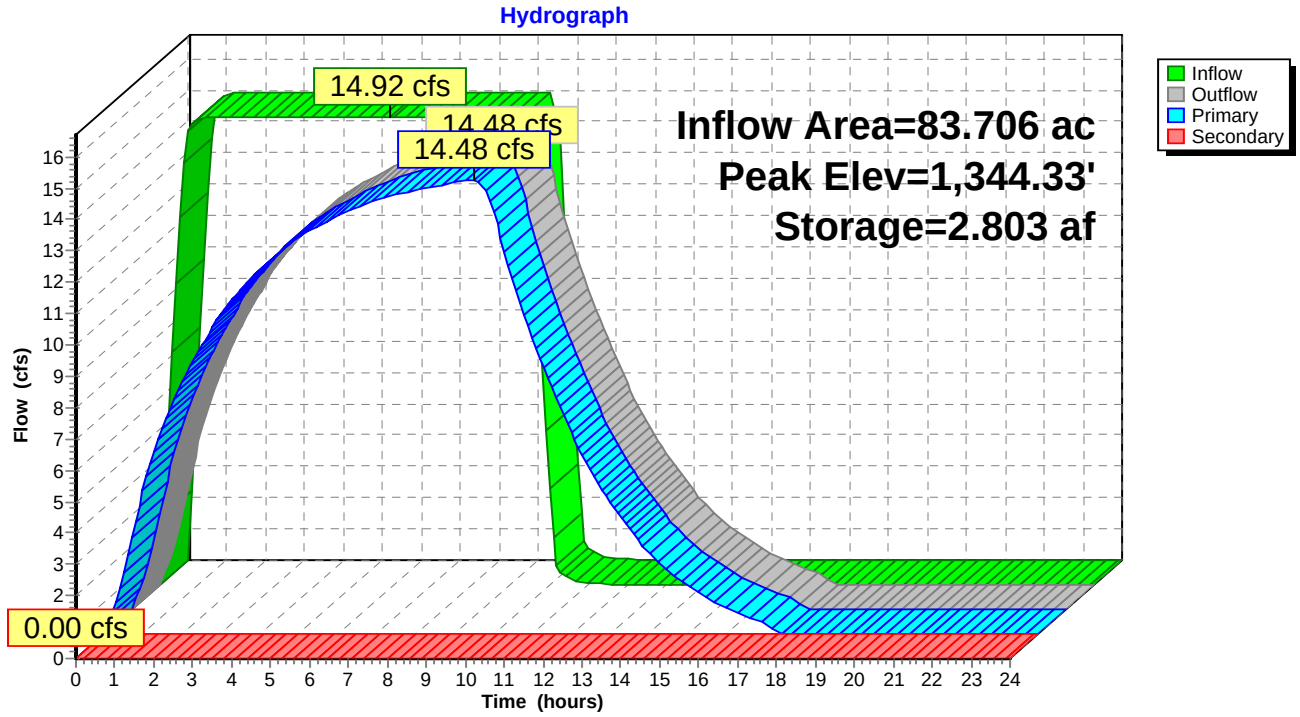
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,343.00	0.115	0.000	0.000
1,344.00	3.230	1.672	1.672
1,345.00	4.256	3.743	5.415
1,346.00	4.568	4.412	9.827
1,347.00	4.568	4.568	14.395
1,348.00	4.591	4.579	18.975

Device	Routing	Invert	Outlet Devices
#1	Primary	1,342.80'	**24.0" x 128.0' long Culvert X 2.00** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,342.50' S= 0.0023 '/' Cc= 0.900 n= 0.013
#2	Secondary	1,347.00'	**200.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 5.0' Crest Height

Primary OutFlow Max=14.48 cfs @ 9.49 hrs HW=1,344.33' TW=1,341.63' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 14.48 cfs @ 3.88 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,343.00' TW=1,340.40' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: BASIN 4B



Pond 6P: BASIN 6A

Inflow Area = 117.577 ac, Inflow Depth = 1.58" for 5-Year event
Inflow = 19.33 cfs @ 9.50 hrs, Volume= 15.518 af
Outflow = 9.94 cfs @ 10.86 hrs, Volume= 13.087 af, Atten= 49%, Lag= 81.9 min
Primary = 9.94 cfs @ 10.86 hrs, Volume= 13.087 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 1,341.65' @ 10.86 hrs Surf.Area= 17.348 ac Storage= 8.488 af

Plug-Flow detention time= 420.2 min calculated for 13.032 af (84% of inflow)
Center-of-Mass det. time= 361.9 min (762.5 - 400.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1,340.40'	40.987 af	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 2

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,340.40	0.115	0.000	0.000
1,341.00	2.196	0.693	0.693
1,342.00	12.112	7.154	7.847
1,343.00	13.180	12.646	20.493

Device	Routing	Invert	Outlet Devices
#1	Primary	1,340.40'	**24.0" x 100.0' long Culvert X 2.00** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,340.20' S= 0.0020 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=9.94 cfs @ 10.86 hrs HW=1,341.65' (Free Discharge)
1=Culvert (Barrel Controls 9.94 cfs @ 3.43 fps)

Pond 6P: BASIN 6A