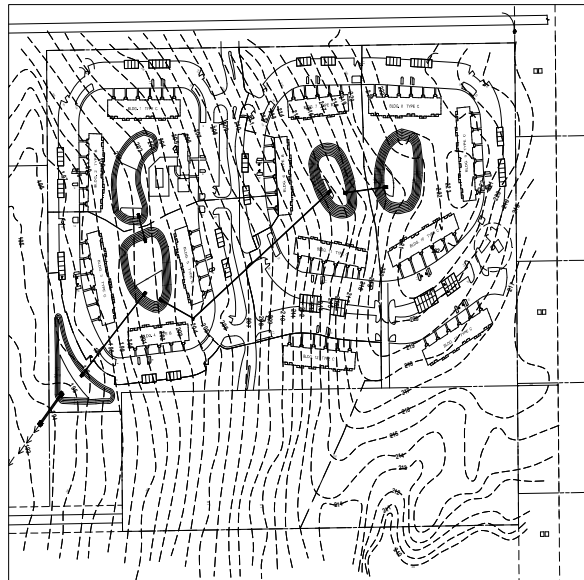


Drainage Report

Stoney Pointe Addition, 29th St. N and Greenwich To Wichita, Sedgwick County, Kansas



November, 2010



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

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Drainage Report

Stoney Pointe Addition

Introduction

The subject property is located about ¼ mile east of the intersection of 29th Street North and Greenwich road on south of the 29th St. North. The tract of land is approximately 45.8 acres and is currently zoned as Limited Industrial (LI). This area is undeveloped and is covered by grass. The proposed use of the land is 34.2 acres apartment complex and 11.6 acres commercial area. The proposed development will consist of apartment buildings, parking lots and other facilities for apartment residents. The site is shown on the quadrangle map, attached in Tab 1.

Current Conditions

The site is in the City of Wichita and is served by the city of Wichita utilities. The site is currently undeveloped and pastureland. There is a swale west of the property which runs South, about three quarters of the property drains to the swale which finally drains through the 2-3'x6' RCB culverts under K-96. The rest of the property drains towards a swale on southeast of the property which further drains to south through 2-48" RCPs under K-96. The soils are of Type D, with an average slope of 2.0%. Most of the property currently drains in to an existing farm pond located southwest of the property. The existing farm pond also receives runoff from the area of about 29 acres north of 29th Street as shown in existing drainage plan.

The undeveloped platted areas on the east and the west of the property are zone limited industrial (LI). The unplatted property on the south is SF-20. The land north of the property, north of 29th Street, is currently zoned as Rural Residential (RR).

According to FIRM, the entire site is in Zone X- areas outside the 500-yr floodplain. There are no signs of wetlands and the nearest 100-yr floodplain (Zone A) is on the west of Greenwich Road, southwest of the property, as indicated on attached FIRM panel in tab 4.

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

Proposed Improvements

The proposed improvements are an apartment complex with apartment buildings, parking lots, drive approaches and other facilities including detention basins, on the north, and unknown commercial development on the south. The entire site will be mass graded with detention ponds, building pads and access drives. The excavation from the dry detention ponds will be used to build up the pads and drives. There will be 5 different dry detention ponds interlinked together to achieve the required detention which is dictated

by the capacity of 2-3'x6' RCB culverts under K-96, east of K-96 and Greenwich. While modeling the proposed detention facility, a target discharge was set by proportioning the area of the property to the total watershed contributing to the flow in 2-3'x6' RCB culverts with the assumed condition that the culvert is operating in full capacity. The calculations are shown in attached existing drainage condition sheet in tab 2.

The proposed detention pond 1 drains to detention pond 2, pond 2 and 3 into pond 4, pond 4 into pond 5 which will drain into the existing swale on the southwest of the property through 2-24" RCPs as shown in the drainage plan. Internal storm water system will be developed and designed to collect the runoff from each area to the corresponding ponds. A cross lot drainage agreement will be provided to drain the outflow of the drainage system into the reserve (as plated previously) on southwest corner of the property.

The entire site in a fully developed condition indicates a 100-yr peak runoff of 145.8 cfs out of which only **36.8 cfs** (16 % of culvert capacity=230 cfs) is allowed as the peak runoff from the site. The proposed interlinked series of detention ponds in the developed condition will achieve the required detention with 100-year peak flow of **35.3** cfs leaving the detention system.

Hydrological models representing the existing and proposed developed conditions were modeled using the HydroCAD 8.00 and the output is attached in the Hydrological analysis section in tab 3.

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 basins. The erosion control plan will have to constantly evolve as the site develops.

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 Storm 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 tab 2. 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 ponds. Detention Pond routing and peak runoff calculations have been developed by Dynamic Storage-Indication Method, with the duration of storm varied to illustrate maximum detention and peak runoff for each storm event. A critical duration analysis was also computed for the proposed detention system contributing to peak out flow from the system for a particular rainfall event.

Hydraulic Model

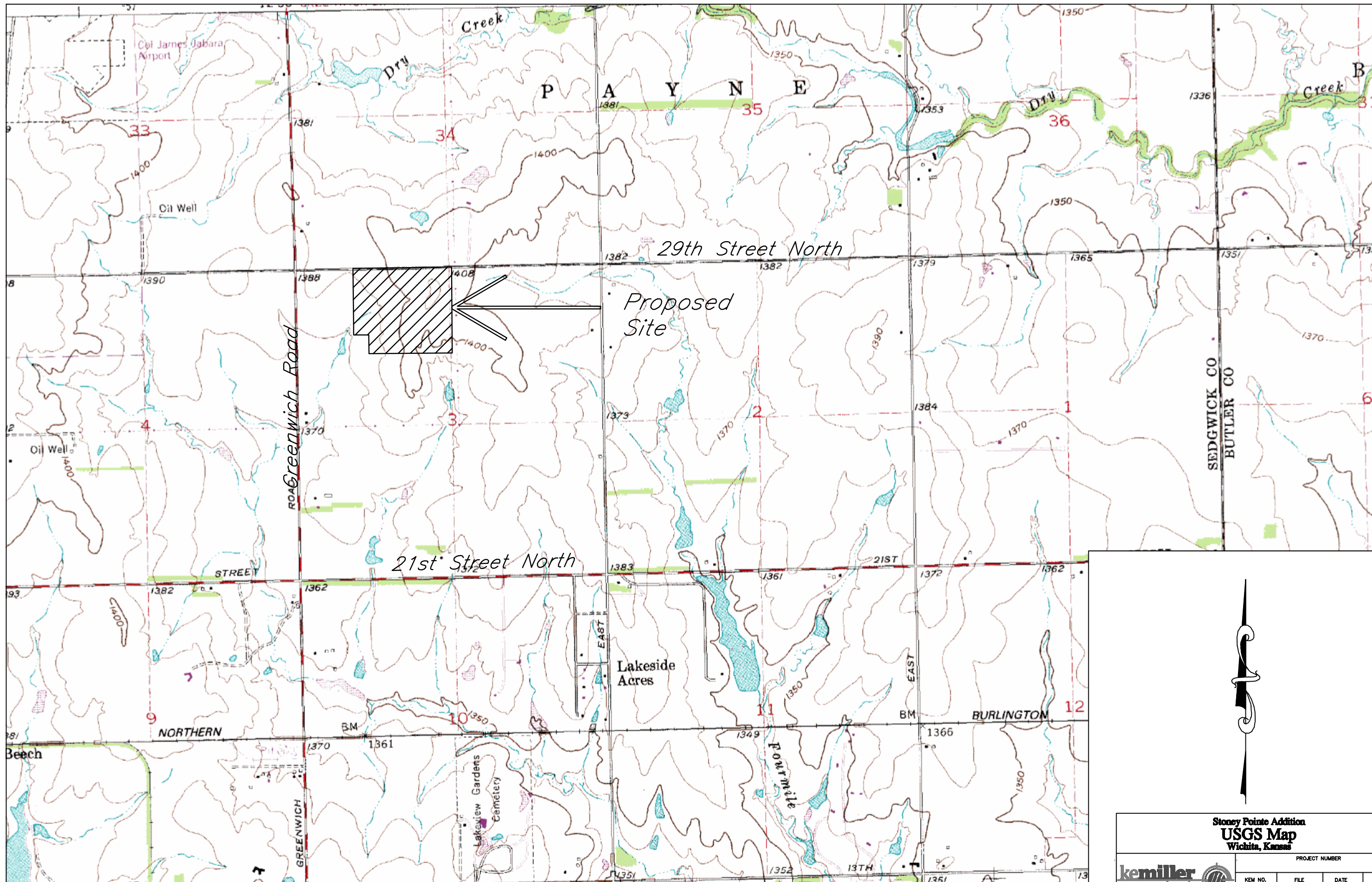
An Analysis of hydraulic characteristics will be developed to carry the water from each drainage area to the corresponding detention pond as the site evolves.

Future Development

The north area of about 34.2 acres of the site is an apartment complex with buildings, parking lots and other facilities to the apartment residents and the south portion of about 11.6 acres will eventually develop as a commercial area with zoning Limited Commercial (LC).

The future site will require internal storm sewer planning through pipes or surface drainage system to bring the water from each drainage area to the corresponding detention pond.

USGS Map with Area Highlighted
Preliminary plat

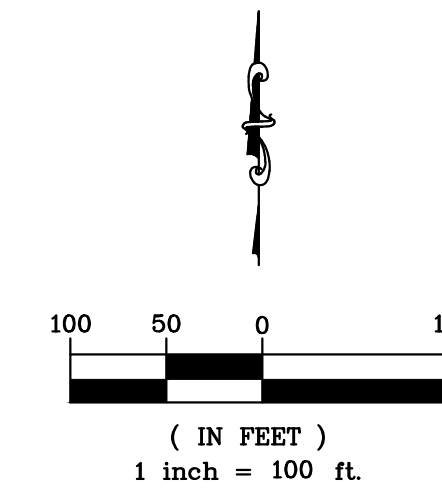


**Stoney Point Addition
USGS Map
Wichita, Kansas**

PROJECT NUMBER			
KEM NO. 10058	FILE drainage	DATE 11/2010	SHEET 1 OF 1
DESIGN GP	DRAWN GP	REVISED	

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

One-Step Final Plat
Stoney Pointe
Wichita, Sedgwick County, Kansas
 Part of the NW 1/4, Section 3
 Township 27 South, Range 2 East of the 6th. P.M.



5/8" Rebar (set) KEMPA CLS #157

State of Kansas } ss
 County of Sedgwick }

I, **Bradley C. Ward**, a licensed land surveyor of the State of Kansas, do hereby certify that the following described tract of land was surveyed on the 12th day of October, 2010, and the accompanying final plat prepared and that all the monuments shown herein actually exist and their positions are correctly shown to the best of my knowledge and belief:

LEGAL DESCRIPTION

Beginning at the Northeast corner of Lot 1, Block 2, of Greenwich Business Center Addition, an addition to Wichita, Sedgwick County, Kansas; thence S 0°35'43" E, a distance of 912.96 feet; thence S 89°14'33" W, a distance of 1366.03 feet; thence S 0°32'28" E, a distance of 50.00 feet; thence S 89°14'33" W, a distance of 250.00 feet; thence N 0°32'28" W, a distance of 963.76 feet; thence N 89°16'15" E, a distance of 1615.17 feet to the Point of Beginning. Said tract 34.16 acres, more or less.

AND:

Commencing at the Northeast corner of Lot 1, Block 2, of Greenwich Business Center Addition, an addition to Wichita, Sedgwick County, Kansas; thence S 0°35'43" E, a distance of 912.96 feet, to the Place of Beginning; thence S 0°35'43" E, a distance of 370.00 feet; thence S 89°14'33" W, a distance of 1366.38 feet; thence N 0°32'28" W, a distance of 370.00 feet; thence N 89°14'33" E, a distance of 1366.03 feet, to the Point of Beginning. Said tract contains 45.77 acres more or less.

All easements and Rights of Way within said tract are hereby vacated by virtue of KSA 12-512(b) amended.

Bradley C. Ward, L.S. #920 _____ Date

BENCHMARK
 Brass disc on top of curb in front of fire hydrant, Lot 1, Block 1, Regency Park Addition to Wichita, Sedgwick County, Kansas. Elevation=1378.96 (NGVD 29)

Entered on transfer record this _____ day of _____, 2010.

Kelly B. Arnold, County Clerk

State of Kansas } ss
 County of Sedgwick }

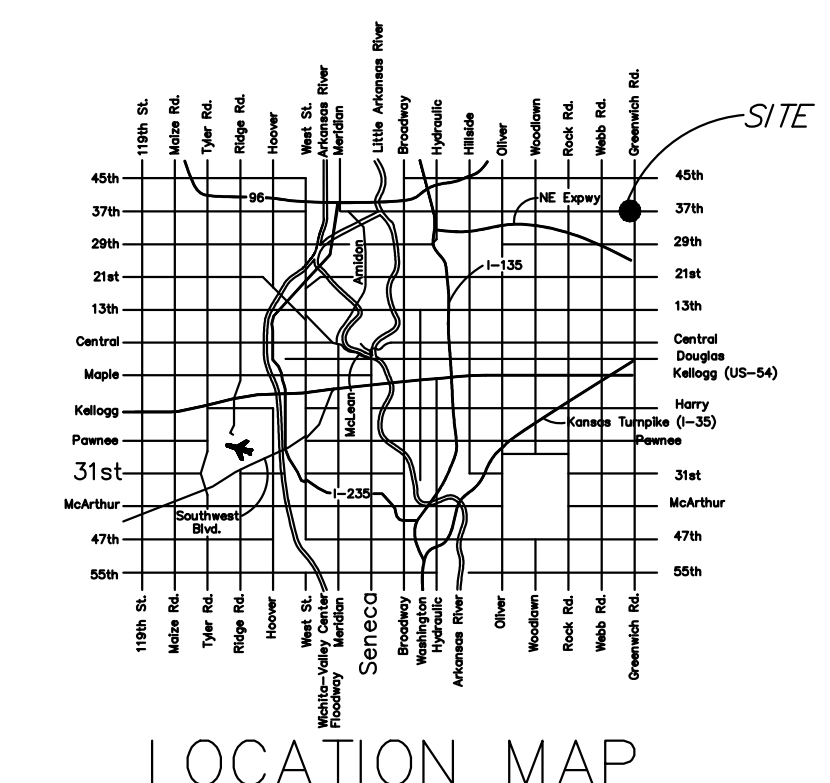
This is to certify that this plat has been filed for record in the Office of the Register of Deeds this _____ day of _____, 2010, at _____ o'clock M; and is duly recorded.

Bill Meek, Register of Deeds

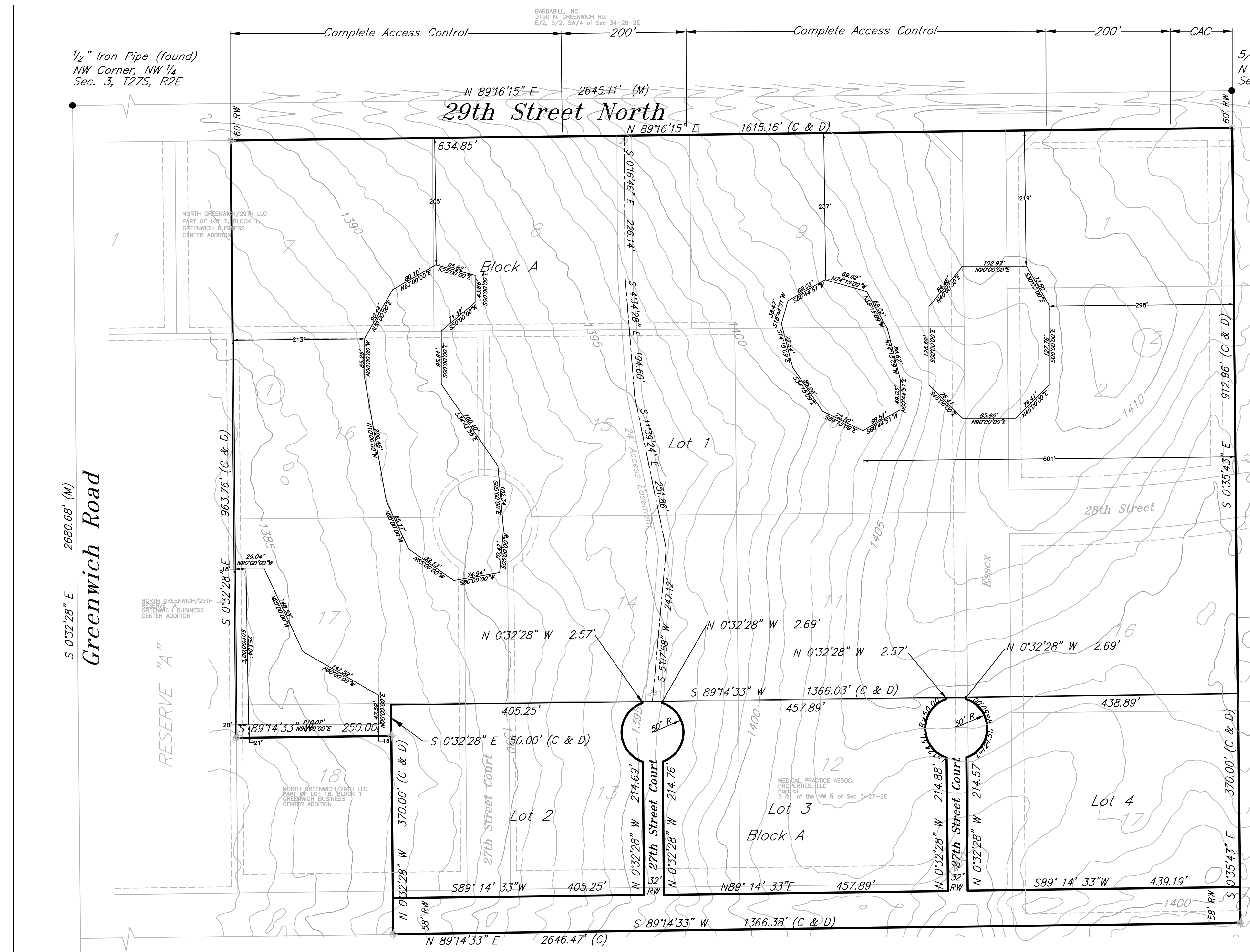
Tonya Buckingham, Deputy

Reviewed in accordance with K.S.A. 58-2005 on this _____ day of _____, 2010.

Tricia L. Robello, L.S. #1246
 Deputy County Surveyor
 Sedgwick County, Kansas



Filename: 10088\29TH AND Greenwich.dwg



State of Kansas } ss
 City of Wichita }
 This plat of Stoney Pointe School Addition, Wichita, Sedgwick County, Kansas, has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas. Dated this _____ day of _____, 2010. Wichita-Sedgwick County Metropolitan Area Planning Commission.

G. Nelson Van Fleet, Chair

John L. Schlegel, Secretary

State of Kansas } ss
 City of Wichita }
 This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this _____ day of _____, 2010.

At the Direction of the City Council

Carl Brewer, Mayor

Karen Sublett, City Clerk

1/2" Iron Pipe (found)
 W 1/4 Corner, NW 1/4
 Sec. 3, T27S, R2E

State of Kansas } ss
 County of Sedgwick }

Know all men by these presents, that we, the undersigned, have caused the land described in the surveyor's certificate to be platted into a Lot and Block to be known as Stoney Pointe Addition, Wichita, Sedgwick County, Kansas. Any easements are hereby granted as indicated for constructing, maintaining, operating, and repairing public utilities. A drainage plan has been developed for the plat and all drainage easements, rights-of-way, or reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of stormwater. And further that the land contained herein is held and shall be conveyed subject to any applicable restrictions, reservations and covenants now on file or hereafter filed in the Office of the Register of Deeds of Sedgwick County, Kansas.

By: _____, owner _____ Date

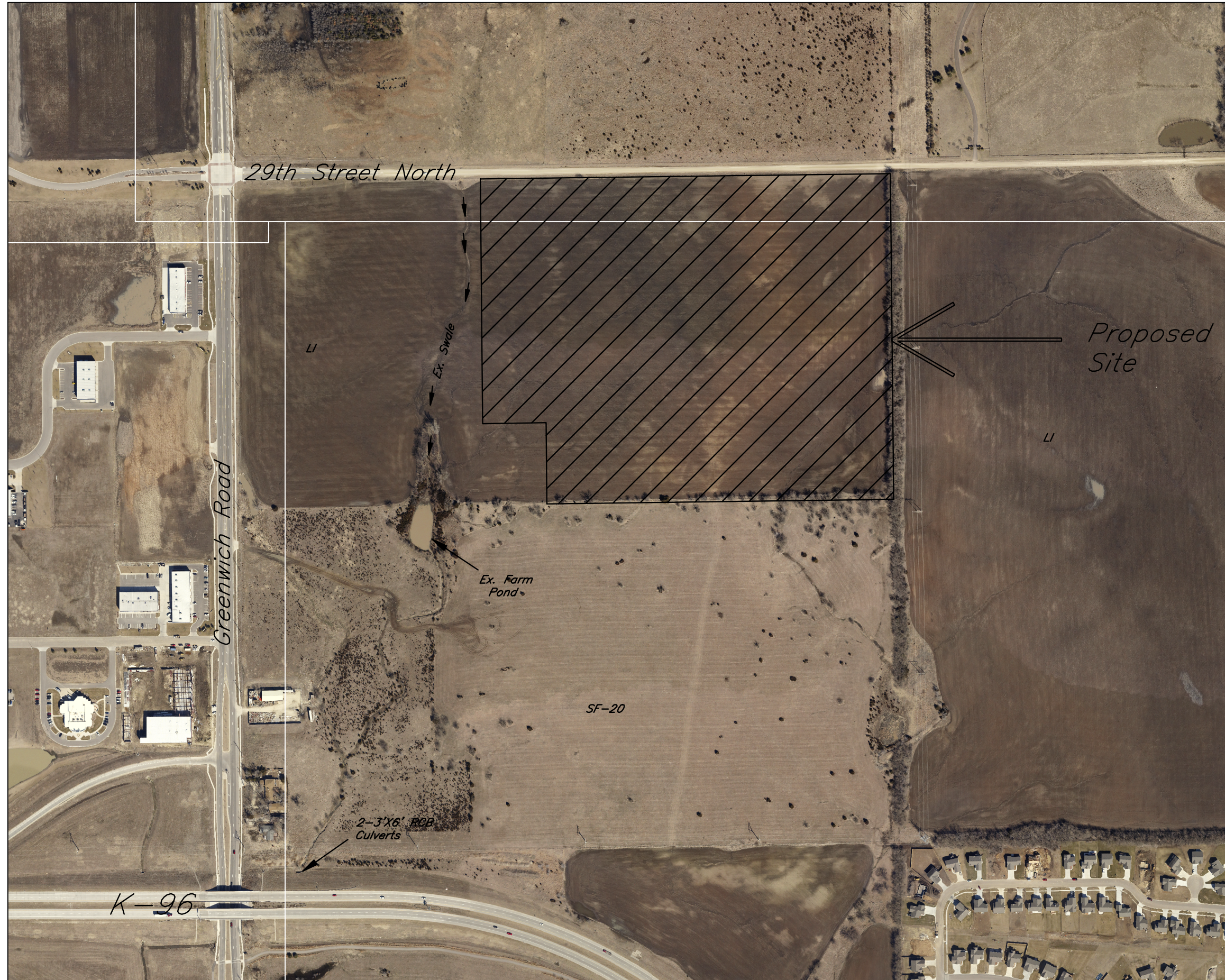
State of Kansas } ss
 County of Sedgwick }

This instrument was acknowledged before me on this _____ day of _____, 2010, by

_____, owner

Notary Public
 My Commission Expires: _____

Aerial Photograph
Existing Drainage System
Preliminary Plat



Garden Apartments, 29th and Greenwich
Aerial Map
 Wichita, Kansas

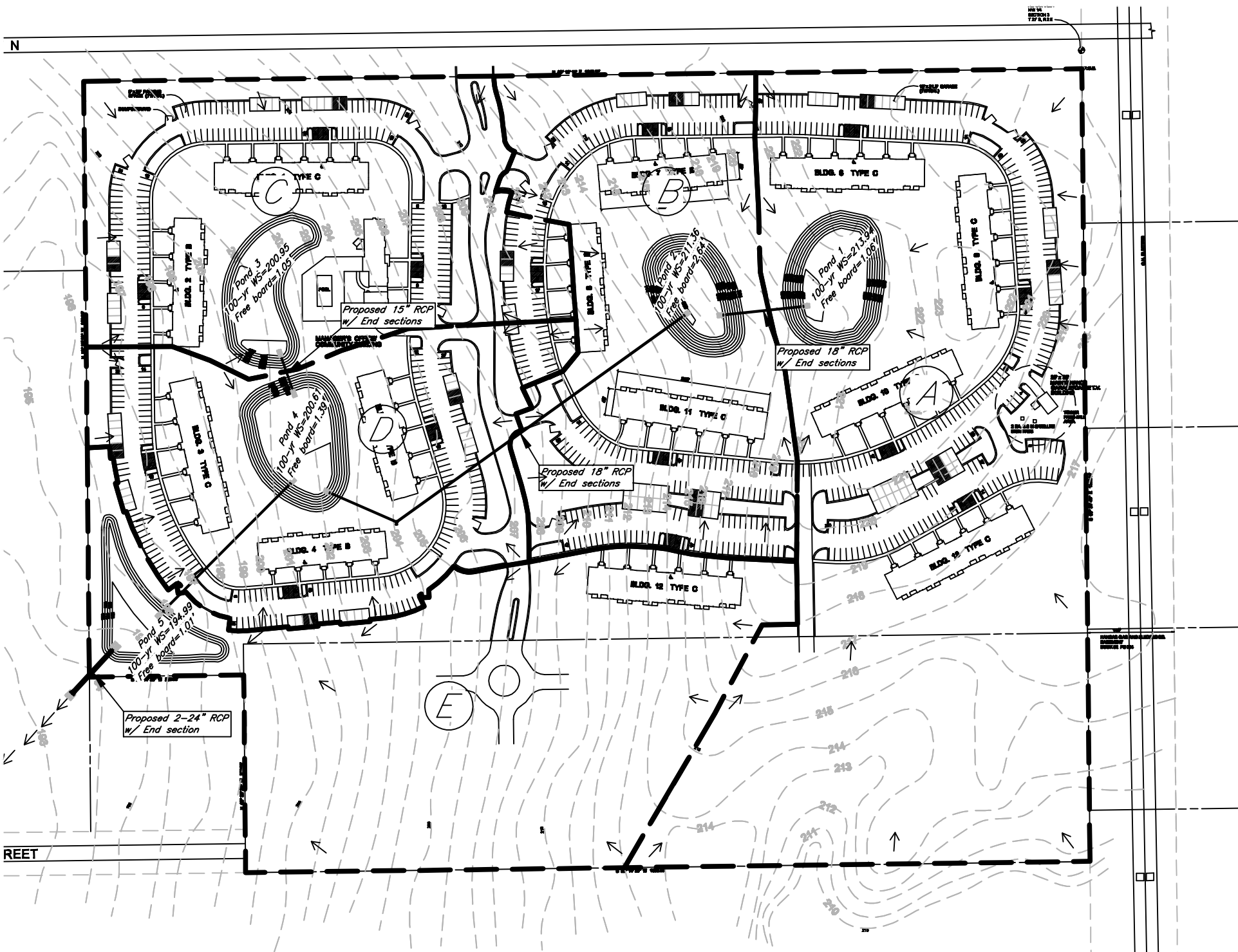
kemiller
 engineering

PROJECT NUMBER			
KEM NO. 10088	FILE drainage	DATE 10/2010	SHEET 1
DESIGN GP	DRAWN GP	REVISED	OF 1

516 S. Market,
 Wichita, KS 67202

316/264-0242

Developed Drainage Plan
Water Quality Calculations
Hydrological Analysis



Developed Condition:

Total Site Area= 45.77 Acres
Land use: Apartment Complex

Drainage Area	Acres	Tc min	C2	I2	C5	I5	C10	I10	C50	I50	C100	I100	Remark
A	15.91	25.8	0.69	1.69	0.72	2.15	0.77	2.53	0.81	3.37	0.84	3.73	Area Draining in to Pond 1
B	6.95	15.8	0.70	1.69	0.73	2.15	0.79	2.53	0.83	3.37	0.86	3.73	Area Draining in to Pond 2
C	7.21	16.2	0.70	1.69	0.73	2.15	0.79	2.53	0.83	3.37	0.86	3.73	Area Draining in to Pond 3
D	6.49	15.2	0.70	1.69	0.73	2.15	0.79	2.53	0.83	3.37	0.86	3.73	Area Draining in to Pond 4
E	9.22	16.8	0.69	1.69	0.70	2.15	0.75	2.53	0.80	3.37	0.82	3.73	Area Draining in to Pond 5

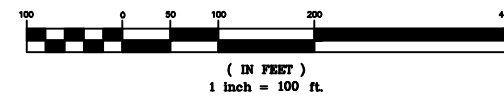
Critical Duration for peak flow=60 mins

Drainage Area	Developed Q, cfs					Q out, cfs					Remark
	Q2	Q5	Q10	Q50	Q100	Q2	Q5	Q10	Q50	Q100	
A	18.88	24.97	31.36	43.95	50.38	10.02	10.59	10.78	11.56	11.94	Detention in Pond 1
B	8.37	11.06	14.06	19.67	22.53	11.58	12.03	12.29	12.60	12.71	Detention in Pond 1+2
C	8.68	11.47	14.58	20.41	23.38	5.93	6.72	7.17	7.72	8.12	Detention in Pond 3
D	7.81	10.33	13.13	18.37	21.04	10.62	11.29	11.86	12.87	13.31	Detention in Pond 1+2+3+4
E	10.94	14.07	17.70	25.15	28.50	18.58	22.77	25.90	31.42	35.29	Detention in Pond 1+2+3+4+5

Note:

Site drainage calculations are developed using the Rational Method for peak runoff. "C" & "I" values are established from the City of Wichita Design Criteria.

Detentions are achieved in detention basins 1,2,3,4 and 5 by outlet structures as shown in plan.



**Garden Apartments, 29th and Greenwich
Developed Drainage Plan
Wichita, Kansas**

PROJECT NUMBER			
KEM NO. 10088	FILE drainage	DATE 10/2010	SHEET 1 OF 1
DESIGN GP	DRAWN GP	REVISED	

516 S. Market, Wichita, KS 67202

316/264-0242

Summary of Channel Protection and Water Quality Volume calculations for future use

Pond	Drainage Area	Water Volume, Ac-ft		Water Elevation	
		Channel Protection, CPv	Water Quality, WQv	Channel Protection, CPv	Water Quality, WQv
1	15.910	1.41	0.956	210.28	209.21
2	6.950	0.63	0.504	207.47	206.97
3	7.210	0.66	0.523	198.76	198.40
4	6.490	1.11	0.930	197.24	196.83
5	9.220	0.31	0.256	193.30	193.13

Channel Protection Volume Calculation for futuer use

Drainage Area	Acres	Post-developed			Pre-developed			Volume needs to be detained for Channel Protection, CPv, ac-ft
		24-hr 1 yr Storm	C-factor	Water volume (ac-ft)	24-hr 1 yr Storm	C-factor	Water volume (ac-ft)	
A	15.910	2.88	0.67	2.56	2.88	0.30	1.15	1.41
B	6.950	2.88	0.68	1.13	2.88	0.30	0.50	0.63
C	7.210	2.88	0.68	1.18	2.88	0.30	0.52	0.66
D	12.190	2.88	0.68	1.99	2.88	0.30	0.88	1.11
E	3.530	2.88	0.67	0.57	2.88	0.30	0.25	0.31

Pond -1

Water Volume needs to be detained
for channel protection, CPV= 1.41 ac-ft

Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
206	2125	0.05		
207	13300	0.31	0.18	0.177
208	15084	0.35	0.33	0.503
209	16970	0.39	0.37	0.871
210	18957	0.44	0.41	1.283
211	21045	0.48	0.46	1.742
212	23232	0.53	0.51	2.251
213	25521	0.59	0.56	2.810
214	27910	0.64	0.61	3.423
215	30400	0.70	0.67	4.093

Pipe elevation to detain 1-yr 24 hr storm = 210.28

or pool level for channel protection 210.28

Pond -2

Water Volume needs to be detained for channel protection, CPV= 0.63 ac-ft

Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
204	1354	0.03		
205	7502	0.17	0.10	0.102
206	8941	0.21	0.19	0.290
207	10408	0.24	0.22	0.512
208	12121	0.28	0.26	0.771
209	13861	0.32	0.30	1.069
210	15703	0.36	0.34	1.409
211	17645	0.41	0.38	1.791
212	19687	0.45	0.43	2.220
213	21830	0.50	0.48	2.696
214	24074.1	0.55	0.53	3.223
214	24074.1	0.55	0.55	3.776

Pipe elevation to detain 1-yr 24 hr storm = 207.47

or pool level for channel protection 207.47

Pond -3

Water Volume needs to be detained for
channel protection, CPV= 0.66 ac-ft

Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
196	2067	0.05		
197	7725	0.18	0.11	0.112
198	15011	0.34	0.26	0.373
199	17444	0.40	0.37	0.746
200	19978	0.46	0.43	1.175
201	22614	0.52	0.49	1.664
202	25351	0.58	0.55	2.215

Pipe elevation to detain 1-yr 24 hr storm = 198.76

or pool level for channel protection 198.76

Pond -4

Water Volume needs to be detained
for channel protection, CPV= 1.11 ac-ft

Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
194	3569	0.08		
195	15154	0.35	0.21	0.215
196	17072	0.39	0.37	0.585
197	19090	0.44	0.42	1.000
198	21209	0.49	0.46	1.462
199	23428	0.54	0.51	1.975
200	25748	0.59	0.56	2.539
201	28169	0.65	0.62	3.158
202	30690	0.70	0.68	3.834

Pipe elevation to detain 1-yr 24 hr storm = 197.24

or pool level for channel protection 197.24

Pond -5

Water Volume needs to be detained for channel protection, CPV=

0.31

ac-ft

Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
192	4893	0.11		
193	13576	0.31	0.21	0.212
194	16354	0.38	0.34	0.556
195	19235	0.44	0.41	0.964
196	22216	0.51	0.48	1.440

Pipe elevation to detain 1-yr 24 hr storm =

193.30

or pool level for channel protection

193.30

Water Quality Volume Calculation for futuer use

Area A, Pond 1

Calculation for water quality volume ($WQv=P \cdot Rv \cdot A/12$)				
85th percentile storm event (1.2 inches), P =		1.2	inches	
Total area, A =		15.91	acres	
Rainfall Coeff, Rv, =		0.601	cf	
Required Vol. for Water Quality		0.96	ac-ft	
Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
206	2125.3	0.05		
207	13300	0.31	0.18	0.177
208	15084	0.35	0.33	0.503
209	16970	0.39	0.37	0.871
210	18957	0.44	0.41	1.283
211	21045	0.48	0.46	1.742
212	23232	0.53	0.51	2.251
213	25521	0.59	0.56	2.810
214	27910	0.64	0.61	3.423
215	30400	0.70	0.67	4.093
Pipe elevation for Water Quality =				209.21
or pool level for Water Quality=				209.21

Soil Group 'D'		
Calculation of Rv		
	Coeff.	Area
Coeff for undisturbed area, R_{vU} =	0.03	0.00
Coeff for turf	0.20	7.06
Coeff for impervious area, R_{vI} =	0.95	8.13
Weighted, Rv = 0.601		

Area B, Pond 2

Calculation for water quality volume ($WQ_v = P \cdot R_v \cdot A / 12$)				
85th percentile storm event (1.2 inches), P =		1.2	inches	
Total area, A =		6.950	acres	
Rainfall Coeff, R _v =		0.725	cf	
Required Vol. for Water Quality		0.50	ac-ft	
Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
204	1353.76	0.03		
205	7502	0.17	0.10	0.102
206	8941	0.21	0.19	0.290
207	10408	0.24	0.22	0.512
208	12121	0.28	0.26	0.771
209	13861	0.32	0.30	1.069
210	15703	0.36	0.34	1.409
211	17645	0.41	0.38	1.791
212	19687	0.45	0.43	2.220
213	21830	0.50	0.48	2.696
214	24074.1	0.55	0.53	3.223
214	24074.1	0.55	0.55	3.776
Pipe elevation for Water Quality =			206.96	
or pool level for Water Quality =			206.96	

Soil Group 'D'		
Calculation of R _v		
	Coeff.	Area
Coeff for undisturbed area, R _{VU} =	0.03	0.00
Coeff for turf	0.20	2.09
Coeff for impervious area, R _{VI} =	0.95	4.87
Weighted, R _v =		0.725

Area C, Pond 3

Calculation for water quality volume ($WQ_v = P \cdot R_v \cdot A / 12$)				
85th percentile storm event (1.2)		1.2	inches	
Total area, A =		7.210	acres	
Rainfall Coeff, R_v , =		0.725	cf	
Required Vol. for Water Quality		0.52	ac-ft	
Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
196	2067	0.05		
197	7725	0.18	0.11	0.112
198	15011	0.34	0.26	0.373
199	17444	0.40	0.37	0.746
200	19978	0.46	0.43	1.175
201	22614	0.52	0.49	1.664
202	25351	0.58	0.55	2.215
Pipe elevation for Water Quality =			198.40	
or pool level for Water Quality =			198.40	

Soil Group 'D'		
Calculation of R_v		
	Coeff.	Area
Coeff for undisturbed area, R_{vU} =	0.03	0.00
Coeff for turf	0.20	2.16
Coeff for impervious area, R_{vI} =	0.95	5.05
Weighted, R_v =		0.725

Area D, Pond 4

Calculation for water quality volume ($WQ_v = P \cdot R_v \cdot A / 12$)				
85th percentile storm event (1.2)		1.2	inches	
Total area, A =		12.190	acres	
Rainfall Coeff, R_v , =		0.763	cf	
Required Vol. for Water Quality		0.93	ac-ft	
Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
194	3569	0.08		
195	15154	0.35	0.21	0.215
196	17072	0.39	0.37	0.585
197	19090	0.44	0.42	1.000
198	21209	0.49	0.46	1.462
199	23428	0.54	0.51	1.975
200	25748	0.59	0.56	2.539
201	28169	0.65	0.62	3.158
202	30690	0.70	0.68	3.834
Pipe elevation for Water Quality =			196.83	
or pool level for Water Quality=			196.83	

Soil Group 'D'		
Calculation of R_v		
	Coeff.	Area
Coeff for undisturbed area, R_{vU} =	0.03	0.00
Coeff for turf	0.20	1.62
Coeff for impervious area, R_{vI} =	0.95	4.87
Weighted, R_v =	0.763	

Area E, Pond 5

Calculation for water quality volume ($WQ_v = P \cdot R_v \cdot A / 12$)				
85th percentile storm event (1.2)		1.2	inches	
Total area, A =		3.530	acres	
Rainfall Coeff, R_v , =		0.725	cf	
Required Vol. for Water Quality		0.26	ac-ft	
Elevn	Area sqft	Area, Acres	Storage, Ac-ft	Cum Storage (Ac-ft)
192	4893	0.11		
193	13576	0.31	0.21	0.212
194	16354	0.38	0.34	0.556
195	19235	0.44	0.41	0.964
196	22216	0.51	0.48	1.440
Pipe elevation for Water Quality =			193.13	
or pool level for Water Quality =			193.13	

Soil Group 'D'		
Calculation of R_v		
	Coeff.	Area
Coeff for undisturbed area, $R_{vU} =$	0.03	0.00
Coeff for turf	0.20	2.77
Coeff for impervious area, $R_{vI} =$	0.95	6.45
Weighted, $R_v =$	0.725	

Existing Runoff Summary:

Area* #	Acres	Land Use	Time of Concentration, Tc	C-Values				
				2-yr	5-yr	10-yr	50-yr	100-yr
A	33.28	Pastureland	44	0.32	0.37	0.47	0.6	0.67
B	8.66	Pastureland	48	0.32	0.37	0.47	0.6	0.67
C	1.30	Pastureland	41	0.32	0.37	0.47	0.6	0.67
D	2.53	Pastureland	41	0.32	0.37	0.47	0.6	0.67

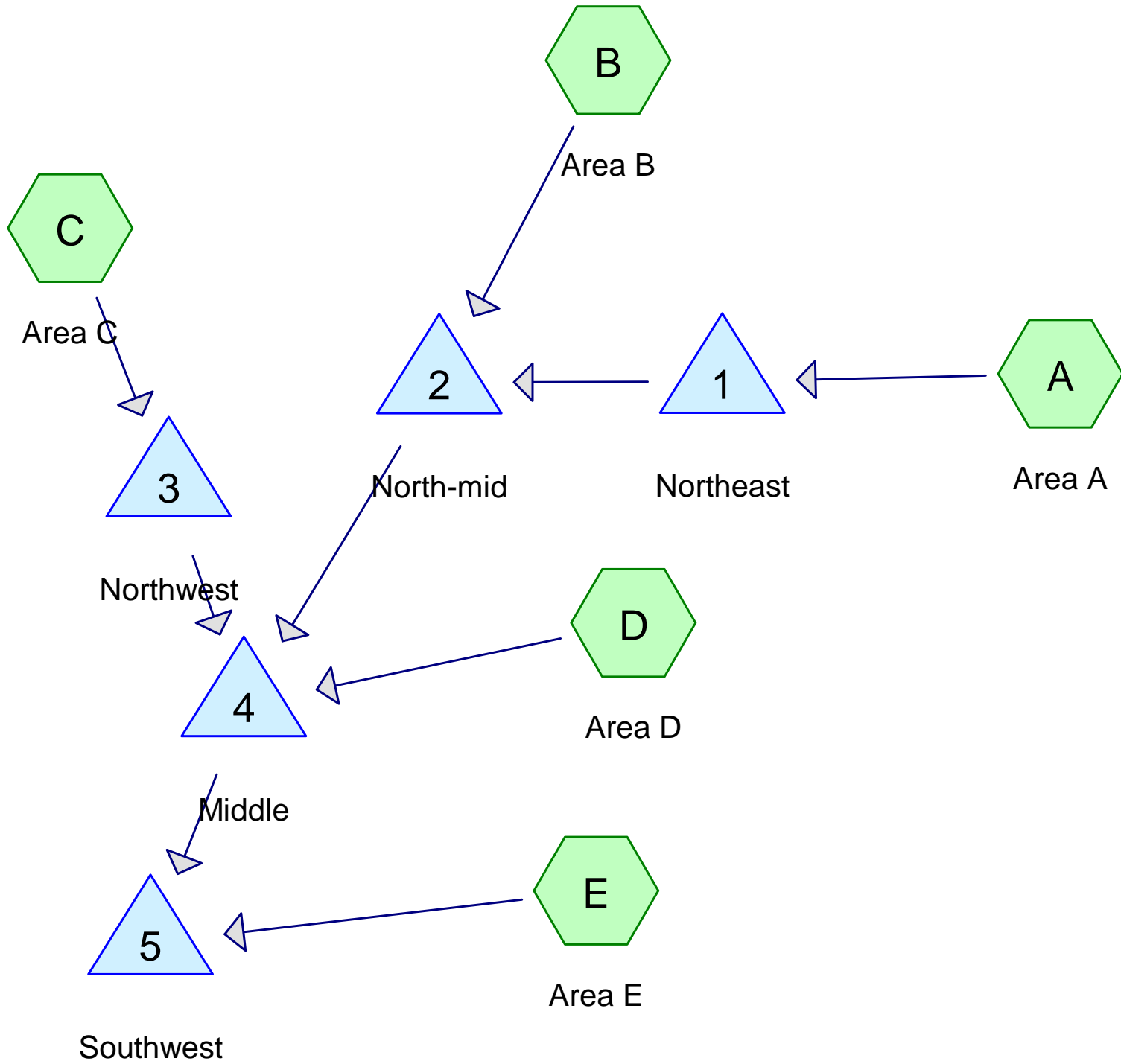
Area* #	Flows, cfs				
	2-yr	5-yr	10-yr	50-yr	100-yr
A	22.47	32.14	47.71	80.47	98.78
B	5.54	7.91	11.80	19.95	24.54
C	0.92	1.31	1.94	3.27	4.01
D	1.79	2.55	3.77	6.36	7.80

Developed Runoff Summary:

Area* #	Acres	Land Use	Time of Concentration, Tc	C				
				2-yr	5-yr	10-yr	50-yr	100-yr
A	15.91	Apartment+Commercial	25.8	0.69	0.72	0.77	0.81	0.84
B	6.95	Apartment	15.2	0.70	0.73	0.79	0.83	0.86
C	7.21	Apartment	16.2	0.70	0.73	0.79	0.83	0.86
D	6.49	Apartment	15.2	0.70	0.73	0.79	0.83	0.86
E	9.22	Apartment+Commercial	16.8	0.69	0.70	0.75	0.80	0.82

Area* #	Developed Q, cfs					Qout cfs					Remark
	2-yr	5-yr	10-yr	50-yr	100-yr	2-yr	5-yr	10-yr	50-yr	100-yr	
A	18.88	24.97	31.36	43.95	50.38	10.02	10.59	10.78	11.56	11.59	Detention in pond 1
B	8.37	11.06	14.06	19.67	22.53	11.58	12.03	12.29	12.6	12.71	Detention in pond 1+2
C	8.68	11.47	14.58	20.41	23.38	5.93	6.72	7.17	7.72	8.12	Detention in pond 3
D	7.81	10.33	13.13	18.37	21.04	10.62	11.29	11.86	12.87	13.31	Detention in pond 1+2+3+4
E	10.94	14.07	17.70	25.15	28.50	18.58	22.77	25.9	31.42	35.29	Detention in pond 1+2+3+4+5

* Drainage Areas are shown in Drainage plans (tab 2).



Summary for Pond 1: Northeast

Inflow Area = 15.910 ac, Inflow Depth = 3.13" for 100-Year event
 Inflow = 50.26 cfs @ 0.50 hrs, Volume= 4.154 af
 Outflow = 11.94 cfs @ 1.03 hrs, Volume= 4.153 af, Atten= 76%, Lag= 31.6 min
 Primary = 11.94 cfs @ 1.03 hrs, Volume= 4.153 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 213.94' @ 1.33 hrs Surf.Area= 27,755 sf Storage= 134,019 cf

Plug-Flow detention time= 128.6 min calculated for 4.125 af (99% of inflow)
 Center-of-Mass det. time= 130.5 min (173.5 - 43.0)

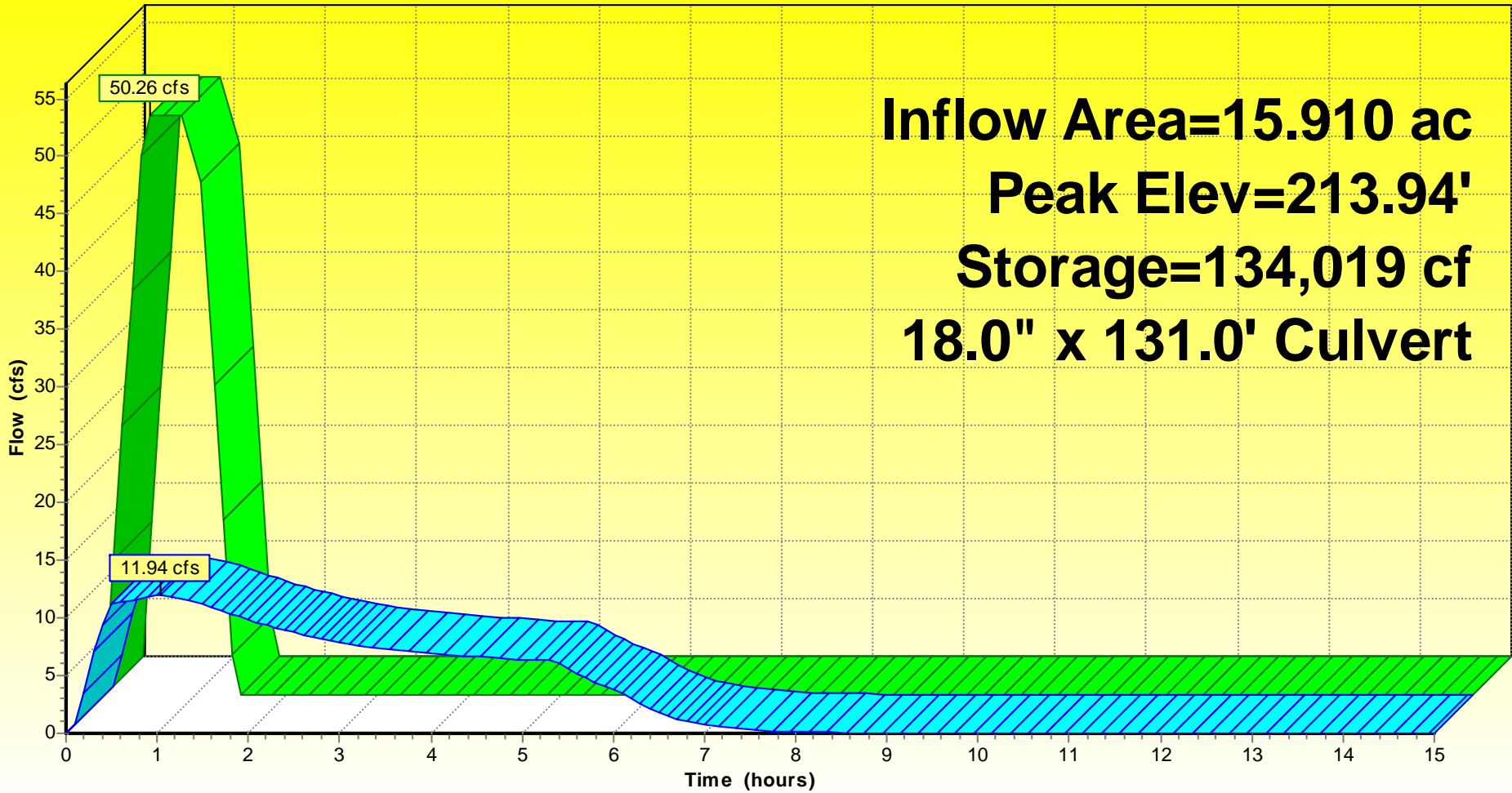
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	164,982 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	2,125	0	0
208.00	15,084	8,605	8,605
209.00	16,970	16,027	24,632
210.00	18,957	17,964	42,595
211.00	21,045	20,001	62,596
212.00	23,232	22,139	84,735
213.00	25,521	24,377	109,111
214.00	27,910	26,716	135,827
215.00	30,400	29,155	164,982

Device	Routing	Invert	Outlet Devices
#1	Primary	207.00'	18.0" x 131.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 206.00' S= 0.0076 '/ Cc= 0.900 n= 0.013

Primary OutFlow Max=10.94 cfs @ 1.03 hrs HW=213.20' TW=210.88' (Dynamic Tailwater)
 ↑ **1=Culvert** (Outlet Controls 10.94 cfs @ 6.19 fps)

Hydrograph



Inflow
Primary

Inflow Area=15.910 ac
Peak Elev=213.94'
Storage=134,019 cf
18.0" x 131.0' Culvert

Summary for Pond 2: North-mid

Inflow Area = 22.860 ac, Inflow Depth = 3.16" for 100-Year event
 Inflow = 34.42 cfs @ 1.00 hrs, Volume= 6.011 af
 Outflow = 12.71 cfs @ 0.98 hrs, Volume= 6.010 af, Atten= 63%, Lag= 0.0 min
 Primary = 12.71 cfs @ 0.98 hrs, Volume= 6.010 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 211.36' @ 1.32 hrs Surf.Area= 18,371 sf Storage= 76,549 cf

Plug-Flow detention time= 66.6 min calculated for 6.010 af (100% of inflow)
 Center-of-Mass det. time= 66.4 min (198.1 - 131.7)

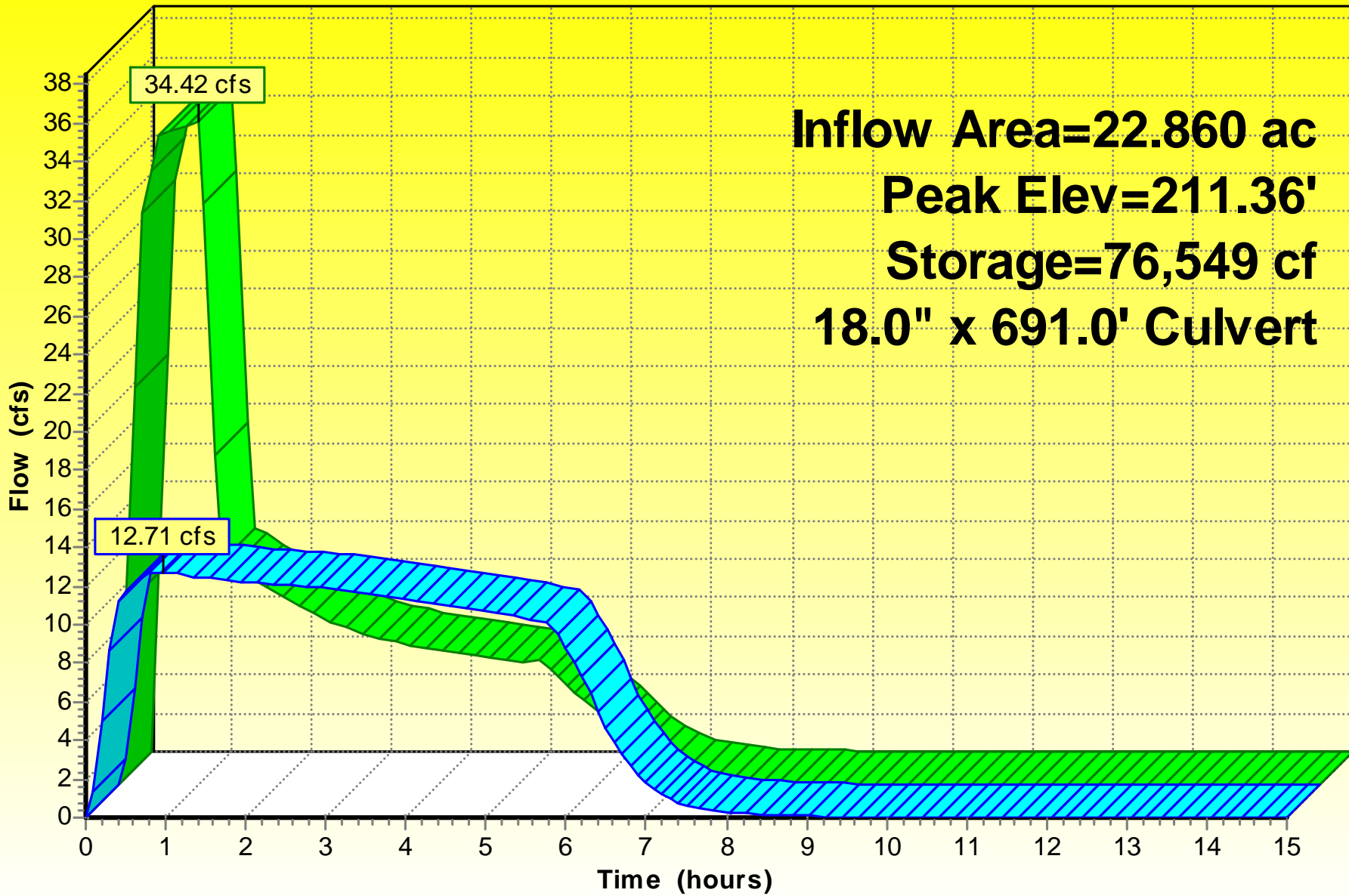
Volume	Invert	Avail.Storage	Storage Description
#1	205.00'	132,524 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
205.00	582	0	0
206.00	8,941	4,762	4,762
207.00	10,408	9,675	14,436
208.00	12,121	11,265	25,701
209.00	13,861	12,991	38,692
210.00	15,703	14,782	53,474
211.00	17,645	16,674	70,148
212.00	19,687	18,666	88,814
213.00	21,830	20,759	109,572
214.00	24,074	22,952	132,524

Device	Routing	Invert	Outlet Devices
#1	Primary	205.00'	18.0" x 691.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 197.00' S= 0.0116 '/ Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=12.47 cfs @ 0.98 hrs HW=210.70' TW=199.77' (Dynamic Tailwater)
 ↑**1=Culvert** (Outlet Controls 12.47 cfs @ 7.06 fps)

Hydrograph



Inflow
Primary

Inflow Area=22.860 ac
Peak Elev=211.36'
Storage=76,549 cf
18.0" x 691.0' Culvert

Summary for Pond 3: Northwest

Inflow Area = 7.210 ac, Inflow Depth = 3.21" for 100-Year event
 Inflow = 23.32 cfs @ 0.30 hrs, Volume= 1.927 af
 Outflow = 8.12 cfs @ 0.61 hrs, Volume= 1.927 af, Atten= 65%, Lag= 18.8 min
 Primary = 8.12 cfs @ 0.61 hrs, Volume= 1.927 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 200.95' @ 1.22 hrs Surf.Area= 22,481 sf Storage= 58,409 cf

Plug-Flow detention time= 244.6 min calculated for 1.927 af (100% of inflow)
 Center-of-Mass det. time= 243.9 min (282.2 - 38.3)

Volume	Invert	Avail.Storage	Storage Description
#1	197.00'	83,529 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

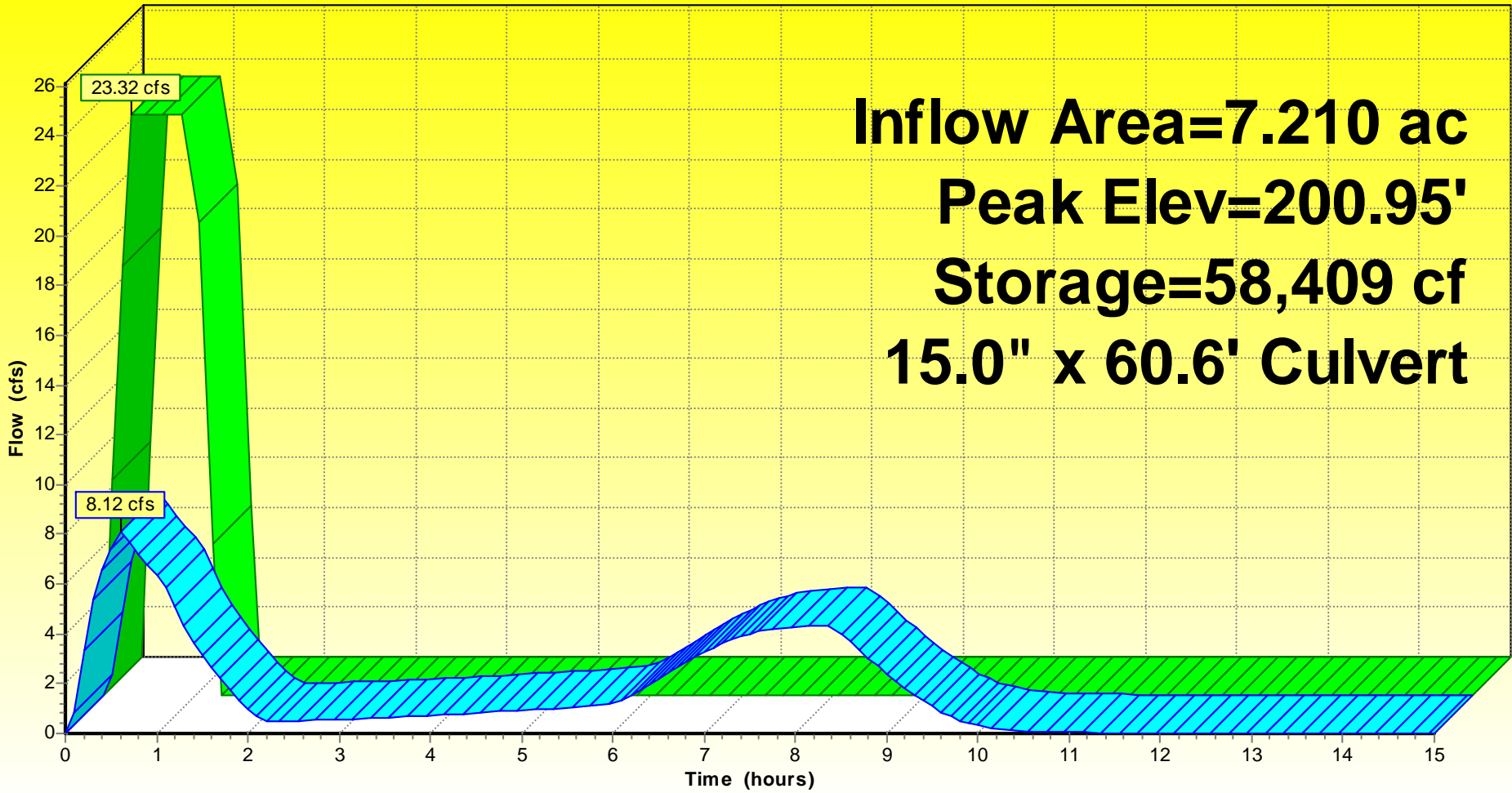
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.00	1,511	0	0
198.00	10,062	5,787	5,787
199.00	17,444	13,753	19,540
200.00	19,978	18,711	38,251
201.00	22,614	21,296	59,547
202.00	25,351	23,983	83,529

Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	15.0" x 60.6' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 196.00' S= 0.0165 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=6.99 cfs @ 0.61 hrs HW=199.55' TW=198.08' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 6.99 cfs @ 5.70 fps)

Hydrograph



Inflow Area=7.210 ac
Peak Elev=200.95'
Storage=58,409 cf
15.0" x 60.6' Culvert

Inflow
Primary

Summary for Pond 4: Middle

Inflow Area = 36.560 ac, Inflow Depth > 3.17" for 100-Year event
 Inflow = 41.29 cfs @ 0.64 hrs, Volume= 9.672 af
 Outflow = 13.31 cfs @ 1.98 hrs, Volume= 9.660 af, Atten= 68%, Lag= 80.2 min
 Primary = 13.31 cfs @ 1.98 hrs, Volume= 9.660 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 200.61' @ 1.98 hrs Surf.Area= 27,218 sf Storage= 112,057 cf

Plug-Flow detention time= 114.3 min calculated for 9.596 af (99% of inflow)
 Center-of-Mass det. time= 114.0 min (300.1 - 186.1)

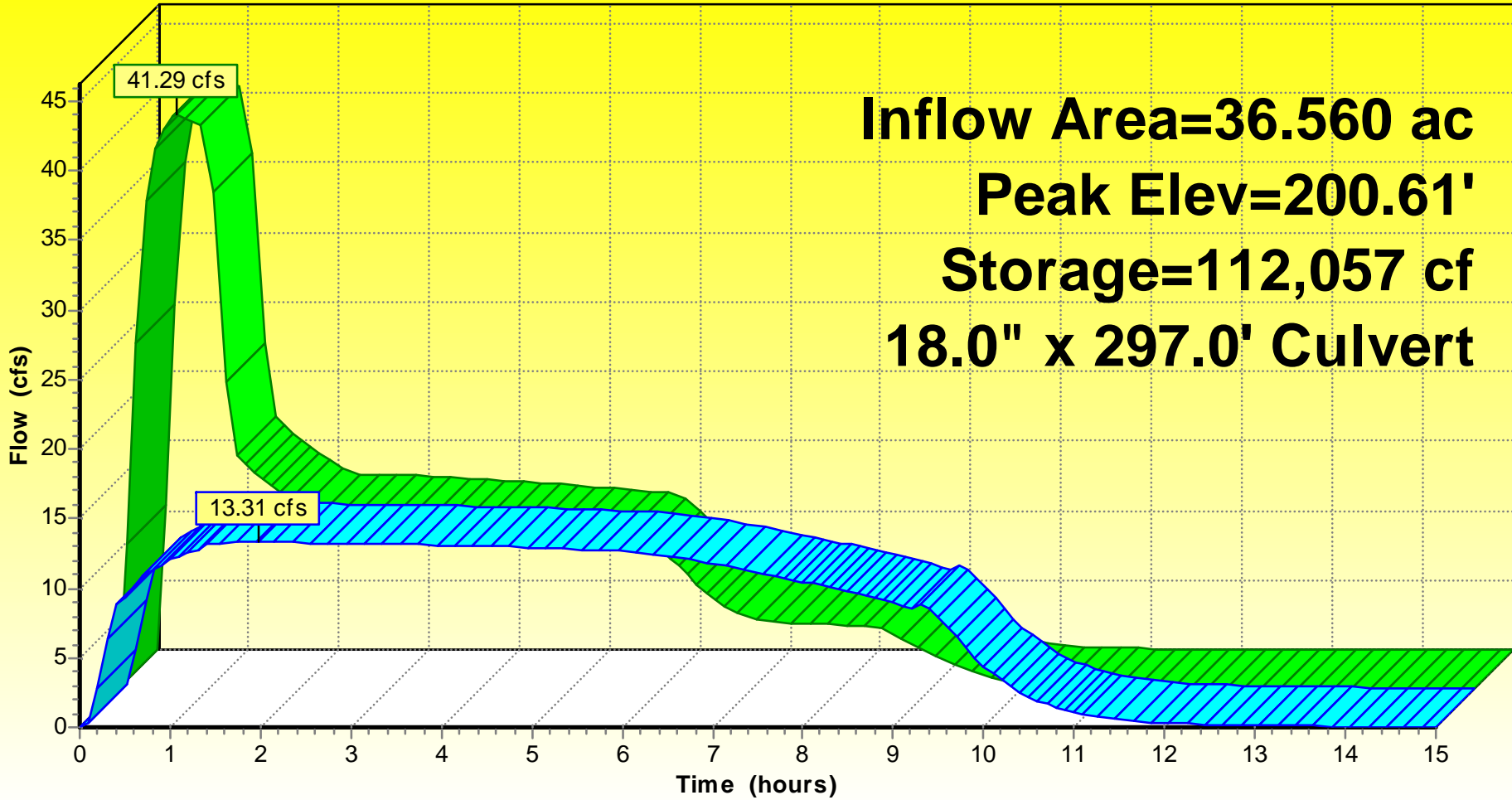
Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	152,367 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	4,612	0	0
196.00	17,072	10,842	10,842
197.00	19,090	18,081	28,923
198.00	21,209	20,150	49,073
199.00	23,428	22,319	71,391
200.00	25,748	24,588	95,979
201.00	28,169	26,959	122,938
202.00	30,690	29,430	152,367

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	18.0" x 297.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 193.00' S= 0.0067 '/ Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=13.31 cfs @ 1.98 hrs HW=200.61' TW=193.46' (Dynamic Tailwater)
 ↑ **1=Culvert** (Barrel Controls 13.31 cfs @ 7.53 fps)

Hydrograph



Inflow
Primary

Inflow Area=36.560 ac
Peak Elev=200.61'
Storage=112,057 cf
18.0" x 297.0' Culvert

Summary for Pond 5: Southwest

Inflow Area = 45.780 ac, Inflow Depth > 3.15" for 100-Year event
 Inflow = 40.47 cfs @ 1.00 hrs, Volume= 12.010 af
 Outflow = 35.29 cfs @ 1.06 hrs, Volume= 11.998 af, Atten= 13%, Lag= 3.3 min
 Primary = 35.29 cfs @ 1.06 hrs, Volume= 11.998 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 194.99' @ 1.06 hrs Surf.Area= 19,220 sf Storage= 41,895 cf

Plug-Flow detention time= 18.7 min calculated for 11.918 af (99% of inflow)
 Center-of-Mass det. time= 18.4 min (267.3 - 248.9)

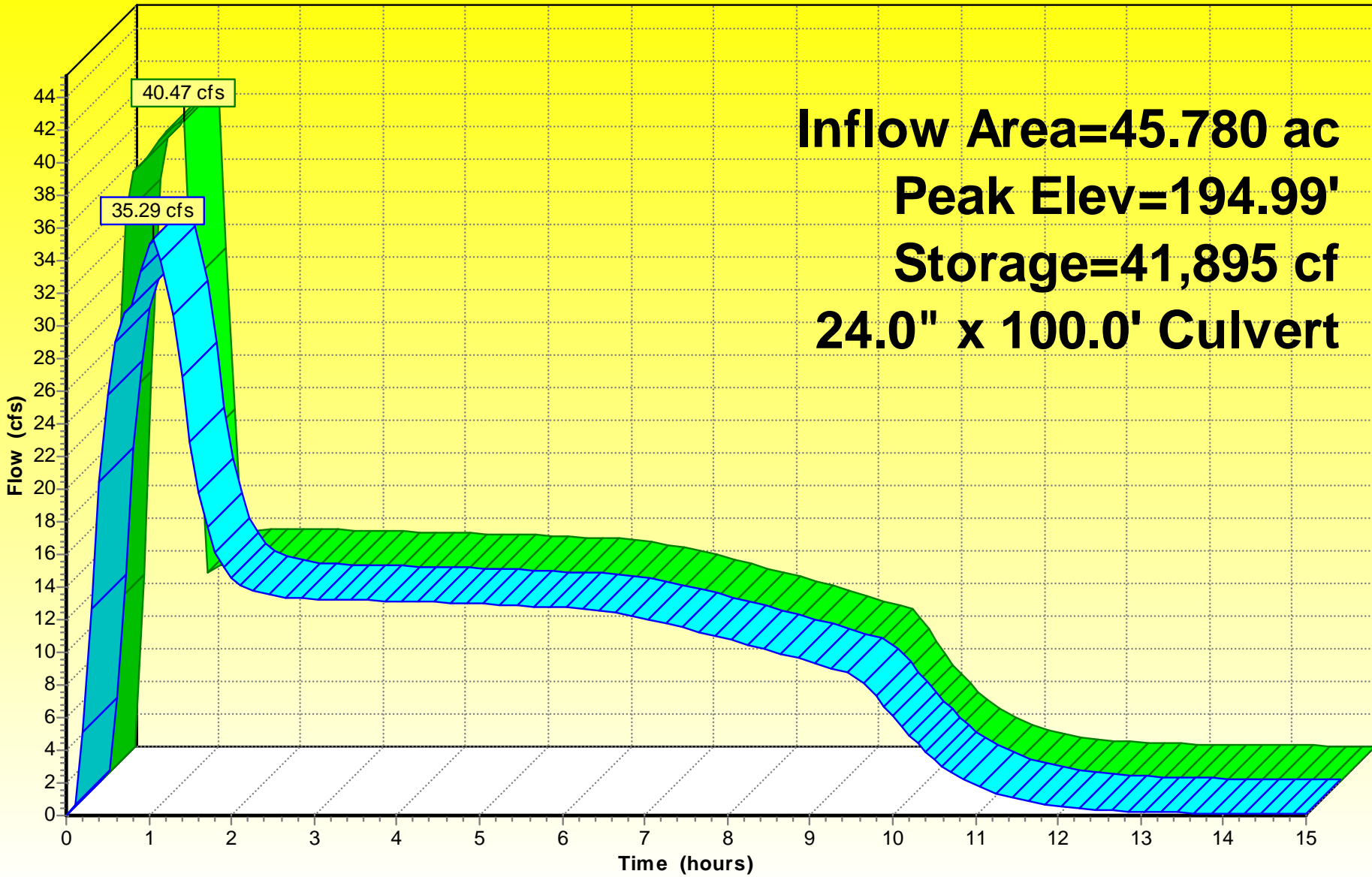
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	62,720 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	4,893	0	0
193.00	13,576	9,235	9,235
194.00	16,354	14,965	24,200
195.00	19,235	17,795	41,994
196.00	22,216	20,726	62,720

Device	Routing	Invert	Outlet Devices
#1	Primary	192.00'	24.0" x 100.0' long Culvert X 2.00 RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 191.65' S= 0.0035 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=35.01 cfs @ 1.06 hrs HW=194.97' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 35.01 cfs @ 5.57 fps)

Hydrograph



Inflow
Primary

Inflow Area=45.780 ac
Peak Elev=194.99'
Storage=41,895 cf
24.0" x 100.0' Culvert

Summary for Pond 1: Northeast

Inflow Area = 15.910 ac, Inflow Depth = 2.73" for 50-Year event
 Inflow = 43.79 cfs @ 0.50 hrs, Volume= 3.619 af
 Outflow = 11.56 cfs @ 1.02 hrs, Volume= 3.618 af, Atten= 74%, Lag= 30.9 min
 Primary = 11.56 cfs @ 1.02 hrs, Volume= 3.618 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 213.15' @ 1.32 hrs Surf.Area= 25,873 sf Storage= 112,896 cf

Plug-Flow detention time= 113.8 min calculated for 3.618 af (100% of inflow)
 Center-of-Mass det. time= 112.5 min (155.6 - 43.0)

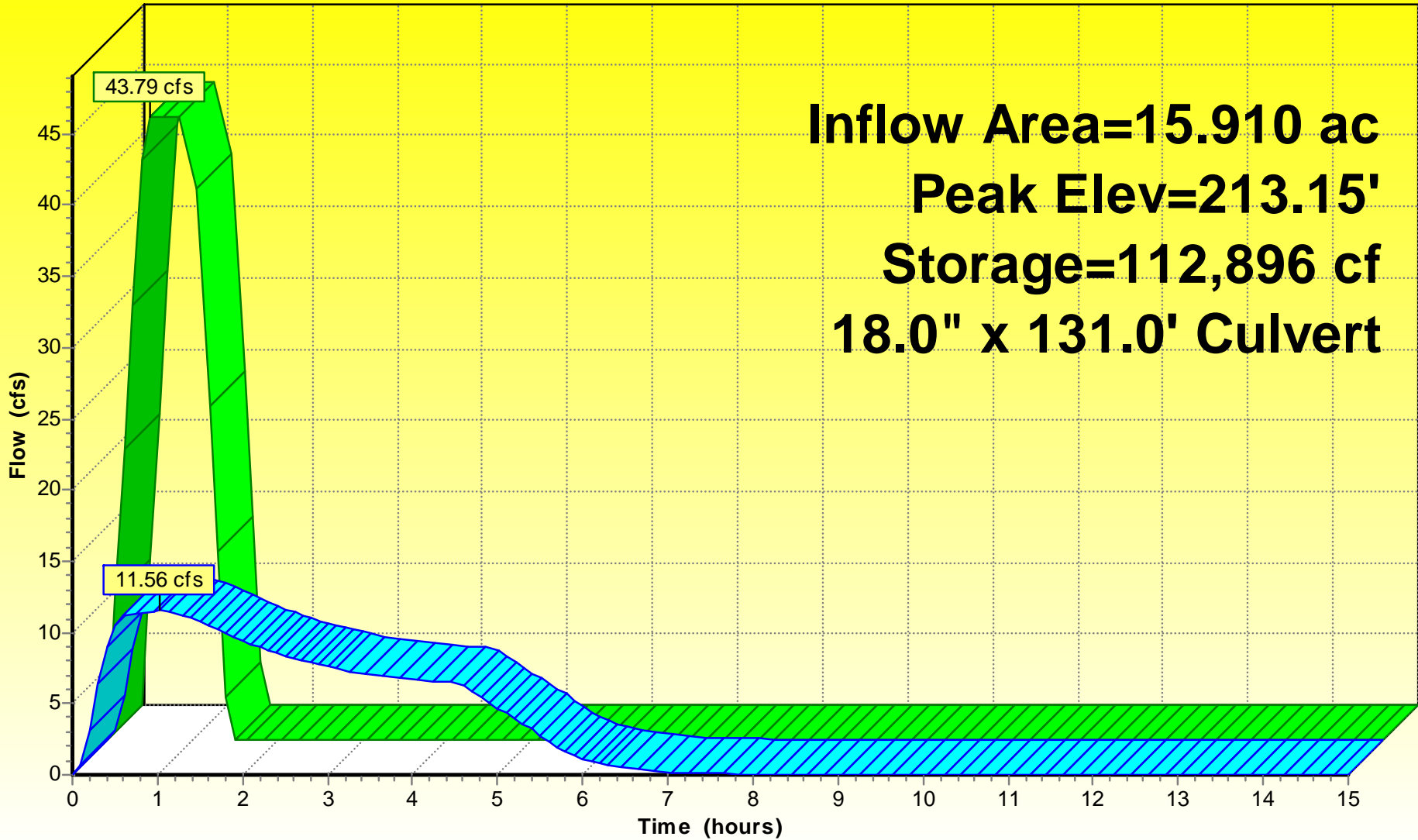
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	164,982 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	2,125	0	0
208.00	15,084	8,605	8,605
209.00	16,970	16,027	24,632
210.00	18,957	17,964	42,595
211.00	21,045	20,001	62,596
212.00	23,232	22,139	84,735
213.00	25,521	24,377	109,111
214.00	27,910	26,716	135,827
215.00	30,400	29,155	164,982

Device	Routing	Invert	Outlet Devices
#1	Primary	207.00'	18.0" x 131.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 206.00' S= 0.0076 '/ Cc= 0.900 n= 0.013

Primary OutFlow Max=10.60 cfs @ 1.02 hrs HW=212.47' TW=210.29' (Dynamic Tailwater)
 ↑ **1=Culvert** (Outlet Controls 10.60 cfs @ 6.00 fps)

Hydrograph



Inflow
Primary

Inflow Area=15.910 ac
Peak Elev=213.15'
Storage=112,896 cf
18.0" x 131.0' Culvert

Summary for Pond 2: North-mid

Inflow Area = 22.860 ac, Inflow Depth = 2.75" for 50-Year event
 Inflow = 31.16 cfs @ 1.00 hrs, Volume= 5.238 af
 Outflow = 12.60 cfs @ 0.97 hrs, Volume= 5.238 af, Atten= 60%, Lag= 0.0 min
 Primary = 12.60 cfs @ 0.97 hrs, Volume= 5.238 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 210.74' @ 1.30 hrs Surf.Area= 17,149 sf Storage= 65,704 cf

Plug-Flow detention time= 58.0 min calculated for 5.203 af (99% of inflow)
 Center-of-Mass det. time= 57.8 min (177.1 - 119.3)

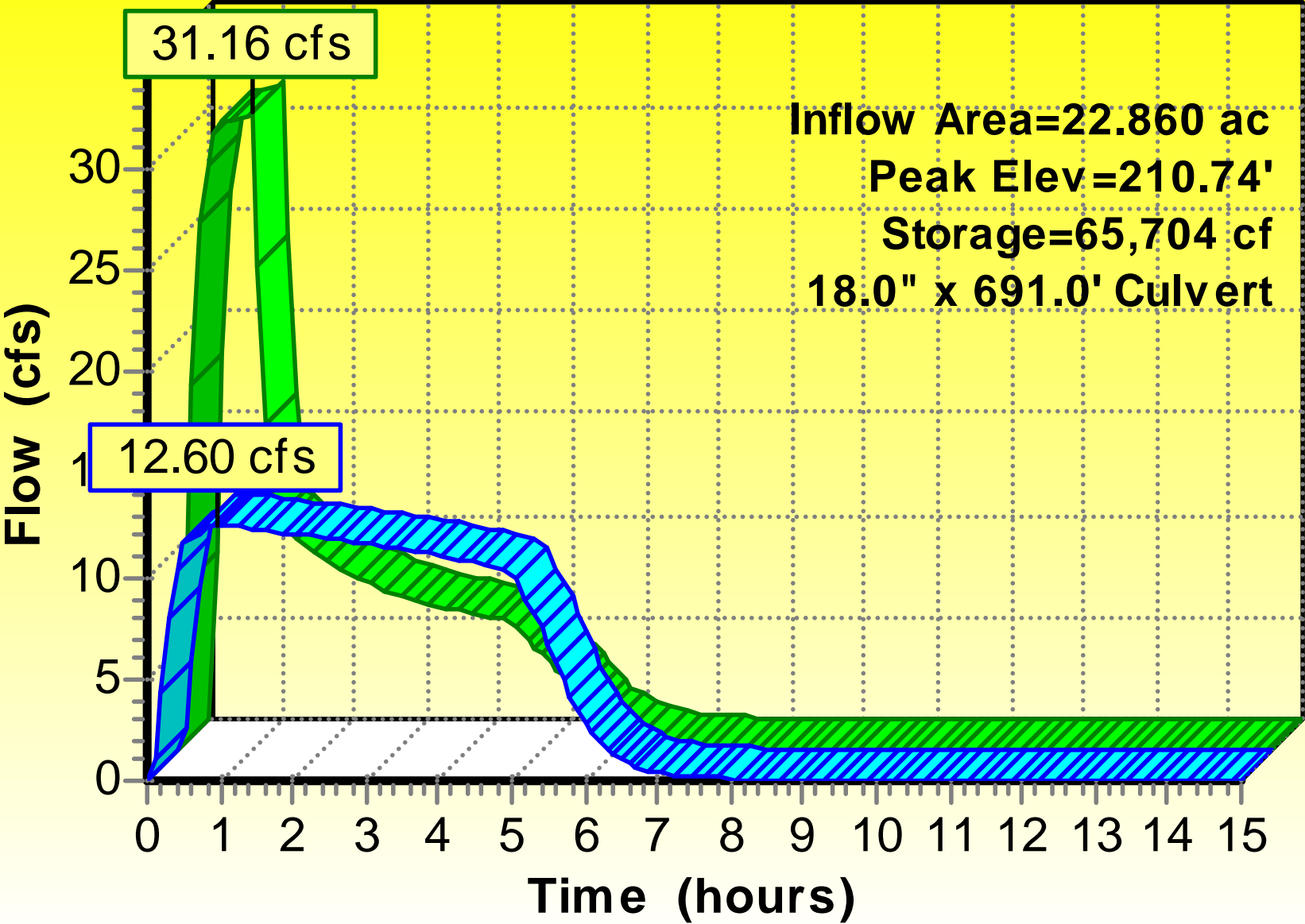
Volume	Invert	Avail.Storage	Storage Description
#1	205.00'	132,524 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
205.00	582	0	0
206.00	8,941	4,762	4,762
207.00	10,408	9,675	14,436
208.00	12,121	11,265	25,701
209.00	13,861	12,991	38,692
210.00	15,703	14,782	53,474
211.00	17,645	16,674	70,148
212.00	19,687	18,666	88,814
213.00	21,830	20,759	109,572
214.00	24,074	22,952	132,524

Device	Routing	Invert	Outlet Devices
#1	Primary	205.00'	18.0" x 691.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 197.00' S= 0.0116 ' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=12.37 cfs @ 0.97 hrs HW=210.10' TW=199.34' (Dynamic Tailwater)
 ↑ **1=Culvert** (Outlet Controls 12.37 cfs @ 7.00 fps)

Hydrograph



- Inflow
- Primary

Inflow Area=22.860 ac
Peak Elev=210.74'
Storage=65,704 cf
18.0" x 691.0' Culvert

Summary for Pond 3: Northwest

Inflow Area = 7.210 ac, Inflow Depth = 2.80" for 50-Year event
 Inflow = 20.34 cfs @ 0.30 hrs, Volume= 1.681 af
 Outflow = 7.72 cfs @ 0.66 hrs, Volume= 1.680 af, Atten= 62%, Lag= 21.8 min
 Primary = 7.72 cfs @ 0.66 hrs, Volume= 1.680 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 200.51' @ 1.22 hrs Surf.Area= 21,320 sf Storage= 48,764 cf

Plug-Flow detention time= 208.0 min calculated for 1.669 af (99% of inflow)
 Center-of-Mass det. time= 210.1 min (248.4 - 38.3)

Volume	Invert	Avail.Storage	Storage Description
#1	197.00'	83,529 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

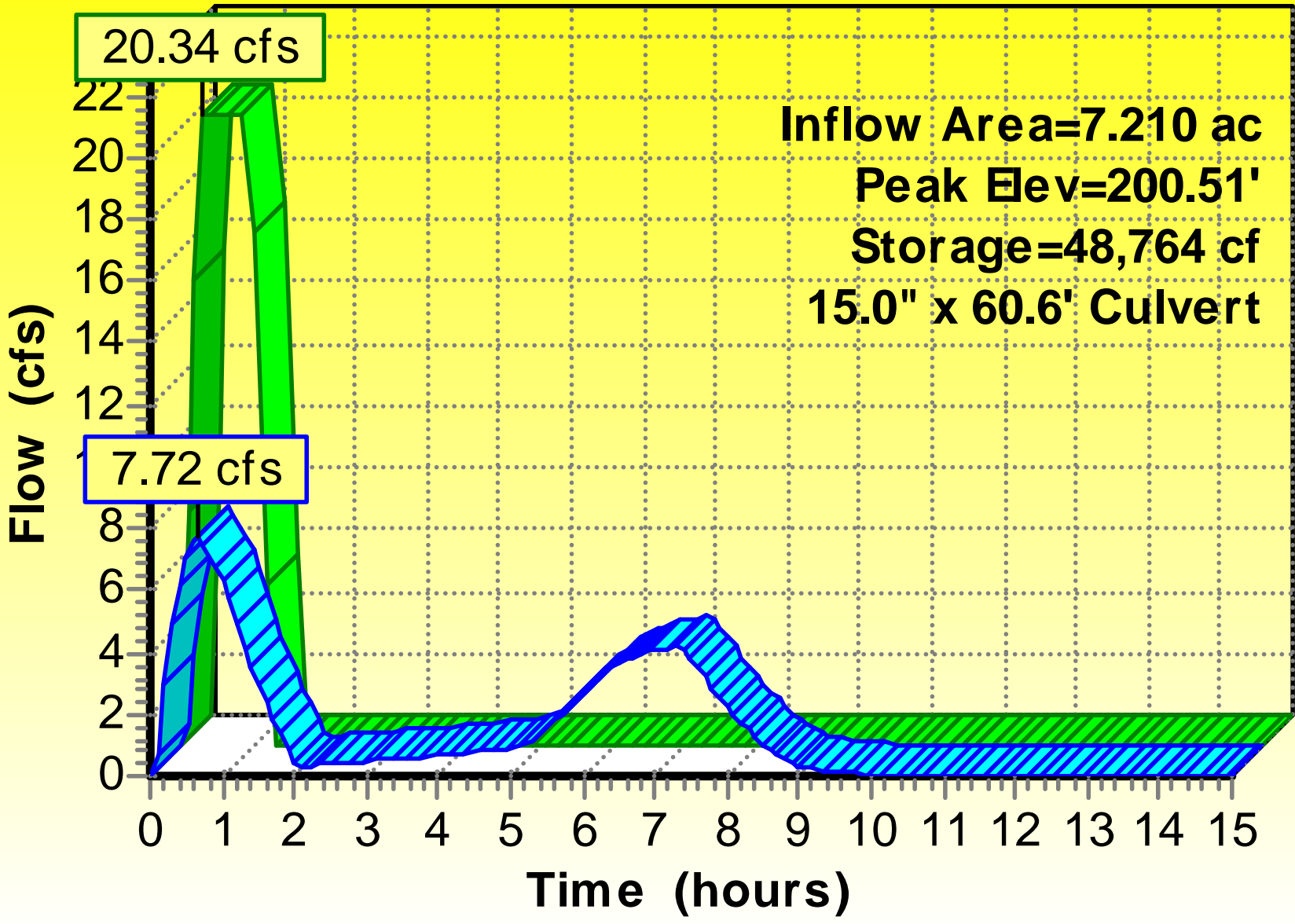
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.00	1,511	0	0
198.00	10,062	5,787	5,787
199.00	17,444	13,753	19,540
200.00	19,978	18,711	38,251
201.00	22,614	21,296	59,547
202.00	25,351	23,983	83,529

Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	15.0" x 60.6' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 196.00' S= 0.0165 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=6.78 cfs @ 0.66 hrs HW=199.44' TW=198.05' (Dynamic Tailwater)

↑ **1=Culvert** (Outlet Controls 6.78 cfs @ 5.53 fps)

Hydrograph



Inflow Area=7.210 ac
Peak Elev=200.51'
Storage=48,764 cf
15.0" x 60.6' Culvert

Inflow
Primary

Summary for Pond 4: Middle

Inflow Area = 36.560 ac, Inflow Depth > 2.77" for 50-Year event
 Inflow = 38.15 cfs @ 0.71 hrs, Volume= 8.430 af
 Outflow = 12.87 cfs @ 1.93 hrs, Volume= 8.421 af, Atten= 66%, Lag= 73.4 min
 Primary = 12.87 cfs @ 1.93 hrs, Volume= 8.421 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 200.21' @ 1.93 hrs Surf.Area= 26,247 sf Storage= 101,336 cf

Plug-Flow detention time= 106.9 min calculated for 8.365 af (99% of inflow)
 Center-of-Mass det. time= 106.8 min (273.1 - 166.3)

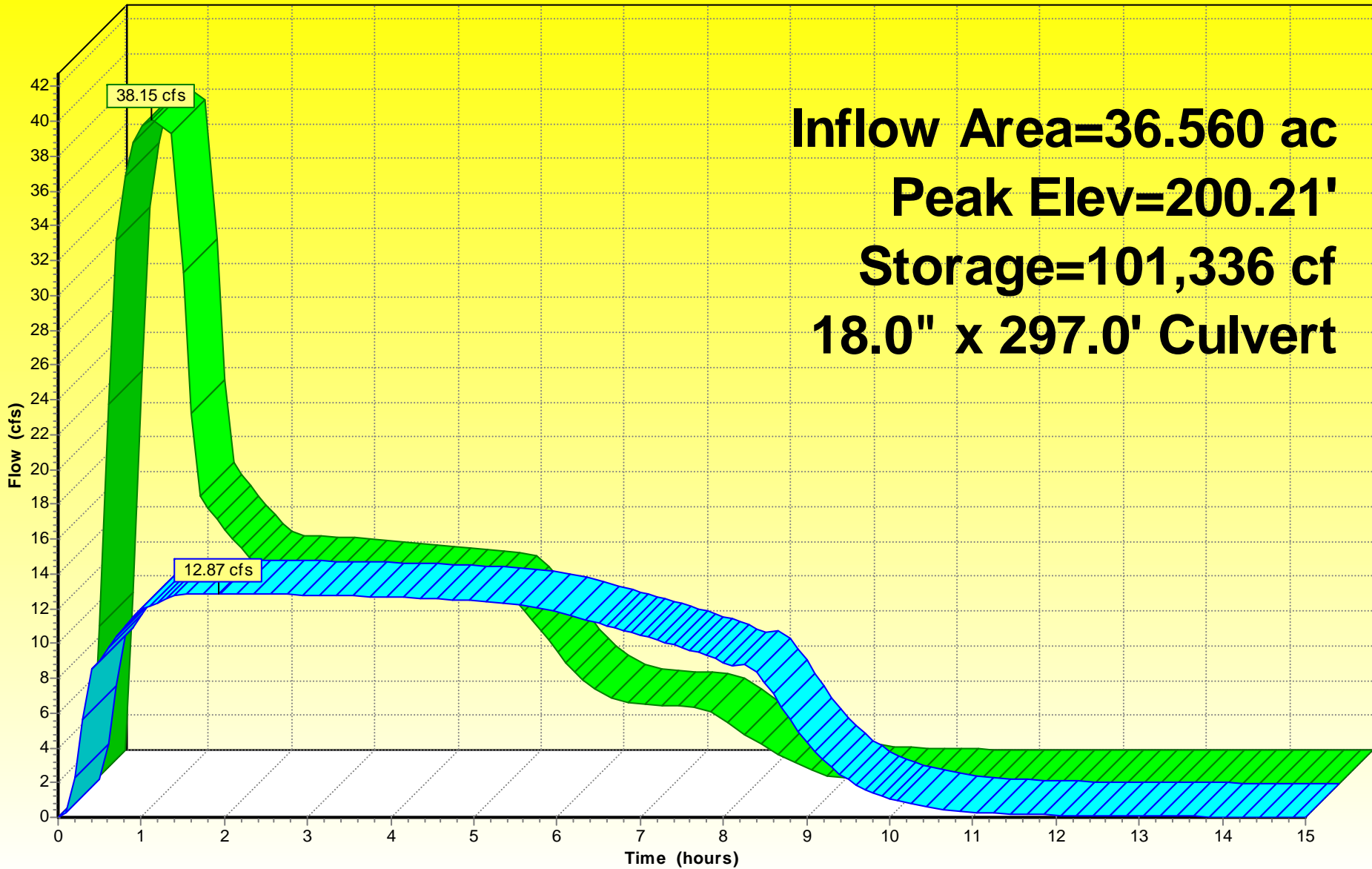
Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	152,367 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	4,612	0	0
196.00	17,072	10,842	10,842
197.00	19,090	18,081	28,923
198.00	21,209	20,150	49,073
199.00	23,428	22,319	71,391
200.00	25,748	24,588	95,979
201.00	28,169	26,959	122,938
202.00	30,690	29,430	152,367

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	18.0" x 297.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 193.00' S= 0.0067 '/ Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=12.87 cfs @ 1.93 hrs HW=200.21' TW=193.43' (Dynamic Tailwater)
 ↑ **1=Culvert** (Barrel Controls 12.87 cfs @ 7.28 fps)

Hydrograph



Inflow Area=36.560 ac
Peak Elev=200.21'
Storage=101,336 cf
18.0" x 297.0' Culvert

Inflow
Primary

Summary for Pond 5: Southwest

Inflow Area = 45.780 ac, Inflow Depth > 2.75" for 50-Year event
 Inflow = 37.94 cfs @ 0.95 hrs, Volume= 10.492 af
 Outflow = 31.42 cfs @ 1.10 hrs, Volume= 10.482 af, Atten= 17%, Lag= 8.8 min
 Primary = 31.42 cfs @ 1.10 hrs, Volume= 10.482 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 194.73' @ 1.07 hrs Surf.Area= 18,446 sf Storage= 36,836 cf

Plug-Flow detention time= 18.6 min calculated for 10.413 af (99% of inflow)
 Center-of-Mass det. time= 18.5 min (245.3 - 226.8)

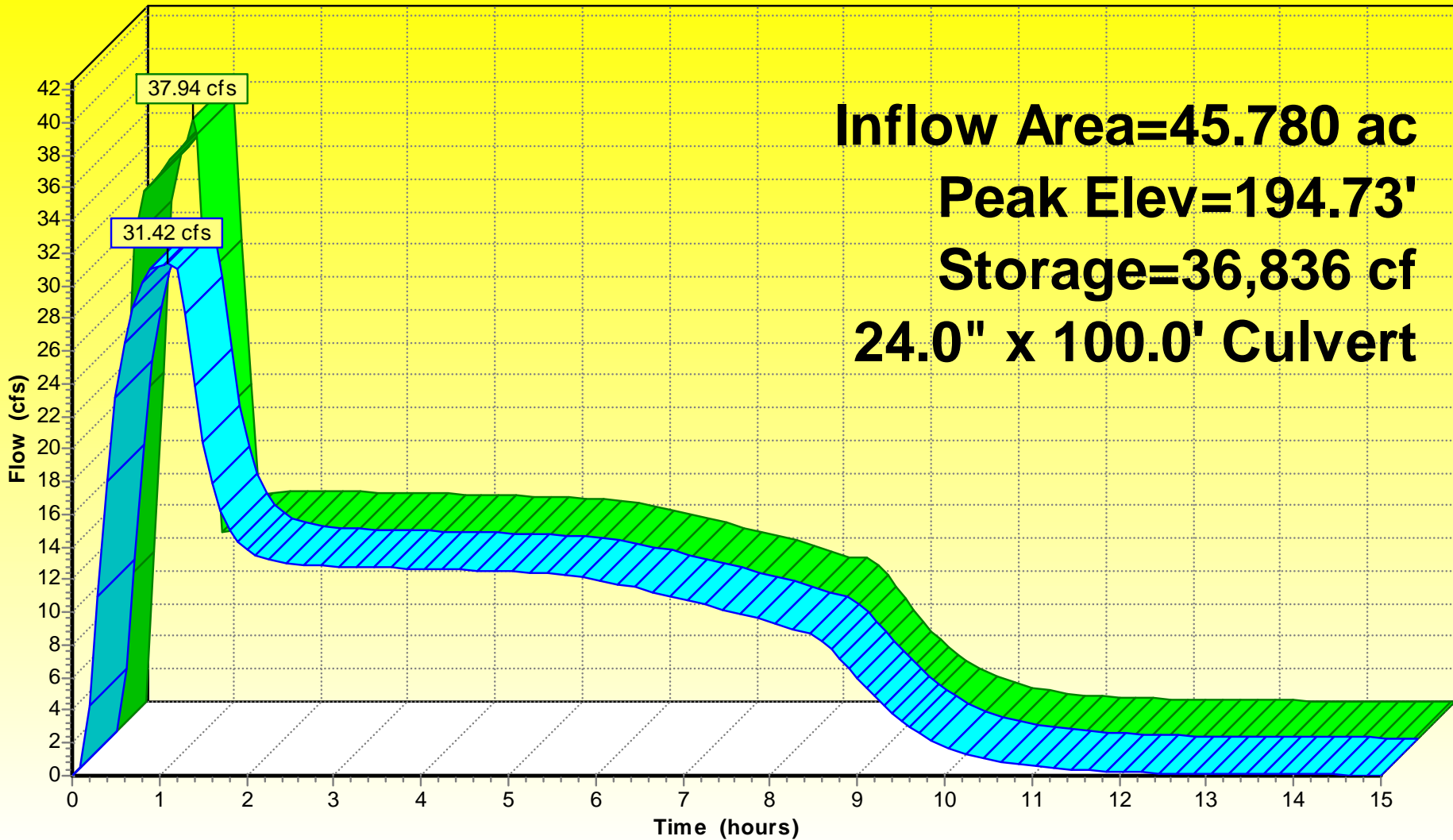
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	62,720 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	4,893	0	0
193.00	13,576	9,235	9,235
194.00	16,354	14,965	24,200
195.00	19,235	17,795	41,994
196.00	22,216	20,726	62,720

Device	Routing	Invert	Outlet Devices
#1	Primary	192.00'	24.0" x 100.0' long Culvert X 2.00 RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 191.65' S= 0.0035 /' Cc= 0.900 n= 0.013

Primary OutFlow Max=31.41 cfs @ 1.10 hrs HW=194.72' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 31.41 cfs @ 5.00 fps)

Hydrograph



Inflow Area=45.780 ac
Peak Elev=194.73'
Storage=36,836 cf
24.0" x 100.0' Culvert

Inflow
Primary

Summary for Pond 1: Northeast

Inflow Area = 15.910 ac, Inflow Depth = 1.92" for 10-Year event
 Inflow = 30.88 cfs @ 0.50 hrs, Volume= 2.552 af
 Outflow = 10.78 cfs @ 0.70 hrs, Volume= 2.551 af, Atten= 65%, Lag= 12.0 min
 Primary = 10.78 cfs @ 0.70 hrs, Volume= 2.551 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 211.43' @ 1.29 hrs Surf.Area= 21,978 sf Storage= 71,770 cf

Plug-Flow detention time= 75.8 min calculated for 2.534 af (99% of inflow)
 Center-of-Mass det. time= 77.4 min (120.4 - 43.0)

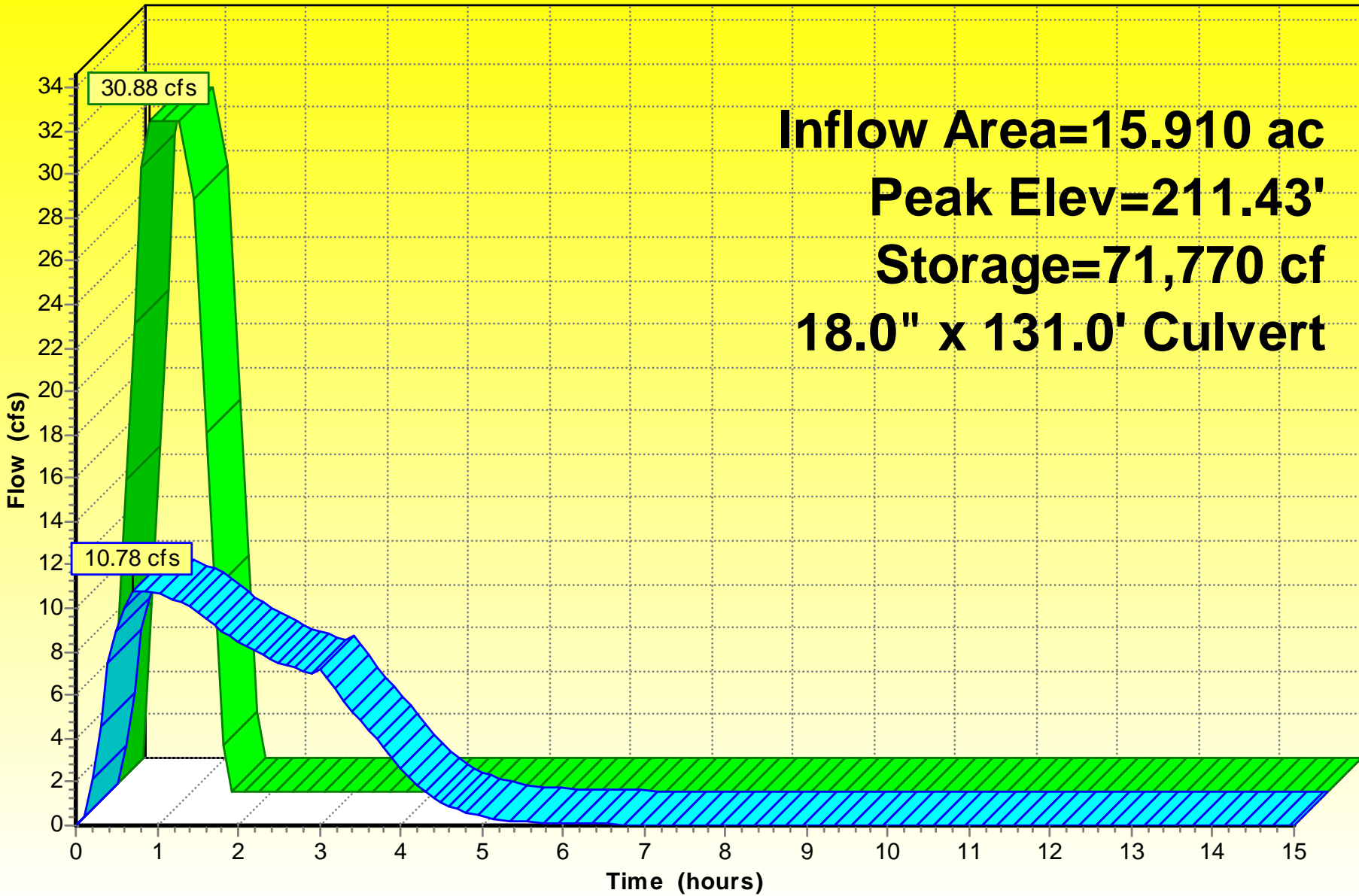
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	164,982 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	2,125	0	0
208.00	15,084	8,605	8,605
209.00	16,970	16,027	24,632
210.00	18,957	17,964	42,595
211.00	21,045	20,001	62,596
212.00	23,232	22,139	84,735
213.00	25,521	24,377	109,111
214.00	27,910	26,716	135,827
215.00	30,400	29,155	164,982

Device	Routing	Invert	Outlet Devices
#1	Primary	207.00'	18.0" x 131.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 206.00' S= 0.0076 '/ Cc= 0.900 n= 0.013

Primary OutFlow Max=9.80 cfs @ 0.70 hrs HW=209.84' TW=207.98' (Dynamic Tailwater)
 ↑ **1=Culvert** (Outlet Controls 9.80 cfs @ 5.54 fps)

Hydrograph



Inflow
Primary

Inflow Area=15.910 ac
Peak Elev=211.43'
Storage=71,770 cf
18.0" x 131.0' Culvert

Summary for Pond 2: North-mid

Inflow Area = 22.860 ac, Inflow Depth = 1.94" for 10-Year event
 Inflow = 24.62 cfs @ 0.70 hrs, Volume= 3.695 af
 Outflow = 12.29 cfs @ 1.08 hrs, Volume= 3.695 af, Atten= 50%, Lag= 23.1 min
 Primary = 12.29 cfs @ 1.08 hrs, Volume= 3.695 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 209.40' @ 1.25 hrs Surf.Area= 14,592 sf Storage= 44,337 cf

Plug-Flow detention time= 41.4 min calculated for 3.695 af (100% of inflow)
 Center-of-Mass det. time= 41.0 min (136.0 - 94.9)

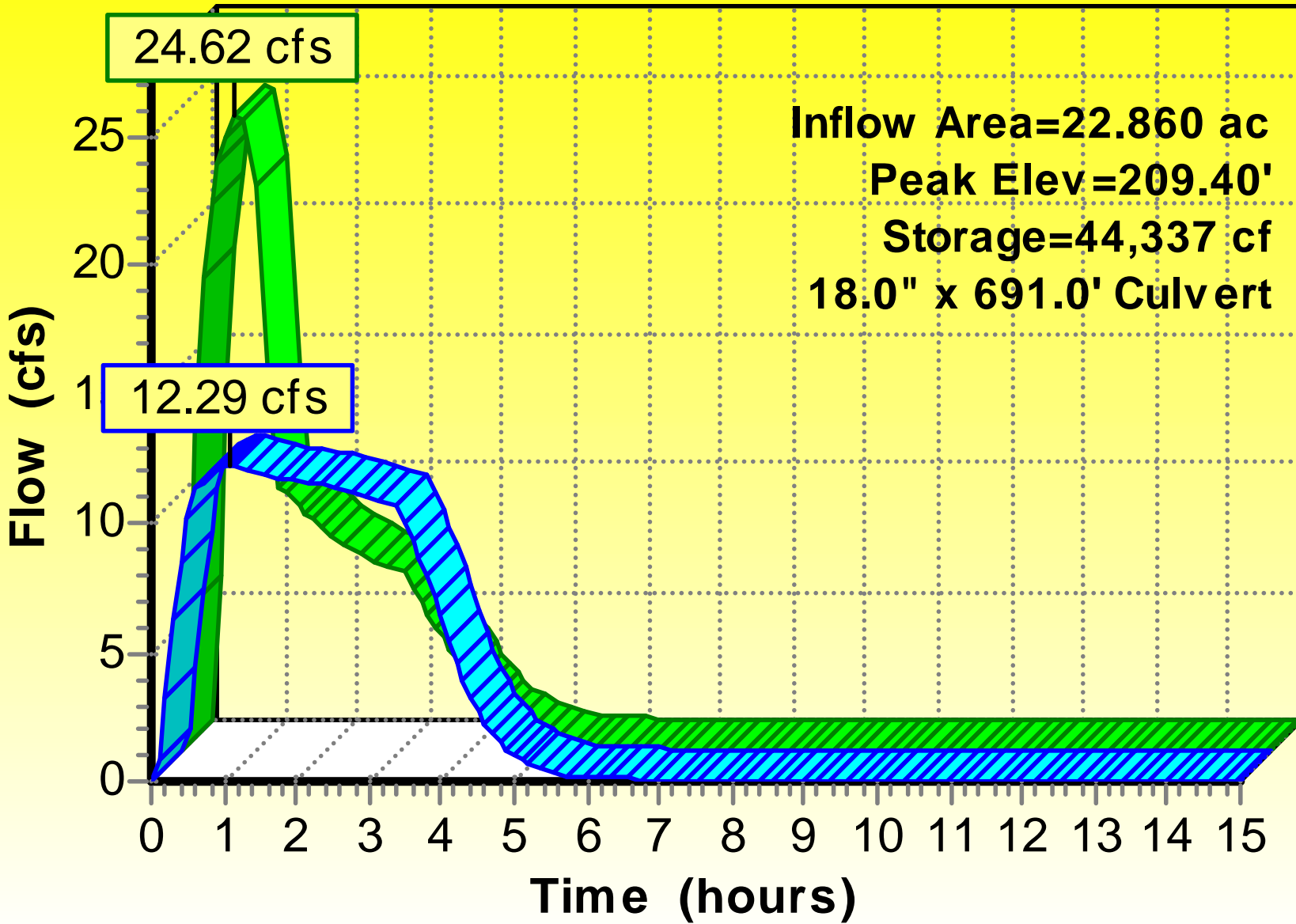
Volume	Invert	Avail.Storage	Storage Description
#1	205.00'	132,524 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
205.00	582	0	0
206.00	8,941	4,762	4,762
207.00	10,408	9,675	14,436
208.00	12,121	11,265	25,701
209.00	13,861	12,991	38,692
210.00	15,703	14,782	53,474
211.00	17,645	16,674	70,148
212.00	19,687	18,666	88,814
213.00	21,830	20,759	109,572
214.00	24,074	22,952	132,524

Device	Routing	Invert	Outlet Devices
#1	Primary	205.00'	18.0" x 691.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 197.00' S= 0.0116 ' /' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=12.14 cfs @ 1.08 hrs HW=209.24' TW=198.89' (Dynamic Tailwater)
 ↑ **1=Culvert** (Outlet Controls 12.14 cfs @ 6.87 fps)

Hydrograph



- Inflow
- Primary

Inflow Area=22.860 ac
Peak Elev=209.40'
Storage=44,337 cf
18.0" x 691.0' Culvert

Summary for Pond 3: Northwest

Inflow Area = 7.210 ac, Inflow Depth = 1.98" for 10-Year event
 Inflow = 14.36 cfs @ 0.30 hrs, Volume= 1.187 af
 Outflow = 7.17 cfs @ 0.78 hrs, Volume= 1.186 af, Atten= 50%, Lag= 29.1 min
 Primary = 7.17 cfs @ 0.78 hrs, Volume= 1.186 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 199.57' @ 1.19 hrs Surf.Area= 18,899 sf Storage= 29,975 cf

Plug-Flow detention time= 135.8 min calculated for 1.178 af (99% of inflow)
 Center-of-Mass det. time= 137.7 min (176.1 - 38.3)

Volume	Invert	Avail.Storage	Storage Description
#1	197.00'	83,529 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

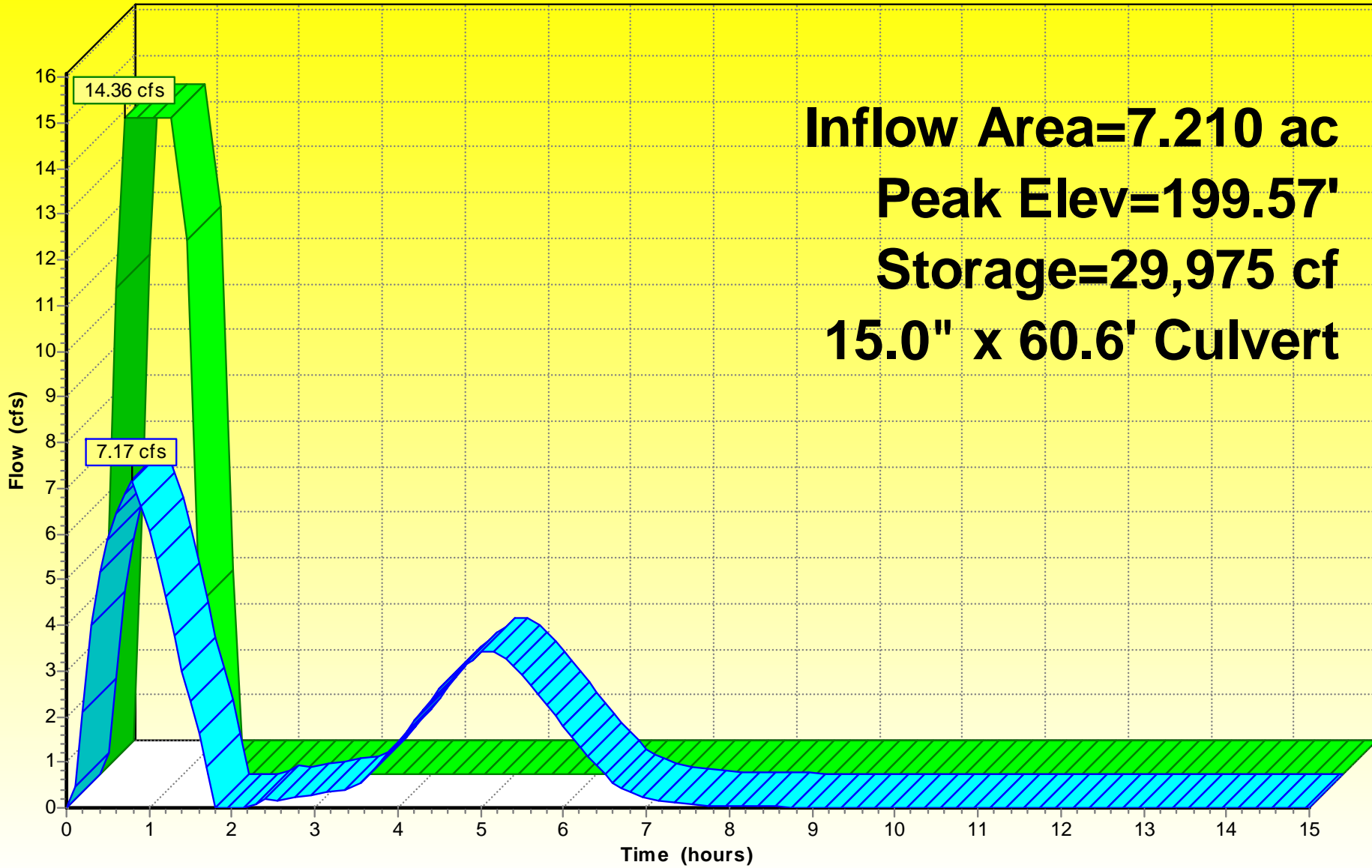
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.00	1,511	0	0
198.00	10,062	5,787	5,787
199.00	17,444	13,753	19,540
200.00	19,978	18,711	38,251
201.00	22,614	21,296	59,547
202.00	25,351	23,983	83,529

Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	15.0" x 60.6' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 196.00' S= 0.0165 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=6.31 cfs @ 0.78 hrs HW=199.10' TW=197.91' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 6.31 cfs @ 5.14 fps)

Hydrograph



Inflow
Primary

Inflow Area=7.210 ac
Peak Elev=199.57'
Storage=29,975 cf
15.0" x 60.6' Culvert

Summary for Pond 4: Middle

[80] Warning: Exceeded Pond 3 by 0.01' @ 1.80 hrs (0.56 cfs 0.015 af)

Inflow Area = 36.560 ac, Inflow Depth = 1.95" for 10-Year event
 Inflow = 31.93 cfs @ 0.81 hrs, Volume= 5.949 af
 Outflow = 11.86 cfs @ 1.83 hrs, Volume= 5.942 af, Atten= 63%, Lag= 61.2 min
 Primary = 11.86 cfs @ 1.83 hrs, Volume= 5.942 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 199.35' @ 1.83 hrs Surf.Area= 24,236 sf Storage= 79,694 cf

Plug-Flow detention time= 90.7 min calculated for 5.903 af (99% of inflow)
 Center-of-Mass det. time= 90.9 min (217.3 - 126.4)

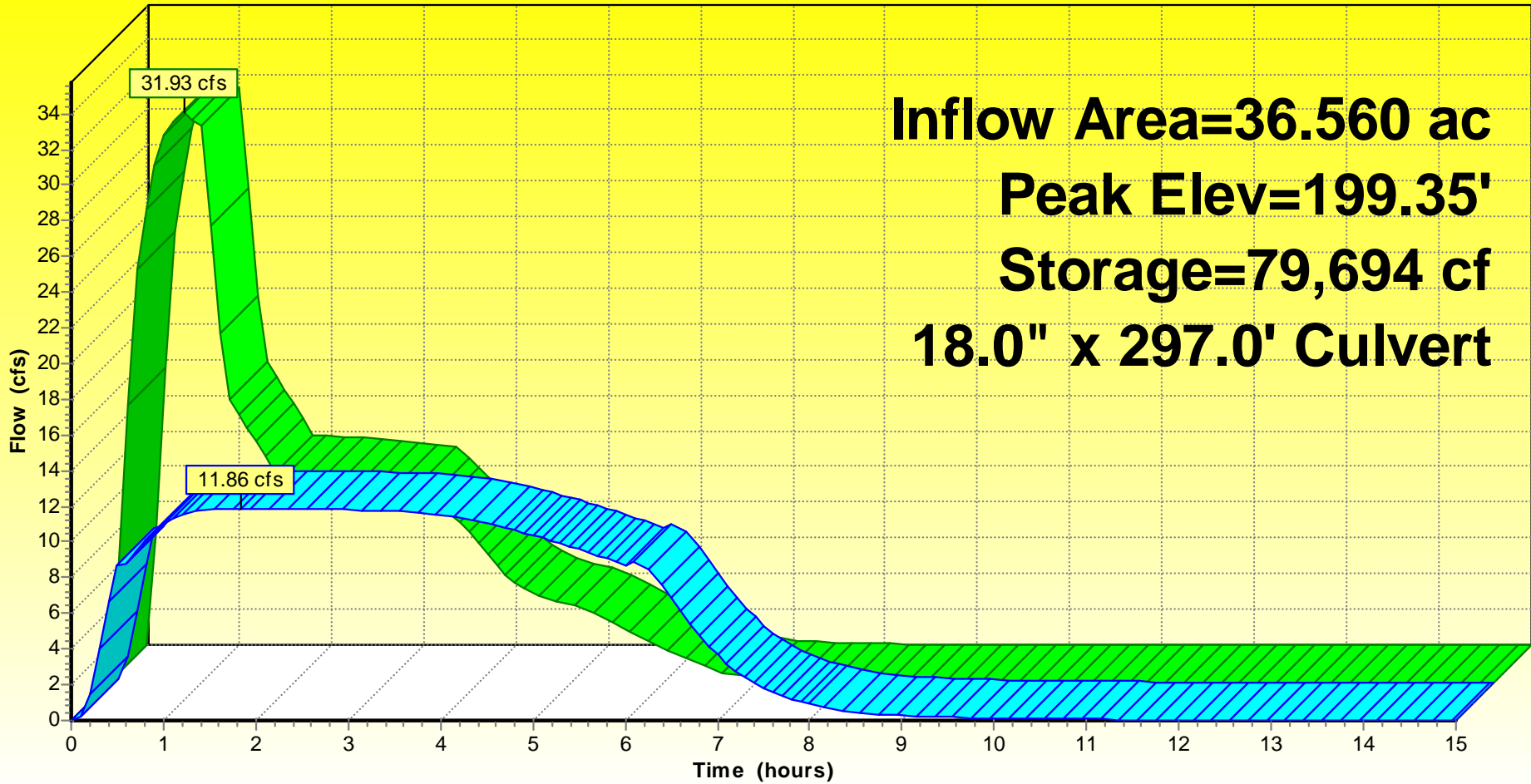
Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	152,367 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	4,612	0	0
196.00	17,072	10,842	10,842
197.00	19,090	18,081	28,923
198.00	21,209	20,150	49,073
199.00	23,428	22,319	71,391
200.00	25,748	24,588	95,979
201.00	28,169	26,959	122,938
202.00	30,690	29,430	152,367

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	18.0" x 297.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 193.00' S= 0.0067 ' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=11.86 cfs @ 1.83 hrs HW=199.35' TW=193.35' (Dynamic Tailwater)
 ↑ **1=Culvert** (Barrel Controls 11.86 cfs @ 6.71 fps)

Hydrograph



Inflow Area=36.560 ac
Peak Elev=199.35'
Storage=79,694 cf
18.0" x 297.0' Culvert

Inflow
Primary

Summary for Pond 5: Southwest

Inflow Area = 45.780 ac, Inflow Depth > 1.94" for 10-Year event
 Inflow = 29.00 cfs @ 0.96 hrs, Volume= 7.383 af
 Outflow = 25.90 cfs @ 1.04 hrs, Volume= 7.376 af, Atten= 11%, Lag= 5.1 min
 Primary = 25.90 cfs @ 1.04 hrs, Volume= 7.376 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 194.13' @ 1.04 hrs Surf.Area= 16,734 sf Storage= 26,383 cf

Plug-Flow detention time= 19.6 min calculated for 7.376 af (100% of inflow)
 Center-of-Mass det. time= 18.8 min (201.2 - 182.4)

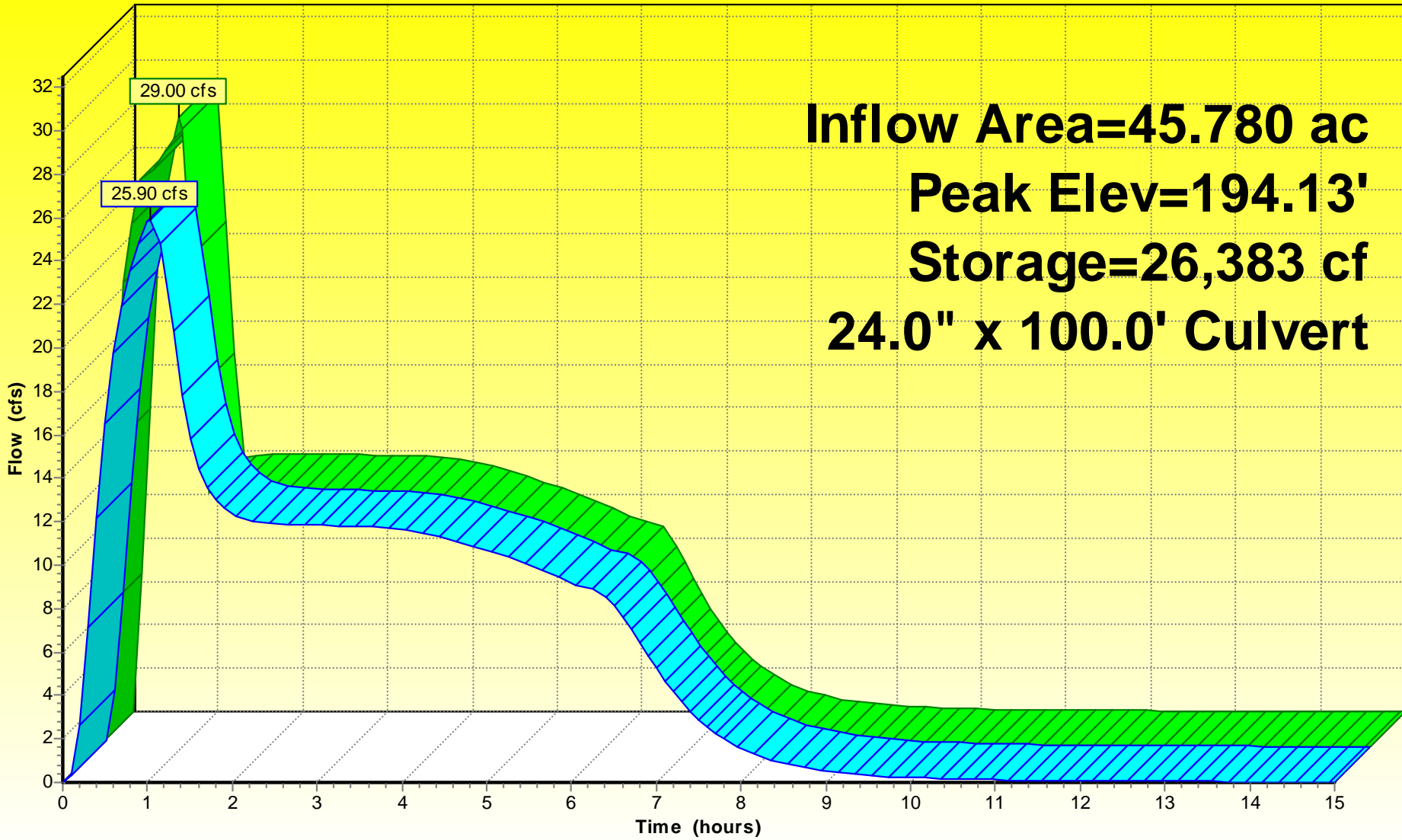
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	62,720 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	4,893	0	0
193.00	13,576	9,235	9,235
194.00	16,354	14,965	24,200
195.00	19,235	17,795	41,994
196.00	22,216	20,726	62,720

Device	Routing	Invert	Outlet Devices
#1	Primary	192.00'	24.0" x 100.0' long Culvert X 2.00 RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 191.65' S= 0.0035 /' Cc= 0.900 n= 0.013

Primary OutFlow Max=25.77 cfs @ 1.04 hrs HW=194.12' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 25.77 cfs @ 4.80 fps)

Hydrograph



Inflow Area=45.780 ac
Peak Elev=194.13'
Storage=26,383 cf
24.0" x 100.0' Culvert

- Inflow
- Primary

Summary for Pond 1: Northeast

Inflow Area = 15.910 ac, Inflow Depth = 1.55" for 5-Year event
 Inflow = 24.83 cfs @ 0.50 hrs, Volume= 2.052 af
 Outflow = 10.59 cfs @ 0.84 hrs, Volume= 2.051 af, Atten= 57%, Lag= 20.5 min
 Primary = 10.59 cfs @ 0.84 hrs, Volume= 2.051 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 210.55' @ 1.26 hrs Surf.Area= 20,097 sf Storage= 53,260 cf

Plug-Flow detention time= 60.1 min calculated for 2.038 af (99% of inflow)
 Center-of-Mass det. time= 61.6 min (104.7 - 43.0)

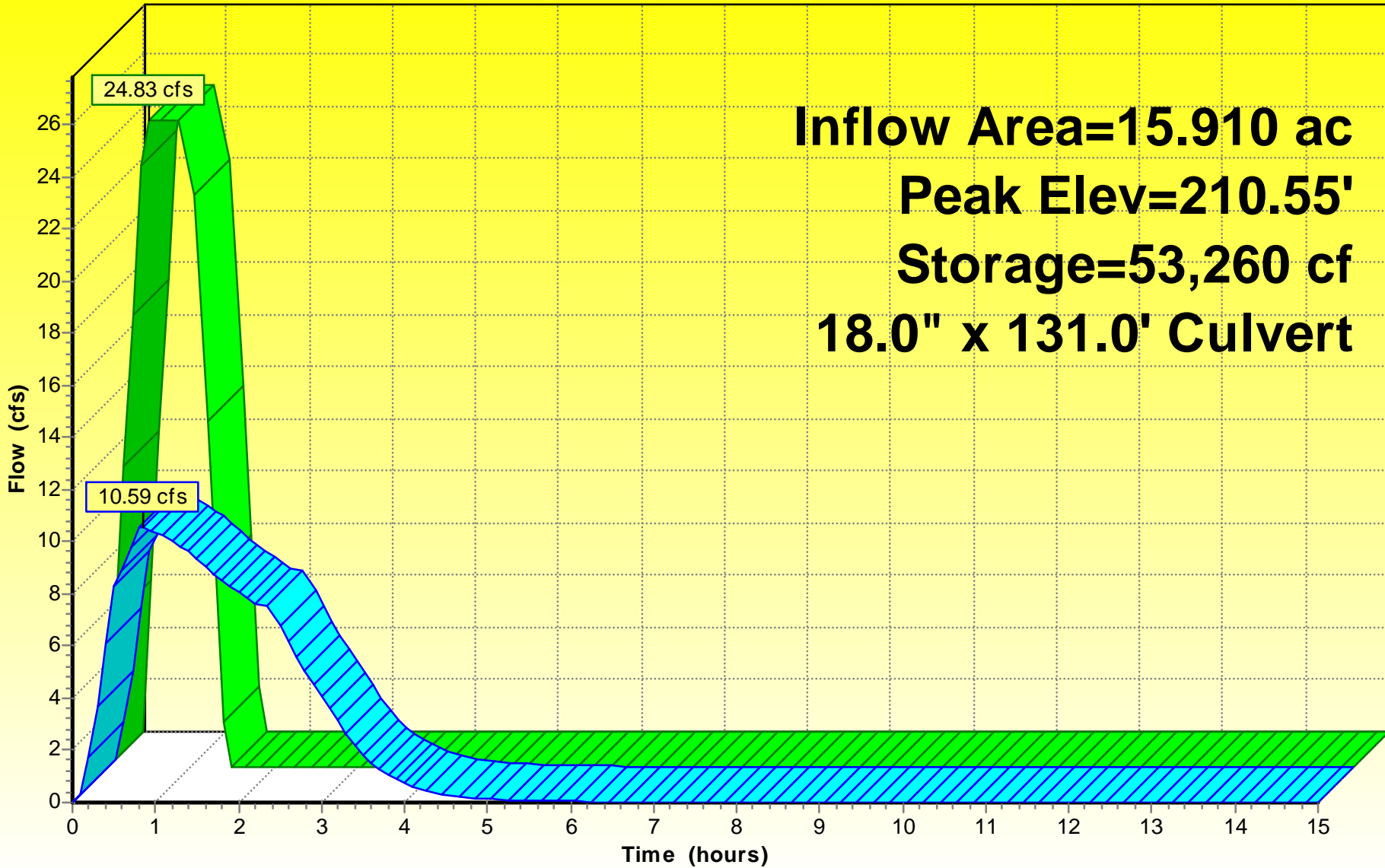
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	164,982 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	2,125	0	0
208.00	15,084	8,605	8,605
209.00	16,970	16,027	24,632
210.00	18,957	17,964	42,595
211.00	21,045	20,001	62,596
212.00	23,232	22,139	84,735
213.00	25,521	24,377	109,111
214.00	27,910	26,716	135,827
215.00	30,400	29,155	164,982

Device	Routing	Invert	Outlet Devices
#1	Primary	207.00'	18.0" x 131.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 206.00' S= 0.0076 '/ Cc= 0.900 n= 0.013

Primary OutFlow Max=9.73 cfs @ 0.84 hrs HW=209.77' TW=207.94' (Dynamic Tailwater)
 ↑ **1=Culvert** (Outlet Controls 9.73 cfs @ 5.50 fps)

Hydrograph



Inflow
Primary

Inflow Area=15.910 ac
Peak Elev=210.55'
Storage=53,260 cf
18.0" x 131.0' Culvert

Summary for Pond 2: North-mid

Inflow Area = 22.860 ac, Inflow Depth = 1.55" for 5-Year event
 Inflow = 21.59 cfs @ 0.84 hrs, Volume= 2.960 af
 Outflow = 12.03 cfs @ 1.19 hrs, Volume= 2.960 af, Atten= 44%, Lag= 20.7 min
 Primary = 12.03 cfs @ 1.19 hrs, Volume= 2.960 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 208.67' @ 1.23 hrs Surf.Area= 13,292 sf Storage= 34,252 cf

Plug-Flow detention time= 33.5 min calculated for 2.941 af (99% of inflow)
 Center-of-Mass det. time= 33.4 min (117.7 - 84.2)

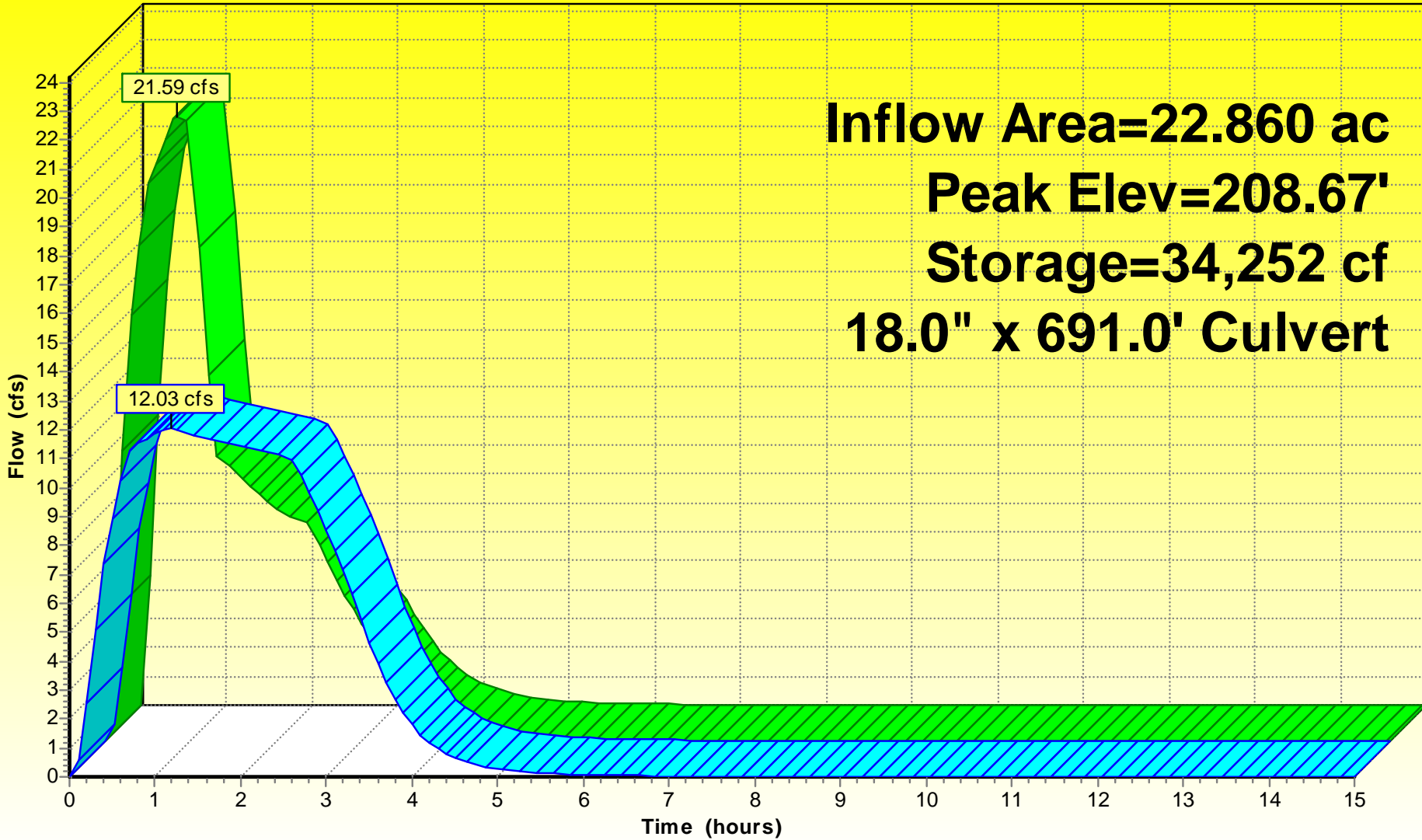
Volume	Invert	Avail.Storage	Storage Description
#1	205.00'	132,524 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
205.00	582	0	0
206.00	8,941	4,762	4,762
207.00	10,408	9,675	14,436
208.00	12,121	11,265	25,701
209.00	13,861	12,991	38,692
210.00	15,703	14,782	53,474
211.00	17,645	16,674	70,148
212.00	19,687	18,666	88,814
213.00	21,830	20,759	109,572
214.00	24,074	22,952	132,524

Device	Routing	Invert	Outlet Devices
#1	Primary	205.00'	18.0" x 691.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 197.00' S= 0.0116 '/ Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=11.97 cfs @ 1.19 hrs HW=208.66' TW=198.59' (Dynamic Tailwater)
 ↑**1=Culvert** (Outlet Controls 11.97 cfs @ 6.77 fps)

Hydrograph



Inflow
Primary

Inflow Area=22.860 ac
Peak Elev=208.67'
Storage=34,252 cf
18.0" x 691.0' Culvert

Summary for Pond 3: Northwest

Inflow Area = 7.210 ac, Inflow Depth = 1.57" for 5-Year event
 Inflow = 11.41 cfs @ 0.30 hrs, Volume= 0.943 af
 Outflow = 6.72 cfs @ 0.88 hrs, Volume= 0.943 af, Atten= 41%, Lag= 35.0 min
 Primary = 6.72 cfs @ 0.88 hrs, Volume= 0.943 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 199.10' @ 1.15 hrs Surf.Area= 17,692 sf Storage= 21,259 cf

Plug-Flow detention time= 101.1 min calculated for 0.943 af (100% of inflow)
 Center-of-Mass det. time= 99.7 min (138.1 - 38.3)

Volume	Invert	Avail.Storage	Storage Description
#1	197.00'	83,529 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

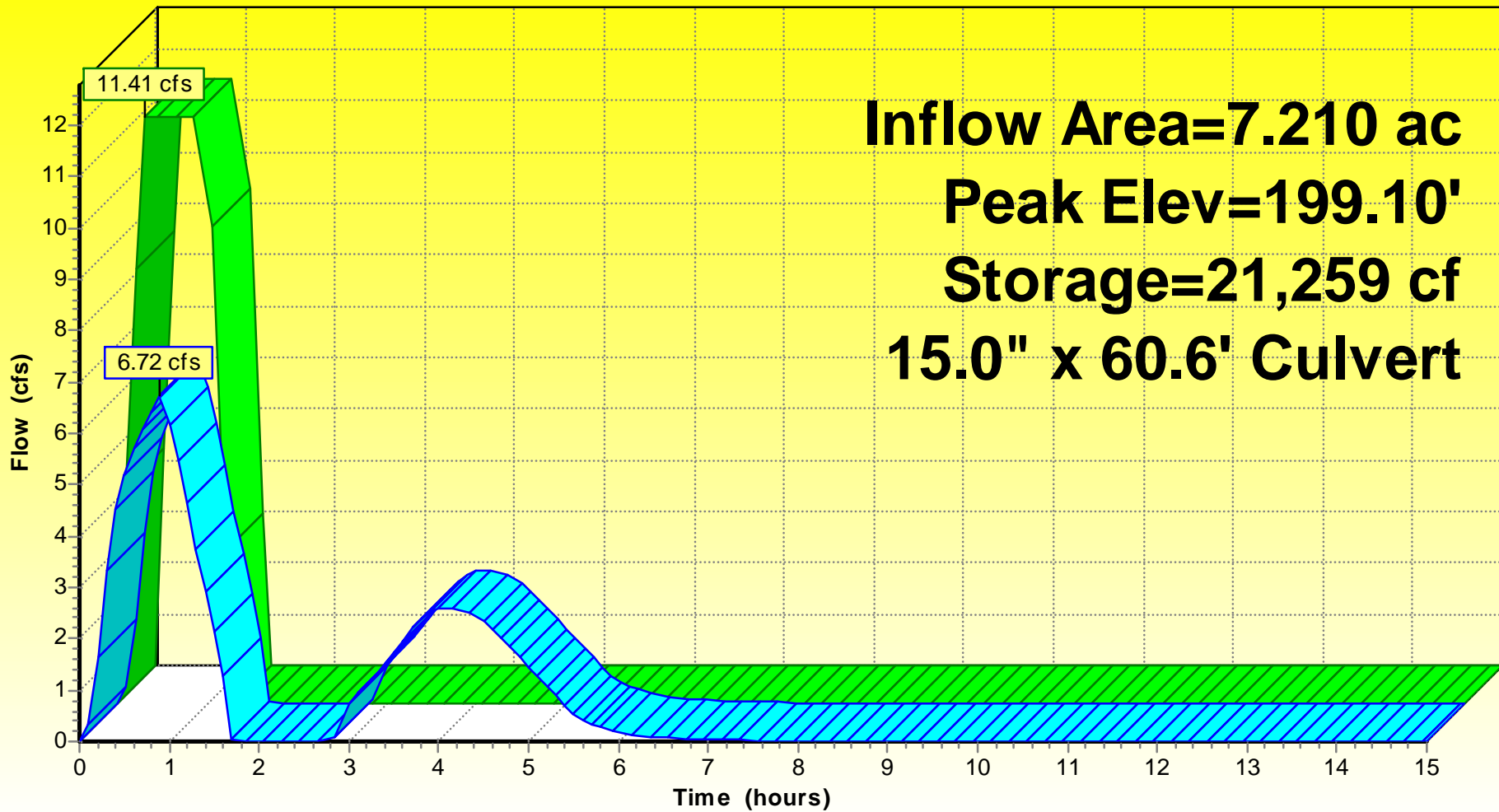
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.00	1,511	0	0
198.00	10,062	5,787	5,787
199.00	17,444	13,753	19,540
200.00	19,978	18,711	38,251
201.00	22,614	21,296	59,547
202.00	25,351	23,983	83,529

Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	15.0" x 60.6' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 196.00' S= 0.0165 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=5.96 cfs @ 0.88 hrs HW=198.90' TW=197.83' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 5.96 cfs @ 4.86 fps)

Hydrograph



Inflow
Primary

Inflow Area=7.210 ac
Peak Elev=199.10'
Storage=21,259 cf
15.0" x 60.6' Culvert

Summary for Pond 4: Middle

[80] Warning: Exceeded Pond 3 by 0.03' @ 2.20 hrs (1.04 cfs 0.085 af)

Inflow Area = 36.560 ac, Inflow Depth = 1.56" for 5-Year event
 Inflow = 28.68 cfs @ 0.90 hrs, Volume= 4.752 af
 Outflow = 11.29 cfs @ 2.23 hrs, Volume= 4.746 af, Atten= 61%, Lag= 79.8 min
 Primary = 11.29 cfs @ 2.23 hrs, Volume= 4.746 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 198.89' @ 2.23 hrs Surf.Area= 23,195 sf Storage= 68,942 cf

Plug-Flow detention time= 83.0 min calculated for 4.746 af (100% of inflow)
 Center-of-Mass det. time= 81.9 min (189.4 - 107.5)

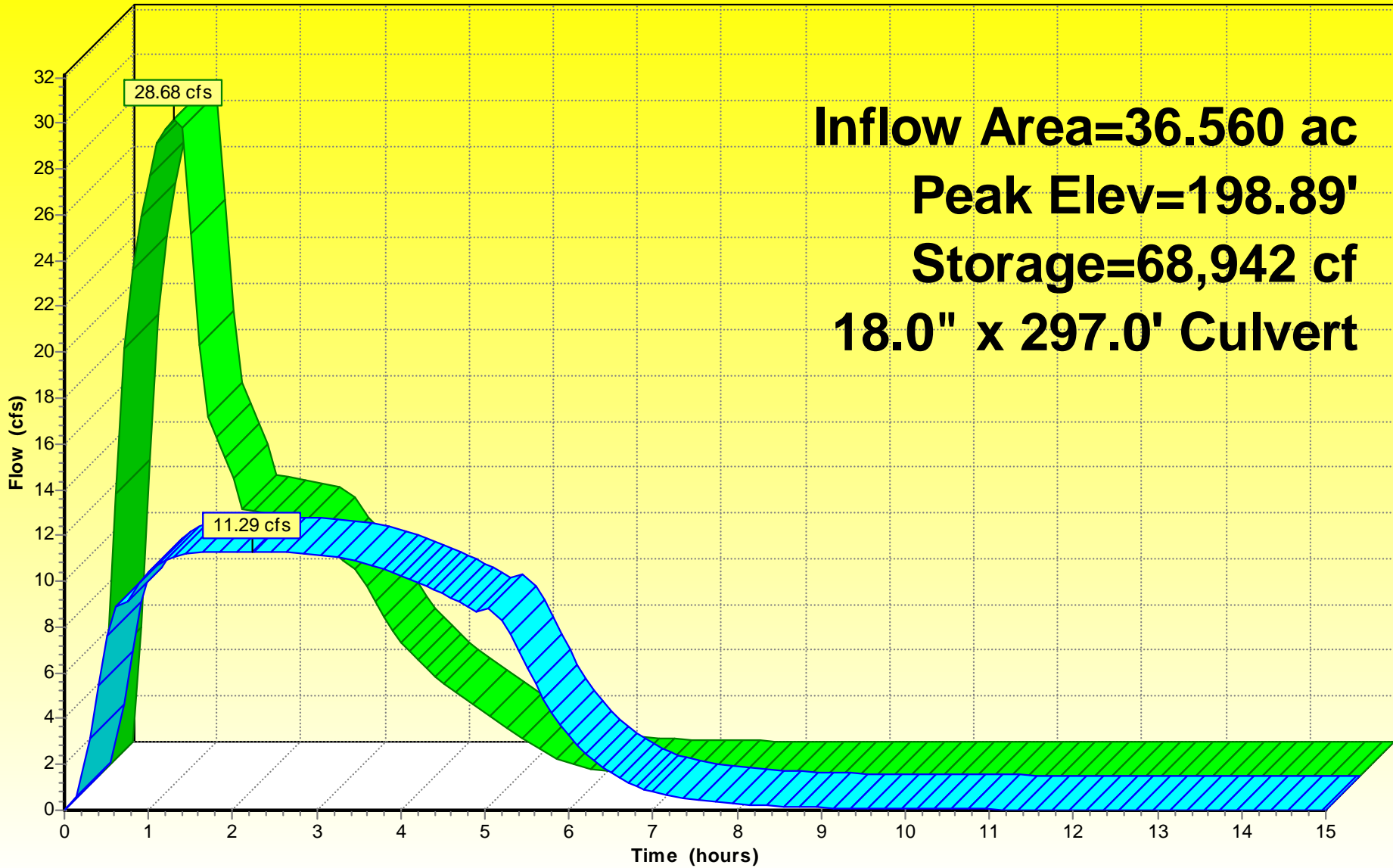
Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	152,367 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	4,612	0	0
196.00	17,072	10,842	10,842
197.00	19,090	18,081	28,923
198.00	21,209	20,150	49,073
199.00	23,428	22,319	71,391
200.00	25,748	24,588	95,979
201.00	28,169	26,959	122,938
202.00	30,690	29,430	152,367

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	18.0" x 297.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 193.00' S= 0.0067 ' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=11.29 cfs @ 2.23 hrs HW=198.89' TW=193.26' (Dynamic Tailwater)
 ↑ **1=Culvert** (Barrel Controls 11.29 cfs @ 6.39 fps)

Hydrograph



Inflow
Primary

Inflow Area=36.560 ac
Peak Elev=198.89'
Storage=68,942 cf
18.0" x 297.0' Culvert

Summary for Pond 5: Southwest

Inflow Area = 45.780 ac, Inflow Depth > 1.56" for 5-Year event
 Inflow = 25.40 cfs @ 0.96 hrs, Volume= 5.952 af
 Outflow = 22.77 cfs @ 1.05 hrs, Volume= 5.945 af, Atten= 10%, Lag= 5.2 min
 Primary = 22.77 cfs @ 1.05 hrs, Volume= 5.945 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 193.94' @ 1.04 hrs Surf.Area= 16,182 sf Storage= 23,191 cf

Plug-Flow detention time= 19.2 min calculated for 5.906 af (99% of inflow)
 Center-of-Mass det. time= 19.2 min (178.0 - 158.8)

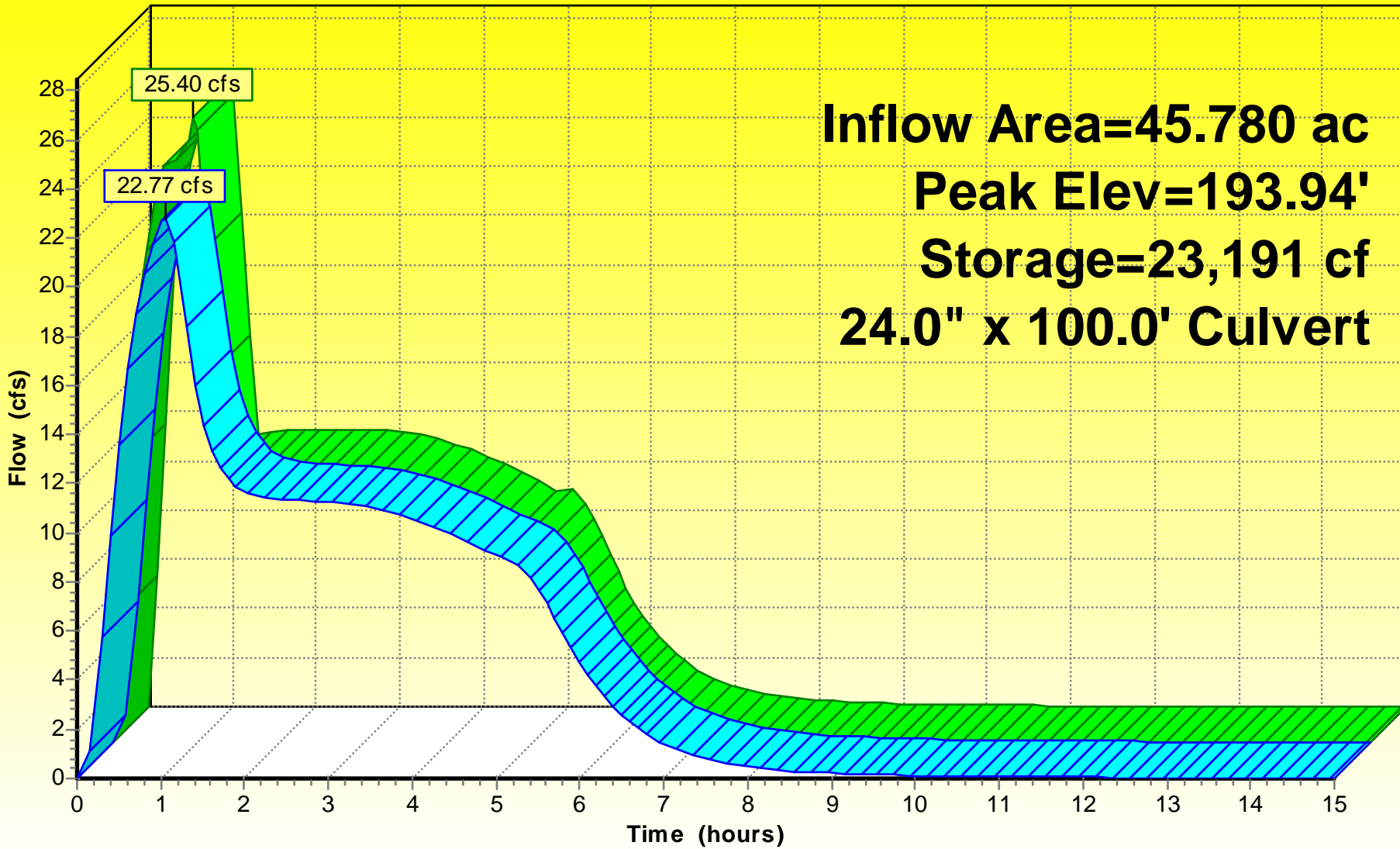
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	62,720 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	4,893	0	0
193.00	13,576	9,235	9,235
194.00	16,354	14,965	24,200
195.00	19,235	17,795	41,994
196.00	22,216	20,726	62,720

Device	Routing	Invert	Outlet Devices
#1	Primary	192.00'	24.0" x 100.0' long Culvert X 2.00 RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 191.65' S= 0.0035 /' Cc= 0.900 n= 0.013

Primary OutFlow Max=22.65 cfs @ 1.05 hrs HW=193.93' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 22.65 cfs @ 4.65 fps)

Hydrograph



Inflow
Primary

Inflow Area=45.780 ac
Peak Elev=193.94'
Storage=23,191 cf
24.0" x 100.0' Culvert

Summary for Pond 1: Northeast

Inflow Area = 15.910 ac, Inflow Depth = 1.17" for 2-Year event
 Inflow = 18.71 cfs @ 0.50 hrs, Volume= 1.546 af
 Outflow = 10.02 cfs @ 1.02 hrs, Volume= 1.545 af, Atten= 46%, Lag= 31.1 min
 Primary = 10.02 cfs @ 1.02 hrs, Volume= 1.545 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 209.63' @ 1.21 hrs Surf.Area= 18,229 sf Storage= 35,783 cf

Plug-Flow detention time= 49.3 min calculated for 1.545 af (100% of inflow)
 Center-of-Mass det. time= 47.9 min (90.9 - 43.0)

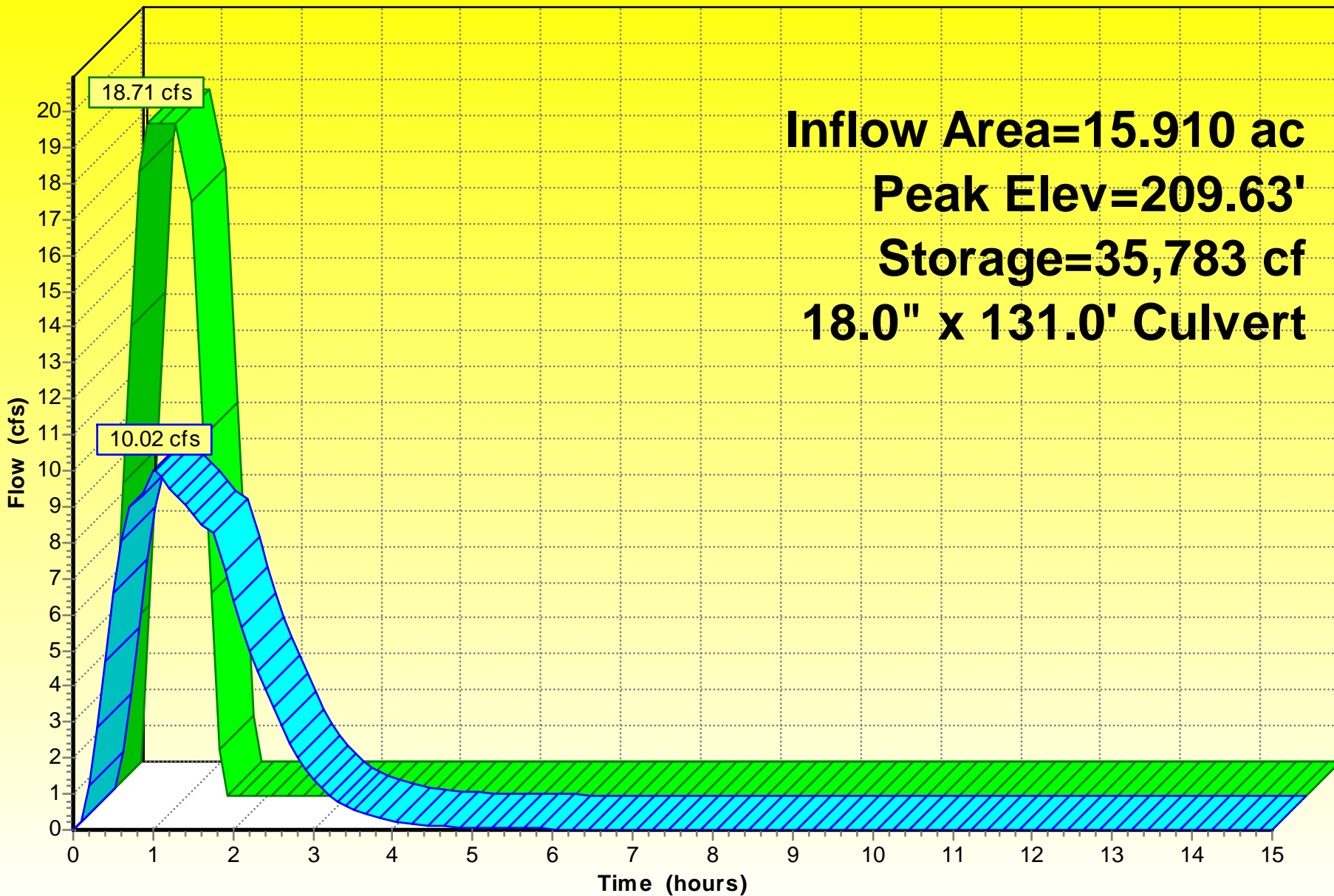
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	164,982 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	2,125	0	0
208.00	15,084	8,605	8,605
209.00	16,970	16,027	24,632
210.00	18,957	17,964	42,595
211.00	21,045	20,001	62,596
212.00	23,232	22,139	84,735
213.00	25,521	24,377	109,111
214.00	27,910	26,716	135,827
215.00	30,400	29,155	164,982

Device	Routing	Invert	Outlet Devices
#1	Primary	207.00'	18.0" x 131.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 206.00' S= 0.0076 '/ Cc= 0.900 n= 0.013

Primary OutFlow Max=9.44 cfs @ 1.02 hrs HW=209.48' TW=207.75' (Dynamic Tailwater)
 ↑ **1=Culvert** (Outlet Controls 9.44 cfs @ 5.34 fps)

Hydrograph



Inflow
Primary

Inflow Area=15.910 ac
Peak Elev=209.63'
Storage=35,783 cf
18.0" x 131.0' Culvert

Summary for Pond 2: North-mid

Inflow Area = 22.860 ac, Inflow Depth = 1.17" for 2-Year event
 Inflow = 18.58 cfs @ 0.96 hrs, Volume= 2.230 af
 Outflow = 11.58 cfs @ 1.21 hrs, Volume= 2.230 af, Atten= 38%, Lag= 14.8 min
 Primary = 11.58 cfs @ 1.21 hrs, Volume= 2.230 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 207.93' @ 1.21 hrs Surf.Area= 11,997 sf Storage= 24,825 cf

Plug-Flow detention time= 27.4 min calculated for 2.230 af (100% of inflow)
 Center-of-Mass det. time= 27.0 min (101.7 - 74.7)

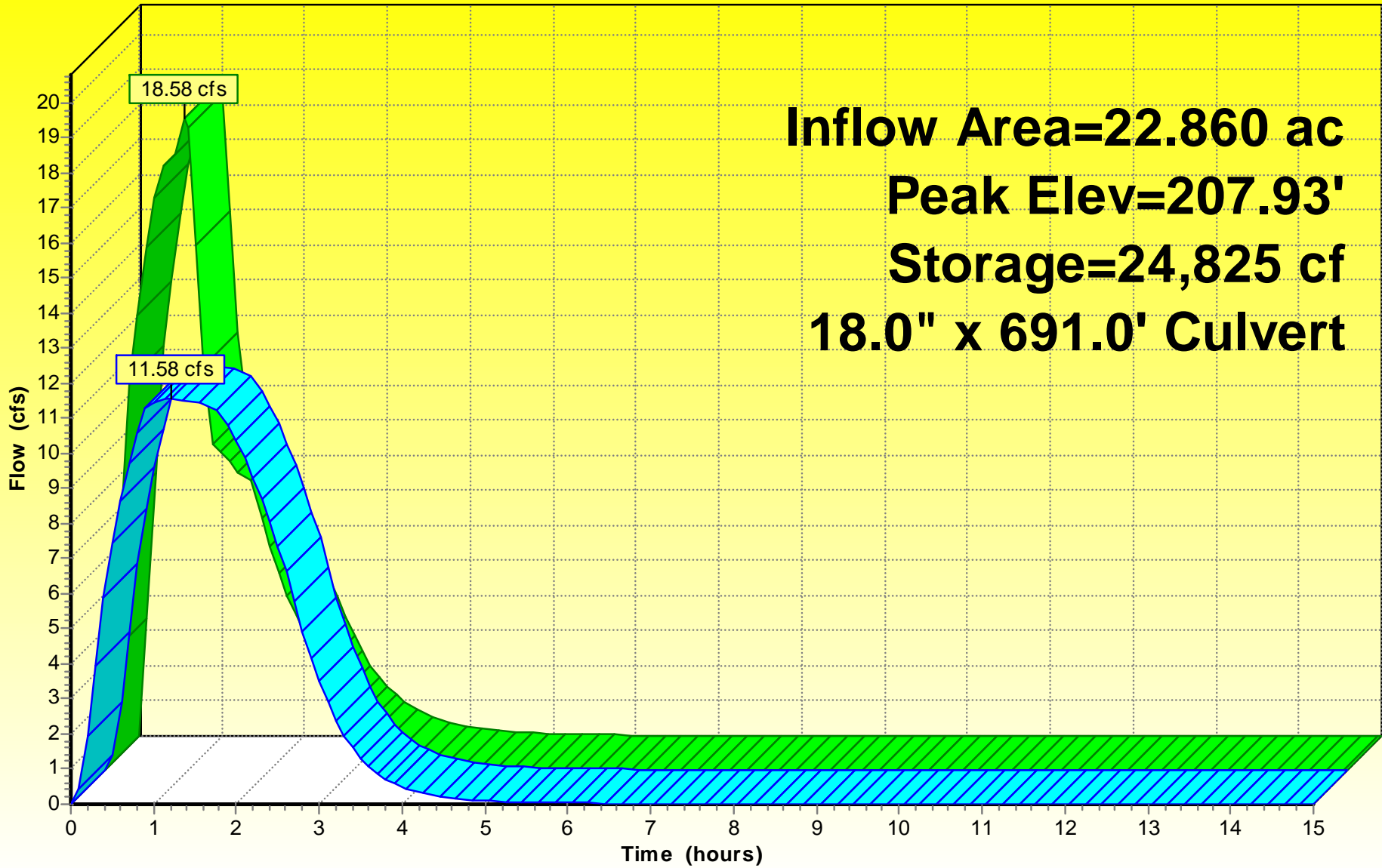
Volume	Invert	Avail.Storage	Storage Description
#1	205.00'	132,524 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
205.00	582	0	0
206.00	8,941	4,762	4,762
207.00	10,408	9,675	14,436
208.00	12,121	11,265	25,701
209.00	13,861	12,991	38,692
210.00	15,703	14,782	53,474
211.00	17,645	16,674	70,148
212.00	19,687	18,666	88,814
213.00	21,830	20,759	109,572
214.00	24,074	22,952	132,524

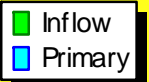
Device	Routing	Invert	Outlet Devices
#1	Primary	205.00'	18.0" x 691.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 197.00' S= 0.0116 '/ Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=11.58 cfs @ 1.21 hrs HW=207.92' TW=198.08' (Dynamic Tailwater)
 ↑ **1=Culvert** (Barrel Controls 11.58 cfs @ 6.55 fps)

Hydrograph



Inflow Area=22.860 ac
Peak Elev=207.93'
Storage=24,825 cf
18.0" x 691.0' Culvert



Summary for Pond 3: Northwest

Inflow Area = 7.210 ac, Inflow Depth = 1.18" for 2-Year event
 Inflow = 8.60 cfs @ 0.30 hrs, Volume= 0.711 af
 Outflow = 5.93 cfs @ 1.02 hrs, Volume= 0.710 af, Atten= 31%, Lag= 43.2 min
 Primary = 5.93 cfs @ 1.02 hrs, Volume= 0.710 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 198.66' @ 1.09 hrs Surf.Area= 14,923 sf Storage= 14,013 cf

Plug-Flow detention time= 61.8 min calculated for 0.706 af (99% of inflow)
 Center-of-Mass det. time= 63.5 min (101.9 - 38.3)

Volume	Invert	Avail.Storage	Storage Description
#1	197.00'	83,529 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

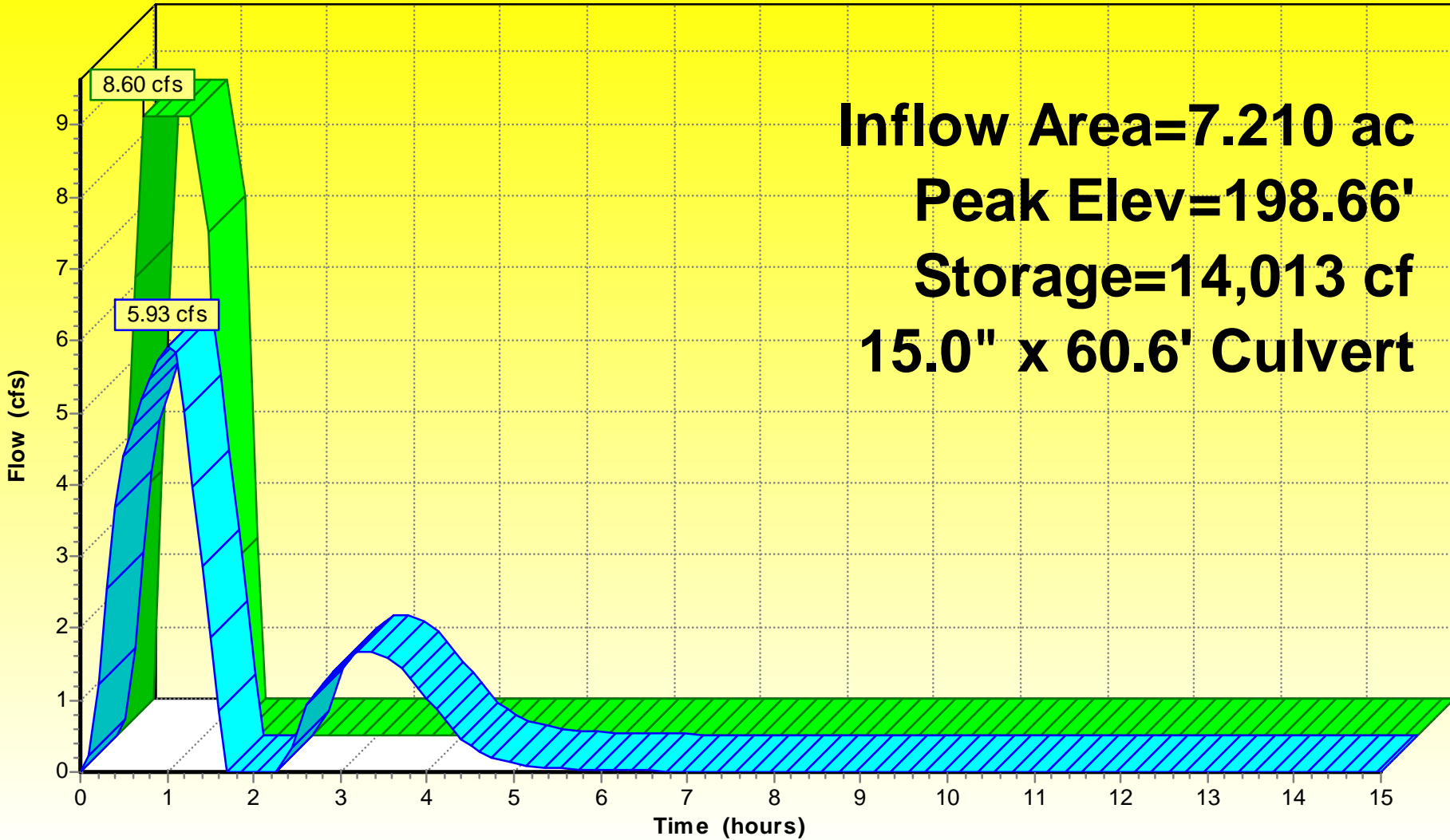
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.00	1,511	0	0
198.00	10,062	5,787	5,787
199.00	17,444	13,753	19,540
200.00	19,978	18,711	38,251
201.00	22,614	21,296	59,547
202.00	25,351	23,983	83,529

Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	15.0" x 60.6' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 196.00' S= 0.0165 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=5.68 cfs @ 1.02 hrs HW=198.64' TW=197.71' (Dynamic Tailwater)

↑ **1=Culvert** (Outlet Controls 5.68 cfs @ 4.65 fps)

Hydrograph



Inflow
Primary

Inflow Area=7.210 ac
Peak Elev=198.66'
Storage=14,013 cf
15.0" x 60.6' Culvert

Summary for Pond 4: Middle

[80] Warning: Exceeded Pond 3 by 0.06' @ 1.90 hrs (1.34 cfs 0.069 af)

Inflow Area = 36.560 ac, Inflow Depth = 1.18" for 2-Year event
 Inflow = 25.38 cfs @ 0.96 hrs, Volume= 3.580 af
 Outflow = 10.62 cfs @ 1.94 hrs, Volume= 3.575 af, Atten= 58%, Lag= 58.7 min
 Primary = 10.62 cfs @ 1.94 hrs, Volume= 3.575 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 198.39' @ 1.94 hrs Surf.Area= 22,074 sf Storage= 57,511 cf

Plug-Flow detention time= 72.7 min calculated for 3.575 af (100% of inflow)
 Center-of-Mass det. time= 71.5 min (161.9 - 90.4)

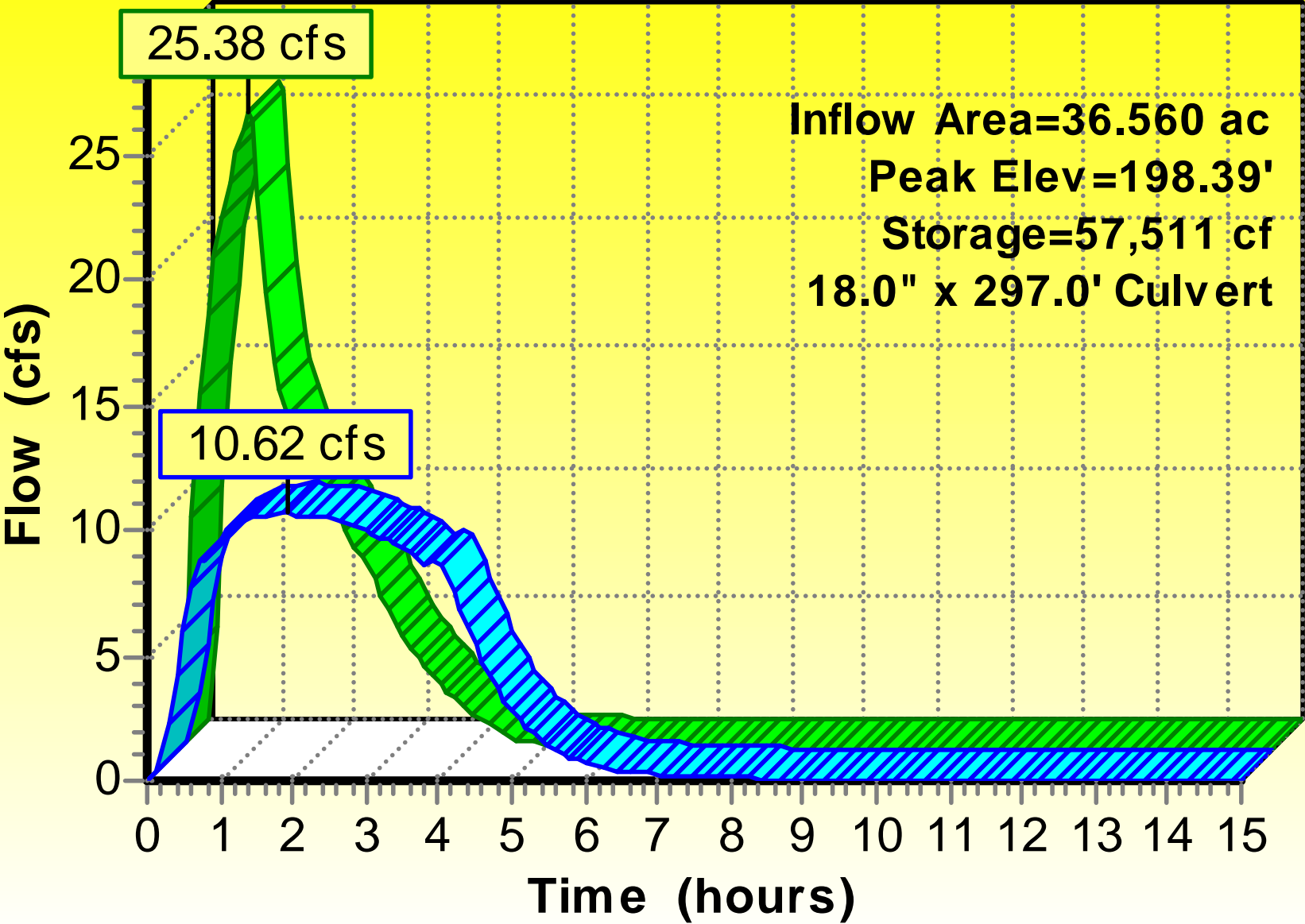
Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	152,367 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	4,612	0	0
196.00	17,072	10,842	10,842
197.00	19,090	18,081	28,923
198.00	21,209	20,150	49,073
199.00	23,428	22,319	71,391
200.00	25,748	24,588	95,979
201.00	28,169	26,959	122,938
202.00	30,690	29,430	152,367

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	18.0" x 297.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 193.00' S= 0.0067 ' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean

Primary OutFlow Max=10.62 cfs @ 1.94 hrs HW=198.39' TW=193.23' (Dynamic Tailwater)
 ↑ **1=Culvert** (Barrel Controls 10.62 cfs @ 6.01 fps)

Hydrograph



Inflow Area=36.560 ac
Peak Elev=198.39'
Storage=57,511 cf
18.0" x 297.0' Culvert

Inflow
Primary

Summary for Pond 5: Southwest

Inflow Area = 45.780 ac, Inflow Depth > 1.17" for 2-Year event
 Inflow = 20.72 cfs @ 0.96 hrs, Volume= 4.471 af
 Outflow = 18.58 cfs @ 1.06 hrs, Volume= 4.465 af, Atten= 10%, Lag= 5.8 min
 Primary = 18.58 cfs @ 1.06 hrs, Volume= 4.465 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.10 hrs
 Peak Elev= 193.69' @ 1.06 hrs Surf.Area= 15,497 sf Storage= 19,287 cf

Plug-Flow detention time= 20.9 min calculated for 4.465 af (100% of inflow)
 Center-of-Mass det. time= 19.8 min (157.0 - 137.2)

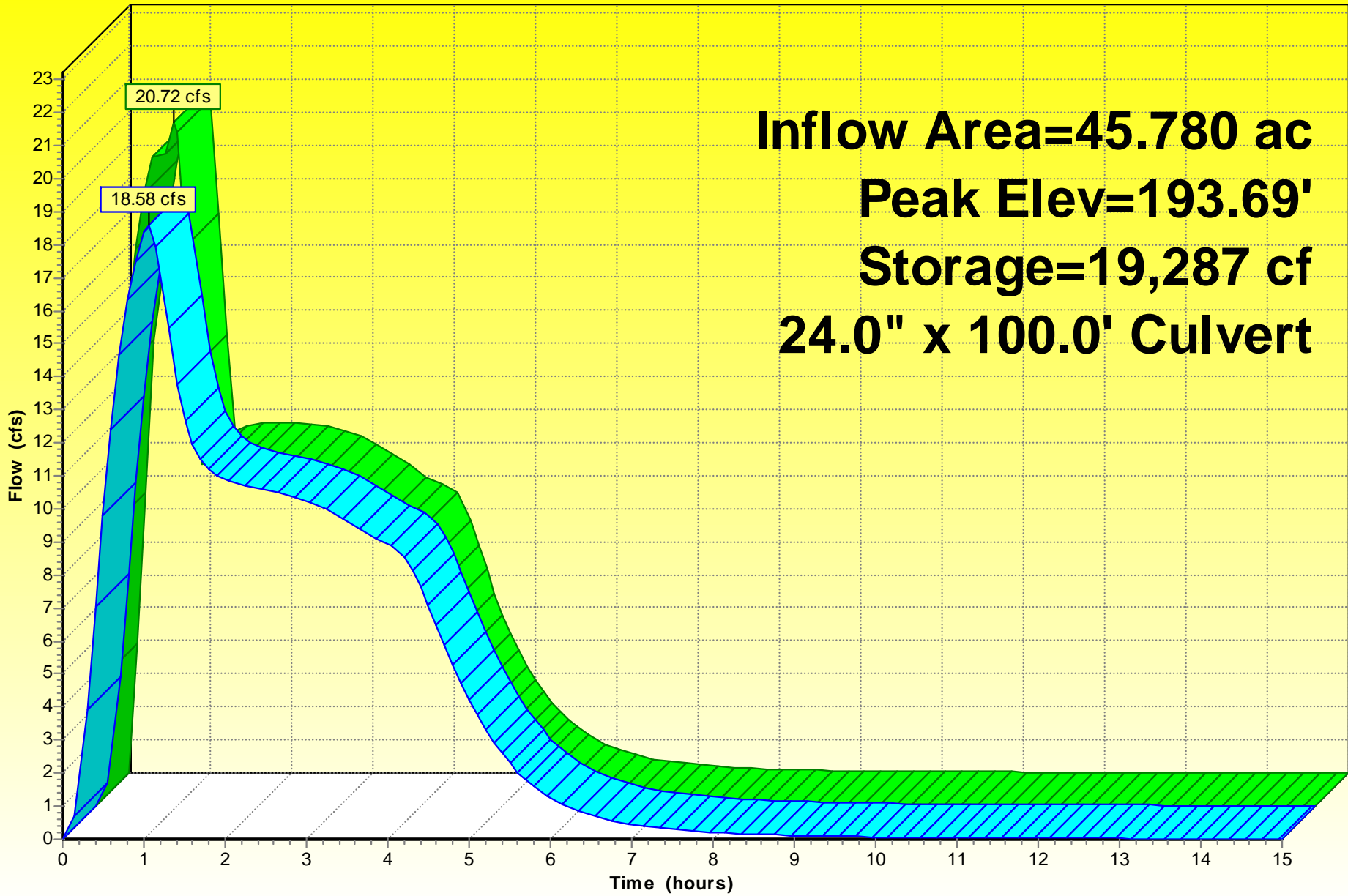
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	62,720 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	4,893	0	0
193.00	13,576	9,235	9,235
194.00	16,354	14,965	24,200
195.00	19,235	17,795	41,994
196.00	22,216	20,726	62,720

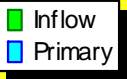
Device	Routing	Invert	Outlet Devices
#1	Primary	192.00'	24.0" x 100.0' long Culvert X 2.00 RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 191.65' S= 0.0035 /' Cc= 0.900 n= 0.013

Primary OutFlow Max=18.43 cfs @ 1.06 hrs HW=193.68' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 18.43 cfs @ 4.41 fps)

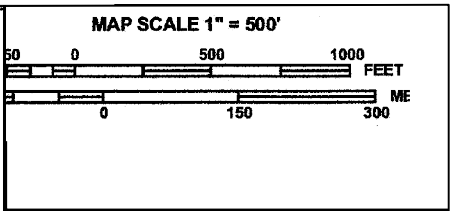
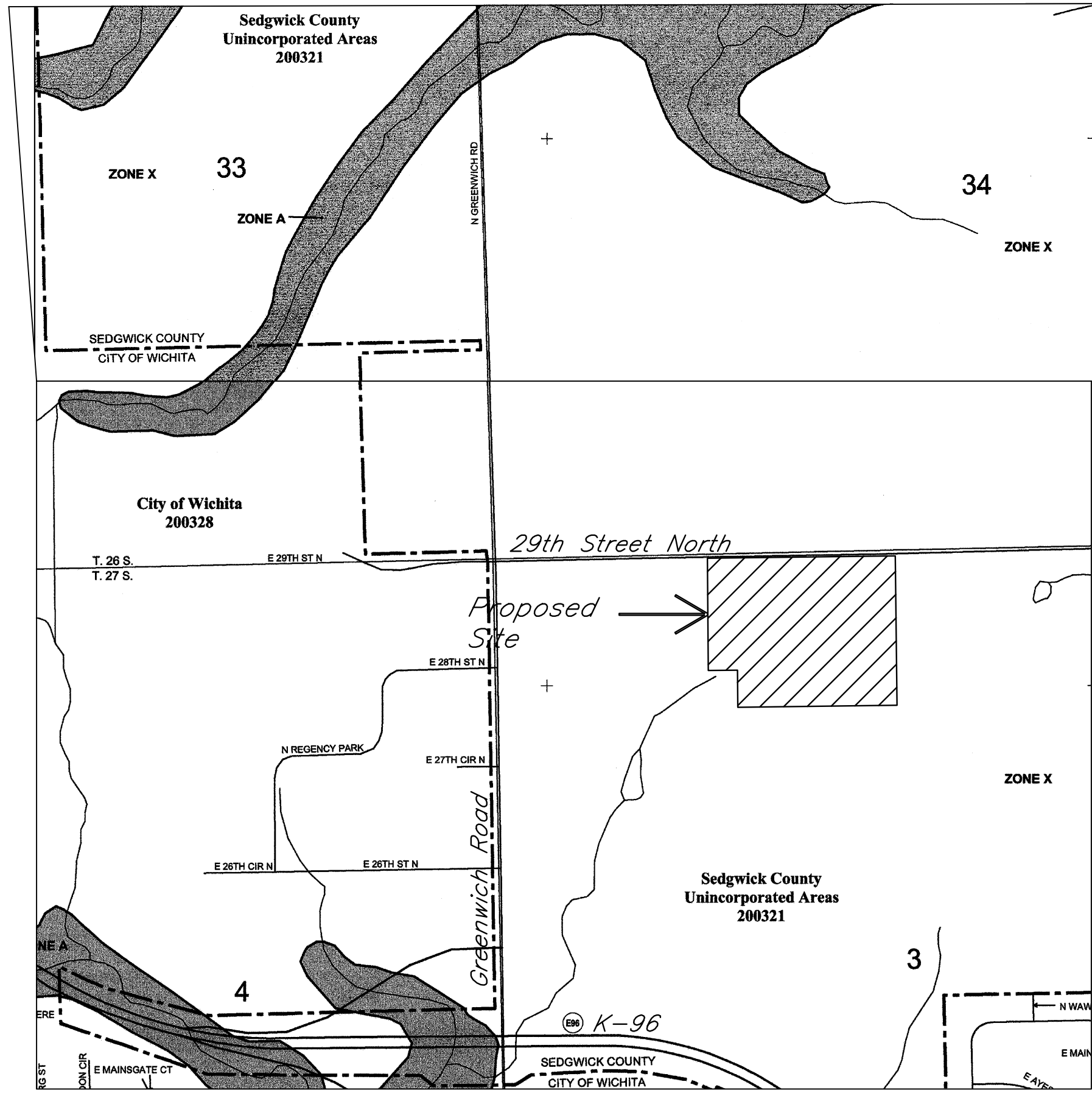
Hydrograph



Inflow Area=45.780 ac
Peak Elev=193.69'
Storage=19,287 cf
24.0" x 100.0' Culvert



FEMA Flood Map



PANEL 0377E


FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS
PANEL 377 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0377	E
WICHITA, CITY OF	200328	0377	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.




MAP NUMBER
20173C0377E

EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



Garden Apartments, 29th and Greenwich Flood Map Wichita, Kansas			
PROJECT NUMBER			
 016 S. Market, Wichita, KS 67202	KEY NO. 10088	FILE drainage	DATE 10/2010
	DESIGN GP	DRAWN GP	REVISED
			SHEET 1 OF 1

Public Works, Eng. Div. Storm water checklist
Electronic copies of Report



Public Works, Engineering Division Stormwater Management Subdivision Submittal Checklist

Reviewer: _____	Date: _____
Subdivision Name: <u>Stoney Pointe Addition</u>	Location: <u>South of 29th St. N. 1/4</u>
Total Land Area Of Ownership: <u>45.77</u> Acres mile east of 29th and Greenwich	
Type: _____ Residential <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Industrial _____ Recreation _____ Municipal _____ Other _____	
Applicant: <u>Edward Rose Dev. Company LLC.</u> Contact: <u>Mark G. Harrison</u> Phone #: <u>(269) 323-9424</u>	
Engineer: <u>K E Miller Eng. PA</u> Contact: <u>Kirk Miller</u> Phone # <u>264-0242</u>	

Please check the appropriate box:

I = Included; NA = Non-Applicable; R= Required prior to development
(If "NA" is checked, an explanation must be entered)

Tab 1. Project Narrative	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Site Location Map, using USGS Map	X		USGS Map/Tab 1		
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		Report/Drainage Plan		
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		Preliminary plat/Tab 1		
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				
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				

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



Stormwater Management Subdivision Submittal Checklist

J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements	X		Existing Drainage Cond'n		
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X		Existing Drainage Cond'n		
L. Flow paths	X		Existing Drainage Cond'n		
M. Location and dimensions of existing channels, bridges or culvert crossings		X			
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		Drainage Plan/Hydrological Analysis		
O. Assumed pre-developed runoff curve numbers	X		Report		
P. Existing time of concentrations used in calculations	X		Report/Drainage Plan		
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	X		Report/Drainage Plan		
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)	X		Report/Drainage Plan		
S. Cross-section data for open channels		X			
T. Ground water elevations, if applicable		X	Not Required		

Tab 3. Post-Development Hydrologic Analysis	Applicant		Engr	
	I	NA	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			
B. Proposed time of concentrations used in calculations	X			
C. Assumed post-developed runoff curve numbers	X			
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)	X			
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration	X			
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities	X			
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary		X		
H. Dam safety analysis, where necessary		X		
I. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)		X		
J. Design water surface elevations and normal pool elevation for ponds.	X			
K. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.	X			
L. Proposed limits of clearing and grading		X		
M. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	X			
N. Location of existing and proposed utilities (e.g., water, sewer) and easements	X			
O. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X			
P. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings		X		



Stormwater Management Subdivision Submittal Checklist

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

Tab 4. Floodplain Submittal	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Provide source of flood profile	X		FEMA flood map		
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		FEMA Flood Map		

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant			Engr	
	I/R	NA	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			