



Introduction

This storm water memorandum will study the development of a 17.40-acre site located at the southeast corner of View High Drive and Ashurst Dr, Lee's Summit, Jackson County, Missouri. The site is located in the Cedar Creek watershed and drains southeasterly from the development site via an un-named tributary to Cedar Creek. The development will meet the City of Lee's Summit and APWA Section 5600 storm water detention requirements for Comprehensive Controls. The site will be developed into buildings, parking areas, athletic fields and onsite storm water detention with extended 40 hour controls for the Water Quality storm event.

Purpose

This memorandum has been prepared to evaluate potential hydrologic and hydraulic issues related to the development of the proposed projects and recommend improvements if necessary to mitigate any anticipated negative downstream impacts. Exhibit A is the Proposed Drainage Area Map

Storm Study Methodology

SCS Technical Release No. 55

Site Impervious Area

43.0% of Site

Curve Number for Developed Site

$84 = (43\% * 98) + (57\% * 74)$

Hydrologic Soil Group

C/D

Additional Resources

Exhibit

C	FEMA Firmette, 29095C0412G, dated January 20, 2017	None
D	US Fish and Wildlife Wetland Inventory	None Identified
E	Soil Map	
F	Drainage Area for Stream Buffer for Unnamed Tributary (No Buffer Required)	21.22 Acres

APWA Section 5600.4.C.1 Comprehensive Control

- Ground Cover: Commercial
 - Drainage Area: 22.58 acres
 - Composite Curve Number: 84
 - Time of Concentration: 15 minutes
- Allowable Discharge Rates
- 2-YR: 11.29 cfs
 - 10-YR: 45.16 cfs
 - 100-YR: 67.74 cfs

Peak Discharge Summary and Allowable Detention Basin Discharge

Condition	Q (2-YR) cfs	Q (10-YR) cfs	Q (100-YR) cfs
Site	63.70	108.91	175.50
Allowable Site Discharge	11.29	45.16	67.74
Design Detention Discharge	10.05	32.13	45.06



The proposed release rates will meet the APWA Section 5600 Allowable Release Rates

Hydraflow Report which includes both proposed hydrographs along with detention basin sizing and routing hydrographs may be found in Exhibit B.

Detention Design

Designation: Detention Basin

Type: Earthen Basin

Side Slopes: 3:1 Max.

Bottom Slope: 2% Min., Turf Lined

Basin Bottom Elevation: 902.00 @ Influent Pipe

Basin Top Berm Elevation: 913.00

Basin Volume: 228,201 cf @ 913.00

Control Structure: 5'x5' control/junction structure

Control Structure Top Elevation: 911.00

Control Structure Influent Pipe: 36" HDPE, FL (In) = 901.00'

Control Structure Effluent Pipe: 36" HDPE, FL (Out) = 900.50'

Emergency Spillway: Earthen Broad Crested Weir, Crest Elevation=912.00, Crest Length=150'

Top of Dam: 913.00, Q=71.44, Depth=0.67', Velocity=2.13 fps

The Detention Basin Plan is located in Exhibit C. See Table below for a summary of detention basin data.

Detention Basin Data

	Peak Q In (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Vol. (cf)
Detention Basin						
2-Year	63.70	10	10.05	17	907.12	65,156
10-Year	108.91	10	32.13	17	909.13	110,645
100-Year	175.50	10	45.06	18	911.80	187,429

As shown in the above table, post detention peak discharge rates have been attenuated well below existing.



Conclusion

The development along with the proposed detention basin will meet all requirements of the City of Lee's Summit and APWA Section 5600 for storm water attenuation. There are no known Stream Buffer setback areas required due to the size of the upstream watershed. There are no known floodplain or wetlands onsite per the exhibits provided within this report from FEMA and National Wetland Mapper. Additionally, there are no required stream buffers due to the upstream watershed area being less than 40 acres.

Due to the reduction in existing peak flow rates from this site the development will not create a negative impact on the downstream system and will provide the required storm attenuation for the proposed development of the site.

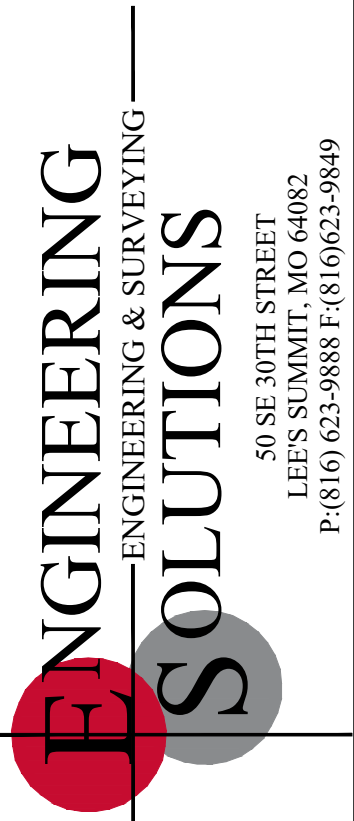
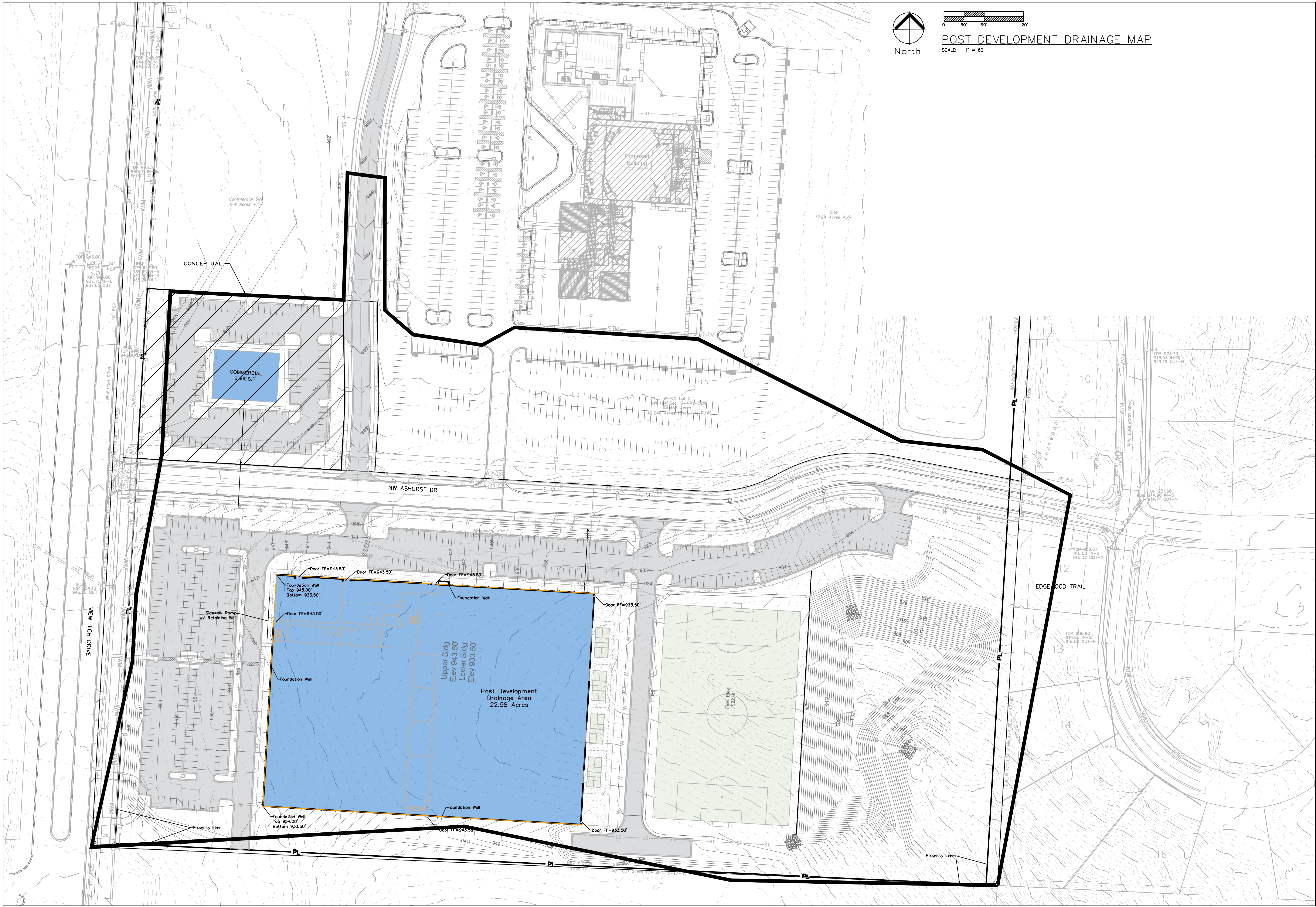
Matt Schlicht, PE 2006019708





Storm Water Memorandum
November 8, 2024
View High Sports Complex
Lee's Summit, MO

Exhibit A Proposed Drainage Area Map



Professional Registration
Missouri
Engineering 305502185-D
Surveying 303503818-2
Kansas
Engineering 5-1686
Surveying LS-219
Oklahoma
Engineering 625-1
Nebraska
Engineering CA2621

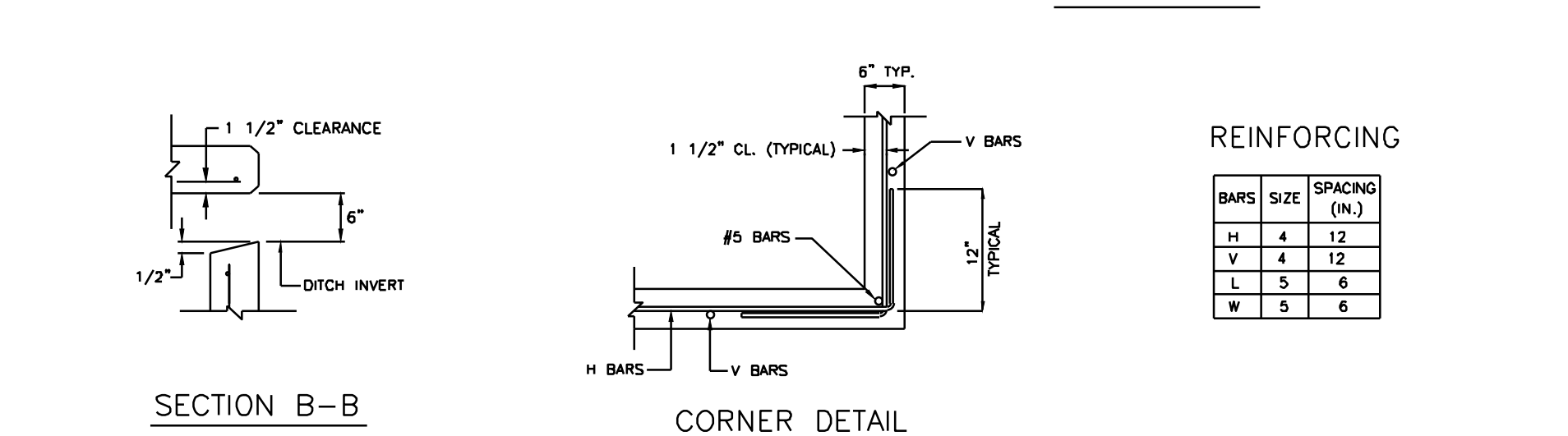
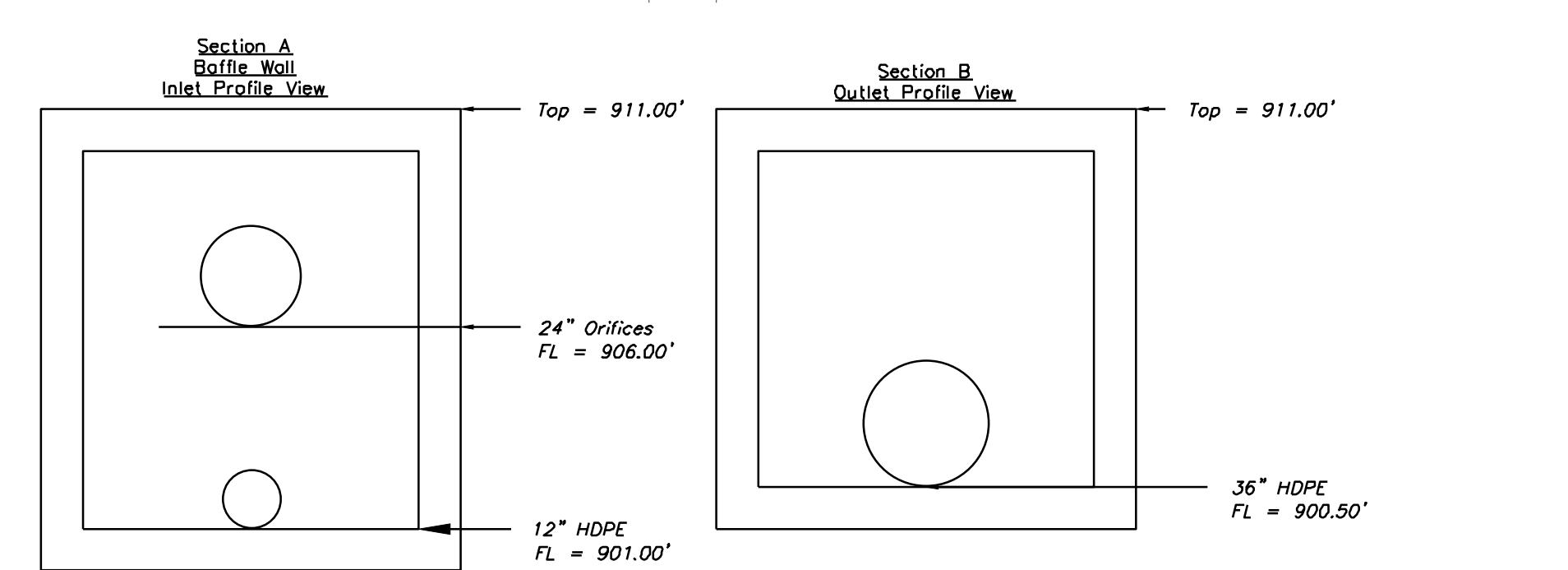
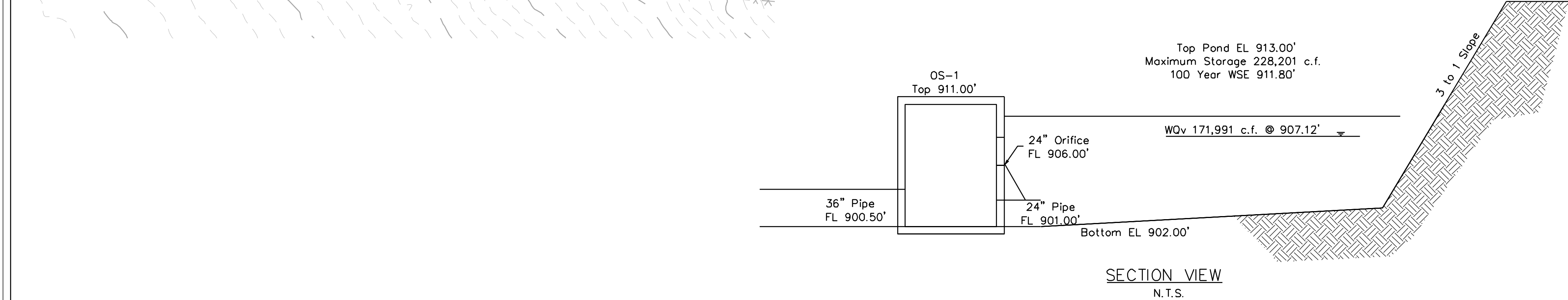
View High Sports Complex
Lee's Summit, Jackson County, Missouri

Project: View High Sports Complex
Sheet: 1 of 1
Issue Date: November 7, 2024

Post Development Drainage Area
Construction Plans for:
View High Sports Complex
Lee's Summit, Jackson County, Missouri

Matthew J. Schlicht
MO PE 2006019708
KS PE 19071
OK PE 25226

REVISIONS



- GENERAL NOTES:
1. Locate ring and cover over outlet.
 2. All work and materials shall conform to APWA Sect. 2600.
 3. Use 3/4" chamfer strip on all exposed concrete corners.
 4. Steps required @ 16" O.C. when depth from top of casting to invert exceeds 4 feet.
 5. Boxouts will not be allowed to project through the corners of the structure.
 6. The minimum reinforcing shall be 1 H-bar over a cast-in place pipe and 2 H-bars over a precast boxout.
 7. Limit opening height to 6" with No. 5 galvanized bars extending to corner rebars.
 8. Show field inlet orientation on plans plus number and size of opening.
 10. O.R. = one half outside pipe diameter (O.D.).
 11. 4" x 8' field tile or precast hole shall be located at entering pipe and in the front face sump points. These tiles or openings shall be capped with 1/4" galvanized wire mesh on the outside of the inlet and clear the invert and base concrete.



Storm Water Memorandum
November 8, 2024
View High Sports Complex
Lee's Summit, MO

Exhibit B Hydraflow Report

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023



Legend

<u>Hvd. Origin</u>	<u>Description</u>
1	SCS Runoff View High Sports Complex
2	Reservoir Detention

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	-----	63.70	-----	-----	108.91	-----	-----	175.50	View High Sports Complex
2	Reservoir	1	-----	10.05	-----	-----	32.13	-----	-----	45.06	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	63.70	1	722	171,992	-----	-----	-----	View High Sports Complex
2	Reservoir	10.05	1	743	171,991	1	907.12	65,156	Detention
Z:\acad\VIEW HIGH SPORTS COMPLEX, LINDSEY PARK STORM STUDY					LINDSEY PARK STORM STUDY, 8 / 2024				

Hydrograph Report

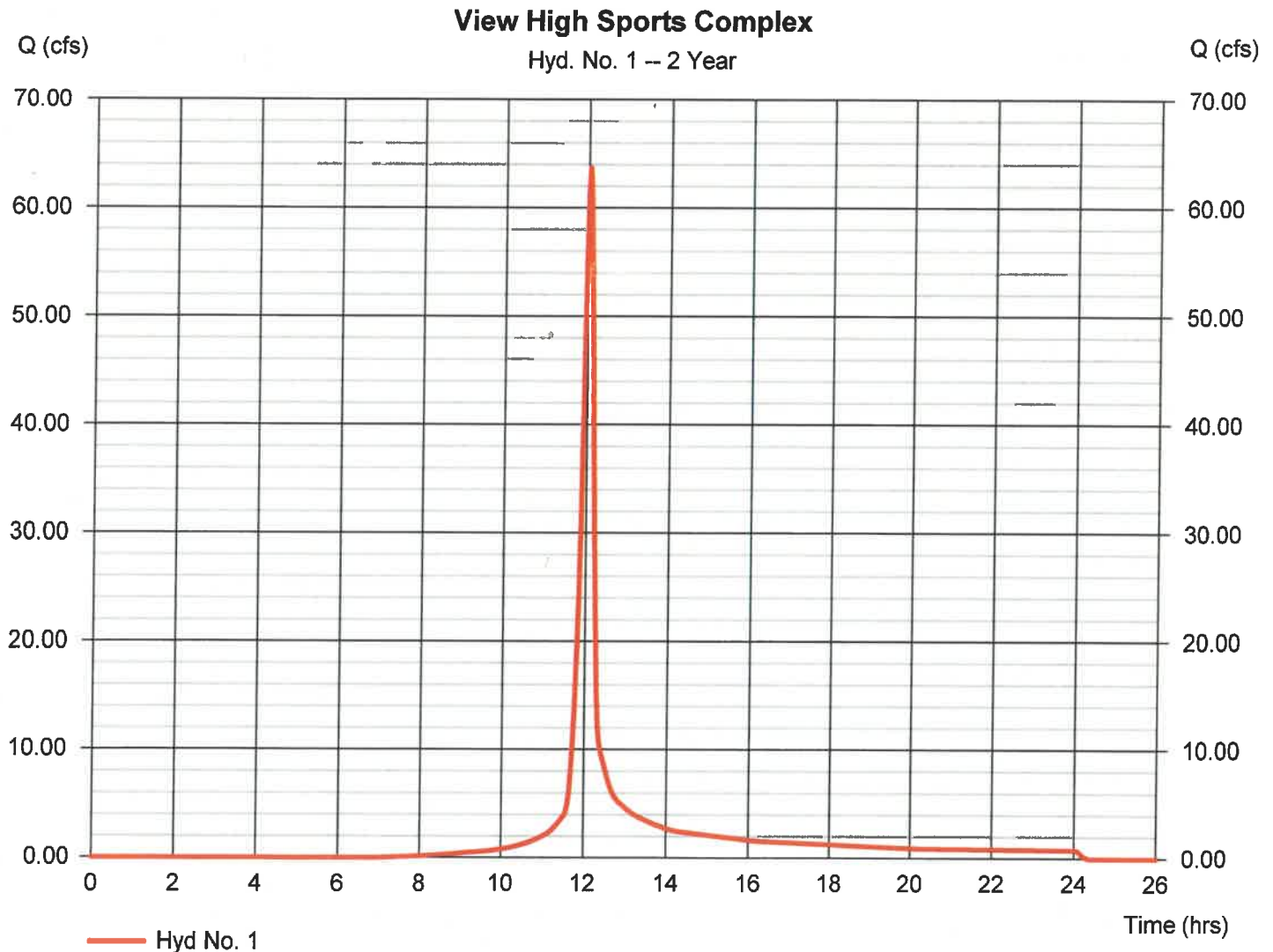
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 11 / 8 / 2024

Hyd. No. 1

View High Sports Complex

Hydrograph type	= SCS Runoff	Peak discharge	= 63.70 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 171,992 cuft
Drainage area	= 22.580 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

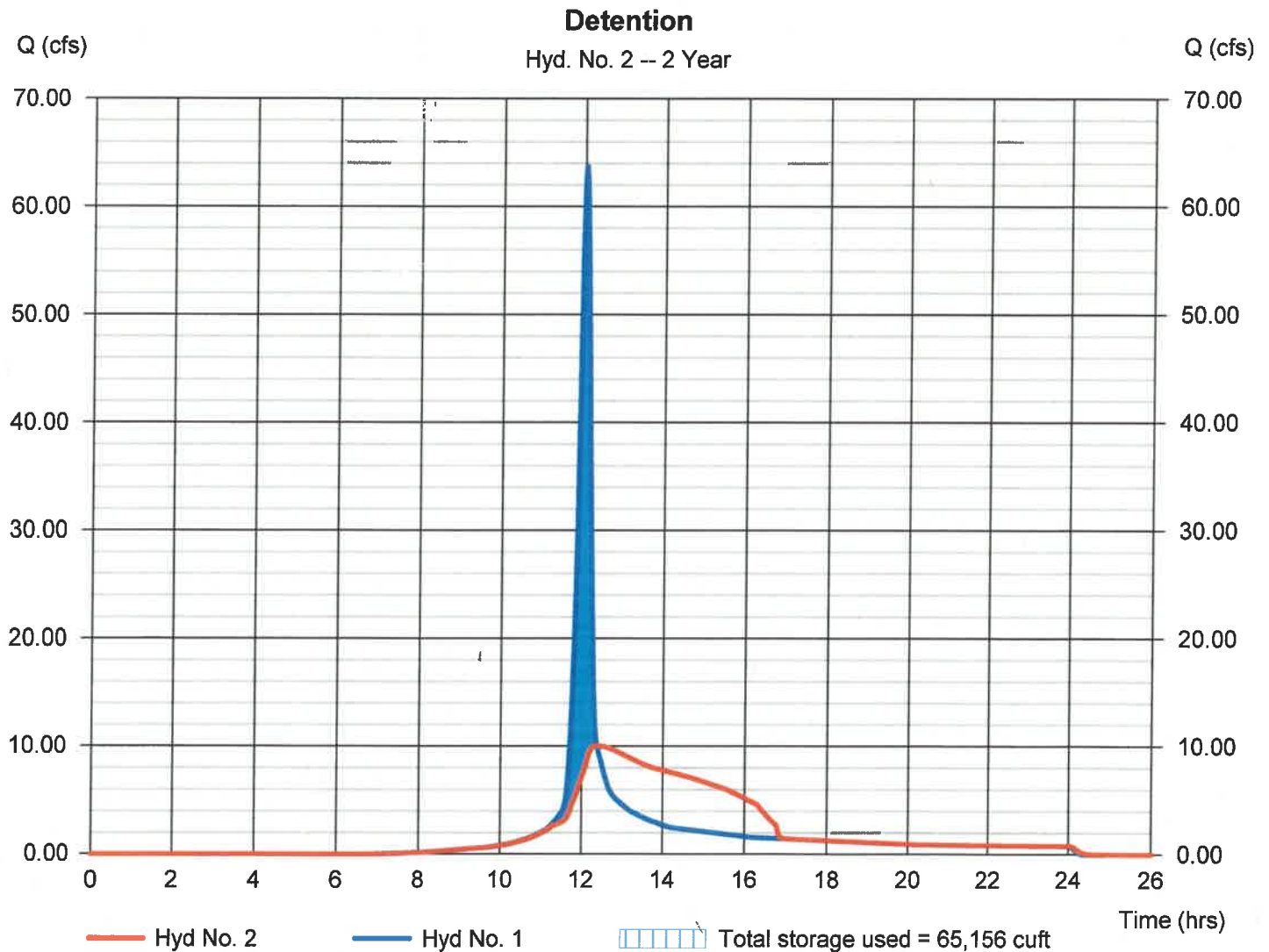
Friday, 11 / 8 / 2024

Hyd. No. 2

Detention

Hydrograph type	= Reservoir	Peak discharge	= 10.05 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.38 hrs
Time interval	= 1 min	Hyd. volume	= 171,991 cuft
Inflow hyd. No.	= 1 - View High Sports Complex	Max. Elevation	= 907.12 ft
Reservoir name	= Detention Basin	Max. Storage	= 65,156 cuft

Storage Indication method used.



Pond Report

6

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 11 / 8 / 2024

Pond No. 1 - Detention Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 901.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	901.00	00	0	0
1.00	902.00	1,466	489	489
2.00	903.00	6,209	3,564	4,052
3.00	904.00	12,650	9,240	13,292
4.00	905.00	15,427	14,014	27,306
5.00	906.00	17,626	16,513	43,819
6.00	907.00	19,925	18,762	62,581
7.00	908.00	22,336	21,117	83,697
8.00	909.00	24,848	23,578	107,276
9.00	910.00	27,512	26,166	133,442
10.00	911.00	30,203	28,844	162,286
11.00	912.00	32,955	31,566	193,852
12.00	913.00	35,769	34,349	228,201

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	12.00	24.00	0.00
Span (in)	= 36.00	12.00	24.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 900.50	901.00	906.00	0.00
Length (ft)	= 56.00	1.00	1.00	0.00
Slope (%)	= 1.00	1.00	1.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 125.00	0.00	0.00	0.00
Crest El. (ft)	= 914.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	901.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.10	49	901.10	1.91 ic	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.044
0.20	98	901.20	1.91 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.178
0.30	147	901.30	1.91 ic	0.37 ic	0.00	---	0.00	---	---	---	---	---	0.372
0.40	195	901.40	1.91 ic	0.64 ic	0.00	---	0.00	---	---	---	---	---	0.645
0.50	244	901.50	1.91 ic	0.95 ic	0.00	---	0.00	---	---	---	---	---	0.945
0.60	293	901.60	1.91 ic	1.30 ic	0.00	---	0.00	---	---	---	---	---	1.301
0.70	342	901.70	1.91 ic	1.69 ic	0.00	---	0.00	---	---	---	---	---	1.688
0.80	391	901.80	2.05 ic	2.05 ic	0.00	---	0.00	---	---	---	---	---	2.051
0.90	440	901.90	2.45 ic	2.40 ic	0.00	---	0.00	---	---	---	---	---	2.404
1.00	489	902.00	2.77 ic	2.67 ic	0.00	---	0.00	---	---	---	---	---	2.674
1.10	845	902.10	2.94 ic	2.93 ic	0.00	---	0.00	---	---	---	---	---	2.929
1.20	1,201	902.20	3.30 ic	3.16 ic	0.00	---	0.00	---	---	---	---	---	3.163
1.30	1,558	902.30	3.48 ic	3.38 ic	0.00	---	0.00	---	---	---	---	---	3.382
1.40	1,914	902.40	3.68 ic	3.59 ic	0.00	---	0.00	---	---	---	---	---	3.587
1.50	2,270	902.50	3.88 ic	3.78 ic	0.00	---	0.00	---	---	---	---	---	3.781
1.60	2,627	902.60	4.09 ic	3.97 ic	0.00	---	0.00	---	---	---	---	---	3.965
1.70	2,983	902.70	4.14 ic	4.14 ic	0.00	---	0.00	---	---	---	---	---	4.142
1.80	3,340	902.80	4.31 ic	4.31 ic	0.00	---	0.00	---	---	---	---	---	4.311
1.90	3,696	902.90	4.53 ic	4.47 ic	0.00	---	0.00	---	---	---	---	---	4.474
2.00	4,052	903.00	4.76 ic	4.63 ic	0.00	---	0.00	---	---	---	---	---	4.631
2.10	4,976	903.10	4.78 ic	4.78 ic	0.00	---	0.00	---	---	---	---	---	4.783
2.20	5,900	903.20	4.99 ic	4.93 ic	0.00	---	0.00	---	---	---	---	---	4.930
2.30	6,824	903.30	5.24 ic	5.07 ic	0.00	---	0.00	---	---	---	---	---	5.073
2.40	7,748	903.40	5.24 ic	5.21 ic	0.00	---	0.00	---	---	---	---	---	5.212
2.50	8,672	903.50	5.49 ic	5.35 ic	0.00	---	0.00	---	---	---	---	---	5.347
2.60	9,596	903.60	5.49 ic	5.48 ic	0.00	---	0.00	---	---	---	---	---	5.479
2.70	10,520	903.70	5.74 ic	5.61 ic	0.00	---	0.00	---	---	---	---	---	5.608

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Detention Basin

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.80	11,444	903.80	5.74 ic	5.73 ic	0.00	---	0.00	---	---	---	---	---	5.734
2.90	12,368	903.90	6.01 ic	5.86 ic	0.00	---	0.00	---	---	---	---	---	5.858
3.00	13,292	904.00	6.01 ic	5.98 ic	0.00	---	0.00	---	---	---	---	---	5.979
3.10	14,693	904.10	6.28 ic	6.10 ic	0.00	---	0.00	---	---	---	---	---	6.097
3.20	16,095	904.20	6.28 ic	6.21 ic	0.00	---	0.00	---	---	---	---	---	6.213
3.30	17,496	904.30	6.33 ic	6.33 ic	0.00	---	0.00	---	---	---	---	---	6.327
3.40	18,898	904.40	6.55 ic	6.44 ic	0.00	---	0.00	---	---	---	---	---	6.439
3.50	20,299	904.50	6.55 ic	6.55 ic	0.00	---	0.00	---	---	---	---	---	6.549
3.60	21,700	904.60	6.84 ic	6.66 ic	0.00	---	0.00	---	---	---	---	---	6.657
3.70	23,102	904.70	6.84 ic	6.76 ic	0.00	---	0.00	---	---	---	---	---	6.764
3.80	24,503	904.80	6.87 ic	6.87 ic	0.00	---	0.00	---	---	---	---	---	6.869
3.90	25,905	904.90	7.13 ic	6.97 ic	0.00	---	0.00	---	---	---	---	---	6.972
4.00	27,306	905.00	7.13 ic	7.07 ic	0.00	---	0.00	---	---	---	---	---	7.074
4.10	28,957	905.10	7.17 ic	7.17 ic	0.00	---	0.00	---	---	---	---	---	7.171
4.20	30,609	905.20	7.43 ic	7.26 ic	0.00	---	0.00	---	---	---	---	---	7.259
4.30	32,260	905.30	7.43 ic	7.36 ic	0.00	---	0.00	---	---	---	---	---	7.357
4.40	33,911	905.40	7.45 ic	7.45 ic	0.00	---	0.00	---	---	---	---	---	7.448
4.50	35,562	905.50	7.73 ic	7.53 ic	0.00	---	0.00	---	---	---	---	---	7.528
4.60	37,214	905.60	7.73 ic	7.62 ic	0.00	---	0.00	---	---	---	---	---	7.622
4.70	38,865	905.70	7.73 ic	7.72 ic	0.00	---	0.00	---	---	---	---	---	7.715
4.80	40,516	905.80	7.79 ic	7.79 ic	0.00	---	0.00	---	---	---	---	---	7.792
4.90	42,167	905.90	8.04 ic	7.88 ic	0.00	---	0.00	---	---	---	---	---	7.878
5.00	43,819	906.00	8.04 ic	7.97 ic	0.00	---	0.00	---	---	---	---	---	7.968
5.10	45,695	906.10	8.05 ic	8.05 ic	0.04 oc	---	0.00	---	---	---	---	---	8.091
5.20	47,571	906.20	8.13 ic	8.13 ic	0.10 oc	---	0.00	---	---	---	---	---	8.231
5.30	49,447	906.30	8.36 ic	8.21 ic	0.19 oc	---	0.00	---	---	---	---	---	8.405
5.40	51,323	906.40	8.36 ic	8.30 ic	0.29 oc	---	0.00	---	---	---	---	---	8.591
5.50	53,200	906.50	8.38 ic	8.38 ic	0.40 oc	---	0.00	---	---	---	---	---	8.781
5.60	55,076	906.60	8.68 ic	8.45 ic	0.52 oc	---	0.00	---	---	---	---	---	8.967
5.70	56,952	906.70	8.68 ic	8.54 ic	0.64 oc	---	0.00	---	---	---	---	---	9.174
5.80	58,828	906.80	8.68 ic	8.62 ic	0.77 oc	---	0.00	---	---	---	---	---	9.385
5.90	60,704	906.90	8.70 ic	8.70 ic	0.90 oc	---	0.00	---	---	---	---	---	9.594
6.00	62,581	907.00	8.77 ic	8.77 ic	1.03 oc	---	0.00	---	---	---	---	---	9.793
6.10	64,692	907.10	9.01 ic	8.85 ic	1.16 oc	---	0.00	---	---	---	---	---	10.00
6.20	66,804	907.20	9.01 ic	8.93 ic	1.29 oc	---	0.00	---	---	---	---	---	10.21
6.30	68,916	907.30	9.01 ic	9.01 ic	1.41 oc	---	0.00	---	---	---	---	---	10.42
6.40	71,027	907.40	9.07 ic	9.07 ic	1.53 oc	---	0.00	---	---	---	---	---	10.61
6.50	73,139	907.50	9.35 ic	9.15 ic	1.65 oc	---	0.00	---	---	---	---	---	10.80
6.60	75,251	907.60	9.35 ic	9.22 ic	1.76 oc	---	0.00	---	---	---	---	---	10.98
6.70	77,362	907.70	9.35 ic	9.30 ic	1.86 oc	---	0.00	---	---	---	---	---	11.16
6.80	79,474	907.80	9.37 ic	9.37 ic	1.95 oc	---	0.00	---	---	---	---	---	11.32
6.90	81,586	907.90	9.44 ic	9.44 ic	2.01 oc	---	0.00	---	---	---	---	---	11.45
7.00	83,697	908.00	9.69 ic	9.51 ic	2.05 oc	---	0.00	---	---	---	---	---	11.56
7.10	86,055	908.10	9.69 ic	9.59 ic	6.80 oc	---	0.00	---	---	---	---	---	16.38
7.20	88,413	908.20	9.69 ic	9.66 ic	9.39 oc	---	0.00	---	---	---	---	---	19.05
7.30	90,771	908.30	9.73 ic	9.73 ic	11.41 oc	---	0.00	---	---	---	---	---	21.14
7.40	93,129	908.40	10.04 ic	9.79 ic	13.12 oc	---	0.00	---	---	---	---	---	22.91
7.50	95,487	908.50	10.04 ic	9.86 ic	14.64 oc	---	0.00	---	---	---	---	---	24.50
7.60	97,845	908.60	10.04 ic	9.94 ic	16.01 oc	---	0.00	---	---	---	---	---	25.94
7.70	100,202	908.70	10.04 ic	10.01 ic	17.27 oc	---	0.00	---	---	---	---	---	27.28
7.80	102,560	908.80	10.07 ic	10.07 ic	18.45 oc	---	0.00	---	---	---	---	---	28.52
7.90	104,918	908.90	10.13 ic	10.13 ic	19.55 oc	---	0.00	---	---	---	---	---	29.68
8.00	107,276	909.00	10.39 ic	10.20 ic	20.60 oc	---	0.00	---	---	---	---	---	30.80
8.10	109,893	909.10	10.39 ic	10.27 ic	21.60 oc	---	0.00	---	---	---	---	---	31.87
8.20	112,509	909.20	10.39 ic	10.34 ic	22.43 ic	---	0.00	---	---	---	---	---	32.78
8.30	115,126	909.30	10.41 ic	10.41 ic	22.94 ic	---	0.00	---	---	---	---	---	33.35
8.40	117,742	909.40	10.47 ic	10.47 ic	23.43 ic	---	0.00	---	---	---	---	---	33.90
8.50	120,359	909.50	10.75 ic	10.53 ic	23.91 ic	---	0.00	---	---	---	---	---	34.45
8.60	122,976	909.60	10.75 ic	10.60 ic	24.39 ic	---	0.00	---	---	---	---	---	34.99
8.70	125,592	909.70	10.75 ic	10.67 ic	24.85 ic	---	0.00	---	---	---	---	---	35.52
8.80	128,209	909.80	10.75 ic	10.73 ic	25.31 ic	---	0.00	---	---	---	---	---	36.04
8.90	130,825	909.90	10.79 ic	10.79 ic	25.76 ic	---	0.00	---	---	---	---	---	36.55
9.00	133,442	910.00	10.85 ic	10.85 ic	26.20 ic	---	0.00	---	---	---	---	---	37.05
9.10	136,326	910.10	11.12 ic	10.92 ic	26.63 ic	---	0.00	---	---	---	---	---	37.55
9.20	139,211	910.20	11.12 ic	10.98 ic	27.06 ic	---	0.00	---	---	---	---	---	38.04
9.30	142,095	910.30	11.12 ic	11.05 ic	27.48 ic	---	0.00	---	---	---	---	---	38.52
9.40	144,980	910.40	11.12 ic	11.11 ic	27.89 ic	---	0.00	---	---	---	---	---	39.00
9.50	147,864	910.50	11.17 ic	11.17 ic	28.30 ic	---	0.00	---	---	---	---	---	39.46
9.60	150,749	910.60	11.49 ic	11.22 ic	28.70 ic	---	0.00	---	---	---	---	---	39.92
9.70	153,633	910.70	11.49 ic	11.29 ic	29.09 ic	---	0.00	---	---	---	---	---	40.38

Continues on next page...

Detention Basin

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
9.80	156,517	910.80	11.49 ic	11.35 ic	29.48 ic	---	0.00	---	---	---	---	---	40.83
9.90	159,402	910.90	11.49 ic	11.41 ic	29.87 ic	---	0.00	---	---	---	---	---	41.28
10.00	162,286	911.00	11.49 ic	11.48 ic	30.25 ic	---	0.00	---	---	---	---	---	41.73
10.10	165,443	911.10	11.53 ic	11.53 ic	30.63 ic	---	0.00	---	---	---	---	---	42.16
10.20	168,599	911.20	11.59 ic	11.59 ic	31.00 ic	---	0.00	---	---	---	---	---	42.58
10.30	171,756	911.30	11.86 ic	11.65 ic	31.36 ic	---	0.00	---	---	---	---	---	43.01
10.40	174,912	911.40	11.86 ic	11.71 ic	31.73 ic	---	0.00	---	---	---	---	---	43.43
10.50	178,069	911.50	11.86 ic	11.77 ic	32.08 ic	---	0.00	---	---	---	---	---	43.85
10.60	181,226	911.60	11.86 ic	11.83 ic	32.44 ic	---	0.00	---	---	---	---	---	44.27
10.70	184,382	911.70	11.89 ic	11.89 ic	32.79 ic	---	0.00	---	---	---	---	---	44.68
10.80	187,539	911.80	11.94 ic	11.94 ic	33.14 ic	---	0.00	---	---	---	---	---	45.08
10.90	190,695	911.90	12.24 ic	12.00 ic	33.48 ic	---	0.00	---	---	---	---	---	45.48
11.00	193,852	912.00	12.24 ic	12.06 ic	33.82 ic	---	0.00	---	---	---	---	---	45.88
11.10	197,287	912.10	12.24 ic	12.11 ic	34.16 ic	---	0.00	---	---	---	---	---	46.27
11.20	200,722	912.20	12.24 ic	12.17 ic	34.49 ic	---	0.00	---	---	---	---	---	46.66
11.30	204,157	912.30	12.24 ic	12.23 ic	34.82 ic	---	0.00	---	---	---	---	---	47.05
11.40	207,592	912.40	12.28 ic	12.28 ic	35.15 ic	---	0.00	---	---	---	---	---	47.43
11.50	211,026	912.50	12.34 ic	12.34 ic	35.47 ic	---	0.00	---	---	---	---	---	47.81
11.60	214,461	912.60	12.63 ic	12.39 ic	35.79 ic	---	0.00	---	---	---	---	---	48.18
11.70	217,896	912.70	12.63 ic	12.45 ic	36.11 ic	---	0.00	---	---	---	---	---	48.56
11.80	221,331	912.80	12.63 ic	12.51 ic	36.42 ic	---	0.00	---	---	---	---	---	48.93
11.90	224,766	912.90	12.63 ic	12.56 ic	36.74 ic	---	0.00	---	---	---	---	---	49.30
12.00	228,201	913.00	12.63 ic	12.62 ic	37.05 ic	---	0.00	---	---	---	---	---	49.67

...End

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	108.91	1	722	299,508	-----	-----	-----	View High Sports Complex Detention
2	Reservoir	32.13	1	735	299,507	1	909.13	110,645	
Z:\acad\VIEW HIGH SPORTS COMPLEX, LBN STORM STUDY\STORM STUDY					LBN STORM STUDY\STORM STUDY				Friday, 8 / 2024

Hydrograph Report

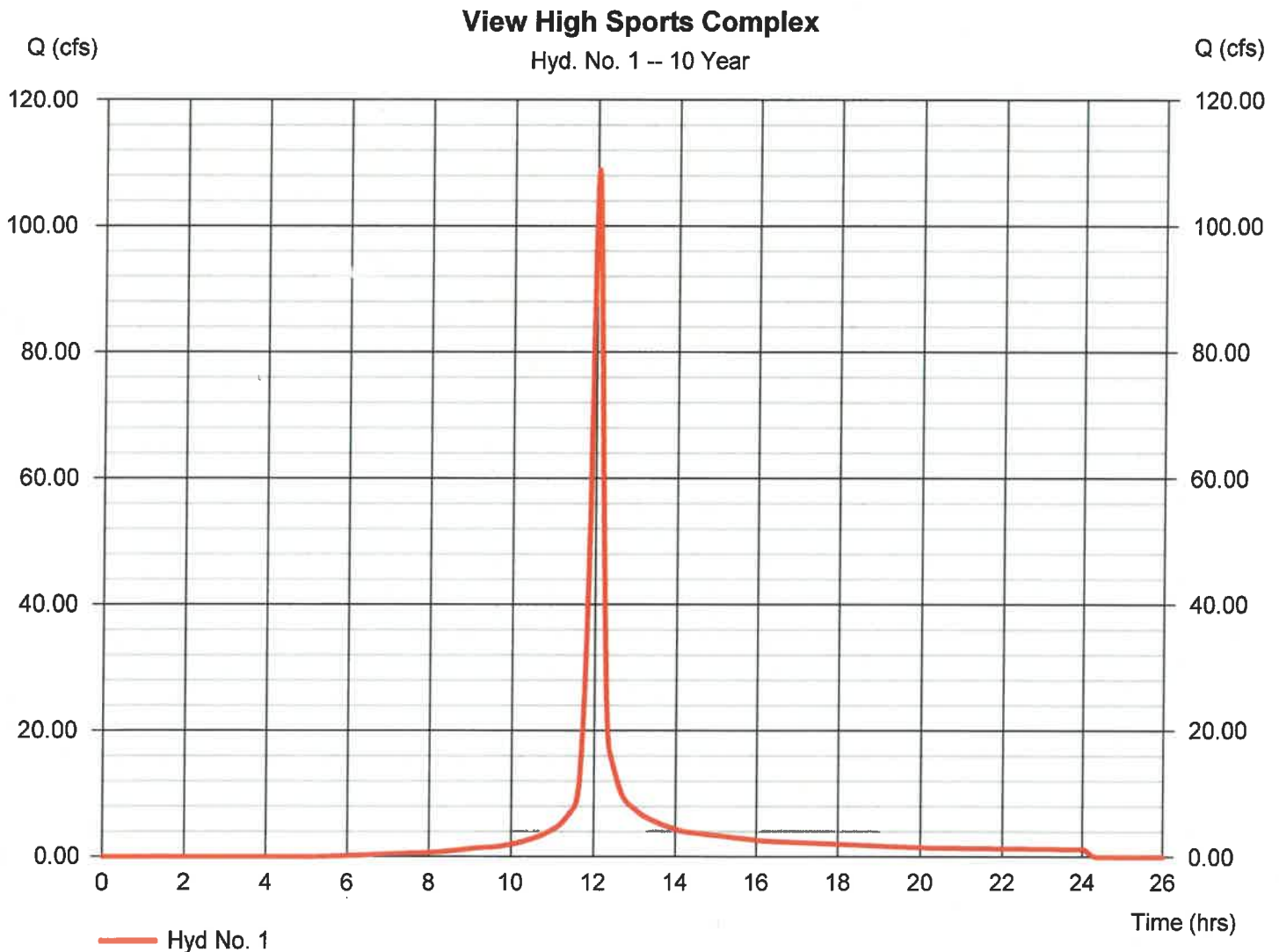
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 11 / 8 / 2024

Hyd. No. 1

View High Sports Complex

Hydrograph type	= SCS Runoff	Peak discharge	= 108.91 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 299,508 cuft
Drainage area	= 22.580 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

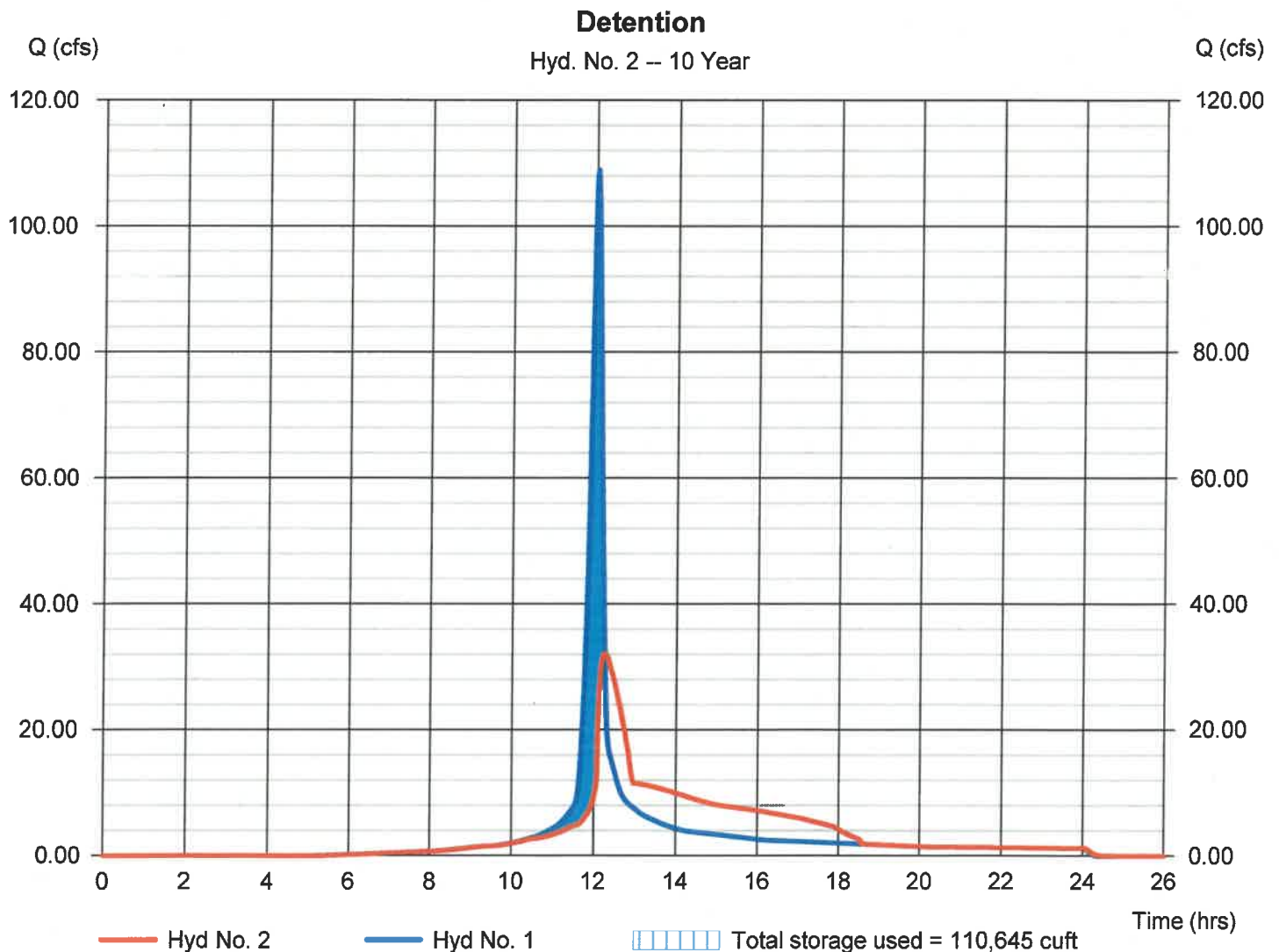
Friday, 11 / 8 / 2024

Hyd. No. 2

Detention

Hydrograph type	= Reservoir	Peak discharge	= 32.13 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.25 hrs
Time interval	= 1 min	Hyd. volume	= 299,507 cuft
Inflow hyd. No.	= 1 - View High Sports Complex	Max. Elevation	= 909.13 ft
Reservoir name	= Detention Basin	Max. Storage	= 110,645 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	175.50	1	722	495,144	-----	-----	-----	View High Sports Complex Detention
2	Reservoir	45.06	1	736	495,143	1	911.80	187,429	
Z:\acad\VIEW HIGH SPORTS COMPLEX, L...					BMS Form: STUDY STORM STUDY				8 / 2024

Hydrograph Report

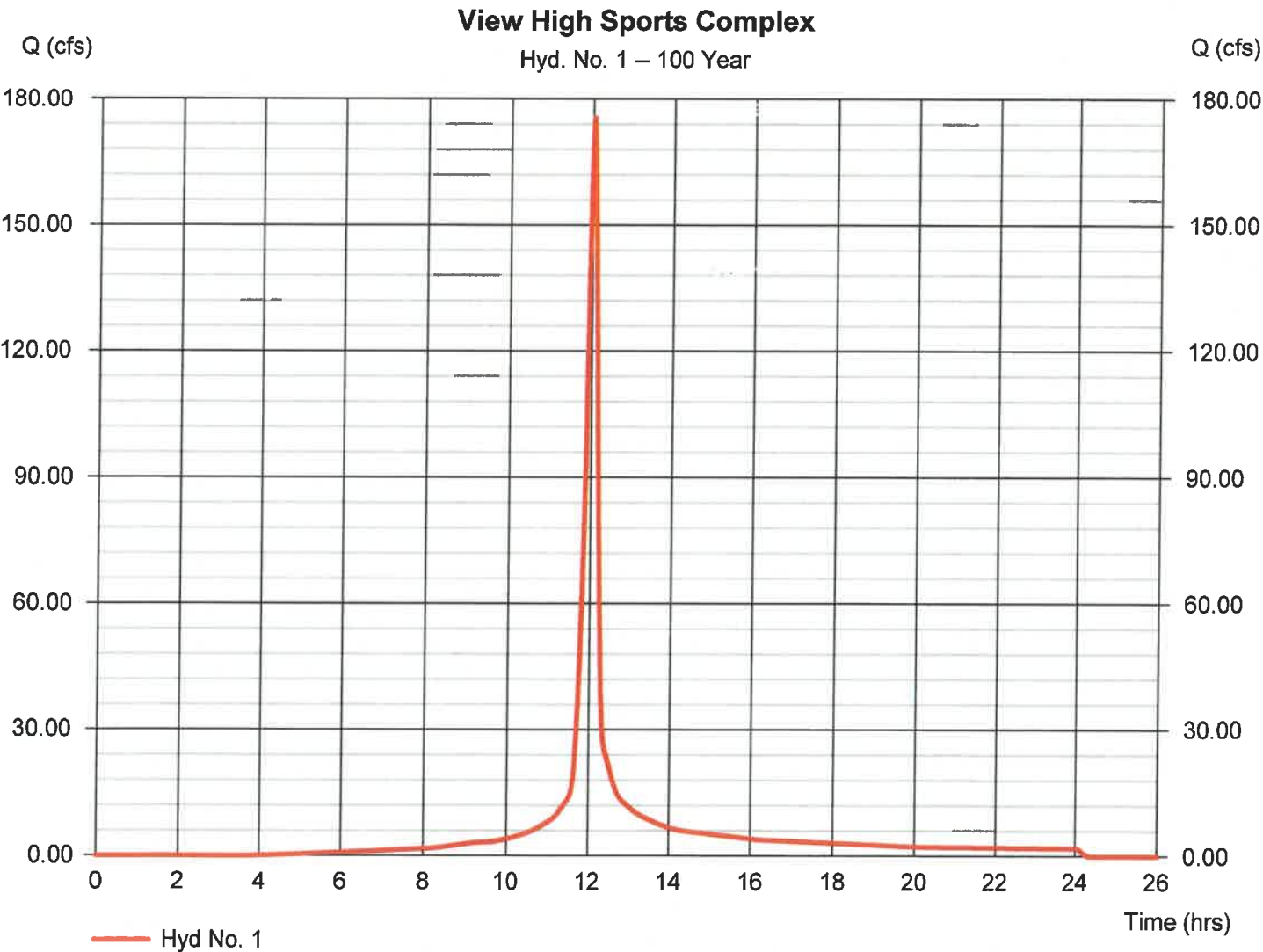
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 11 / 8 / 2024

Hyd. No. 1

View High Sports Complex

Hydrograph type	=	SCS Runoff	Peak discharge	=	175.50 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	1 min	Hyd. volume	=	495,144 cuft
Drainage area	=	22.580 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	7.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

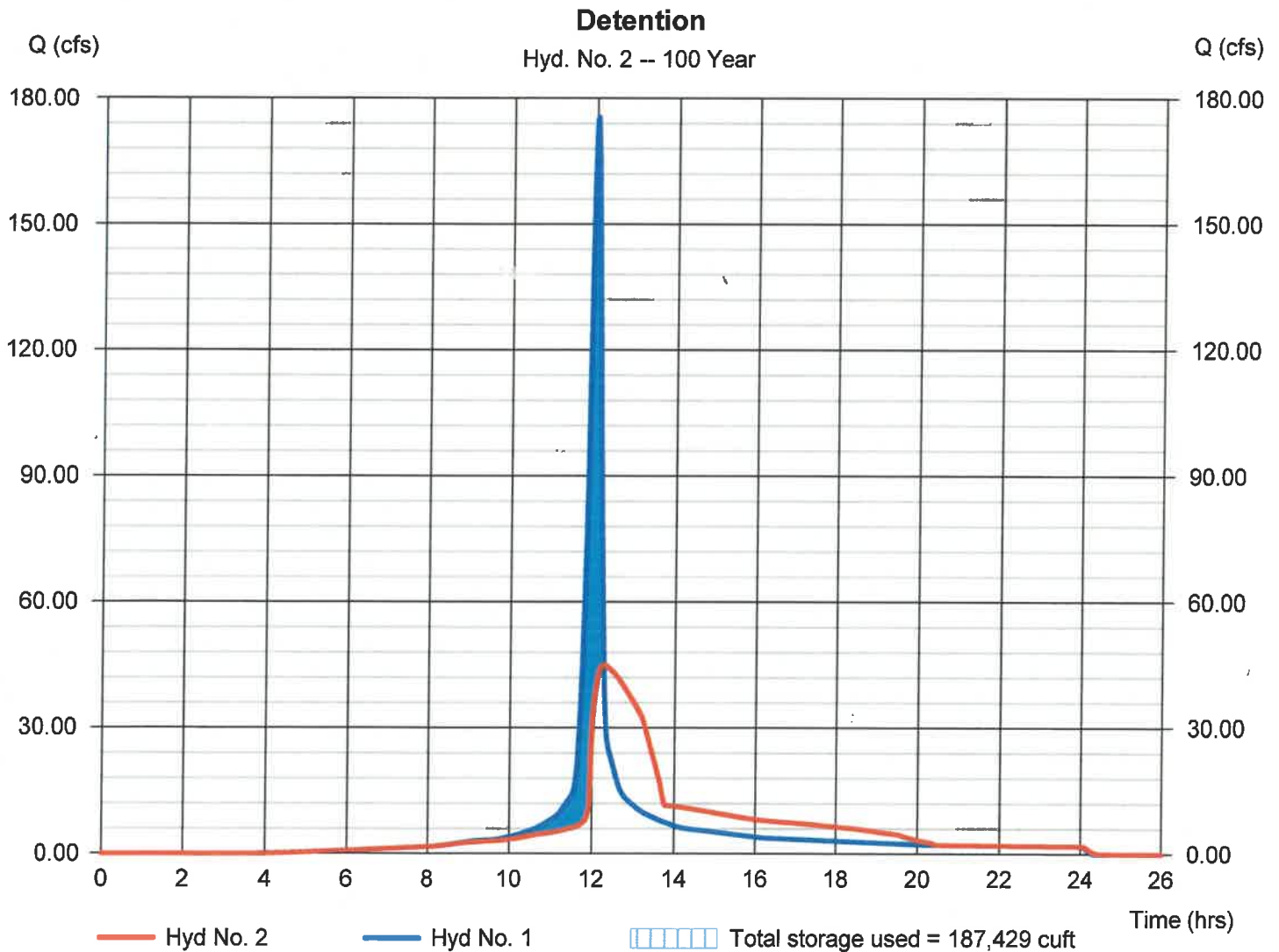
Friday, 11 / 8 / 2024

Hyd. No. 2

Detention

Hydrograph type	= Reservoir	Peak discharge	= 45.06 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 495,143 cuft
Inflow hyd. No.	= 1 - View High Sports Complex	Max. Elevation	= 911.80 ft
Reservoir name	= Detention Basin	Max. Storage	= 187,429 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 11 / 8 / 2024

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	64.1474	17.7000	0.8922	-----
2	95.7859	19.2000	0.9317	-----
3	0.0000	0.0000	0.0000	-----
5	118.7799	19.1000	0.9266	-----
10	125.1300	18.2000	0.9051	-----
25	158.9867	18.7000	0.9180	-----
50	171.2459	18.3000	0.9078	-----
100	187.3624	18.1000	0.9031	-----

File name: KCMO.IDF

$$\text{Intensity} = B / (T_c + D)^E$$

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	3.96	3.31	2.86	2.52	2.25	2.04	1.87	1.72	1.60	1.49	1.40	1.32
2	4.92	4.13	3.56	3.14	2.81	2.54	2.32	2.14	1.98	1.85	1.73	1.63
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.23	5.23	4.51	3.98	3.56	3.22	2.94	2.71	2.52	2.35	2.20	2.07
10	7.27	6.09	5.26	4.63	4.14	3.75	3.43	3.16	2.93	2.74	2.57	2.42
25	8.70	7.30	6.30	5.54	4.96	4.49	4.10	3.78	3.51	3.27	3.07	2.89
50	9.83	8.24	7.11	6.26	5.60	5.07	4.64	4.27	3.97	3.70	3.47	3.27
100	11.00	9.21	7.95	7.00	6.26	5.67	5.19	4.78	4.44	4.14	3.89	3.66

Tc = time in minutes. Values may exceed 60.

Precip. file name: Z:\acad\KCMO.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	1.37	3.50	0.00	3.30	5.20	6.00	6.80	7.70
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	2.49	3.10	0.00	4.01	4.64	5.52	6.21	6.90
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10



Storm Water Memorandum
November 8, 2024
View High Sports Complex
Lee's Summit, MO

Exhibit C FEMA FIRMette

National Flood Hazard Layer FIRMette



94°27'5"W 38°55'44"N

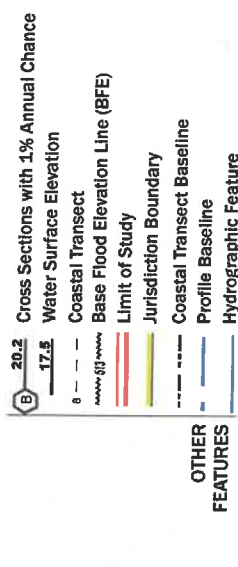
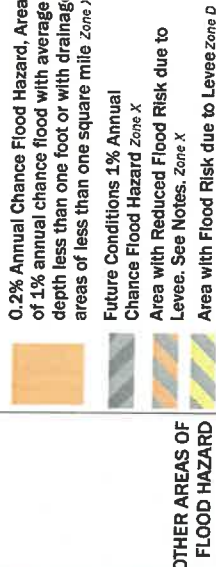


0 250 500 1,000 1,500 2,000 Feet 1:6,000

94°26'28"W 38°55'16"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/8/2024 at 5:42 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Storm Water Memorandum
November 8, 2024
View High Sports Complex
Lee's Summit, MO

Exhibit D Wetland Inventory Map



U.S. Fish and Wildlife Service

National Wetlands Inventory

View High Sports Complex



November 8, 2024

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine

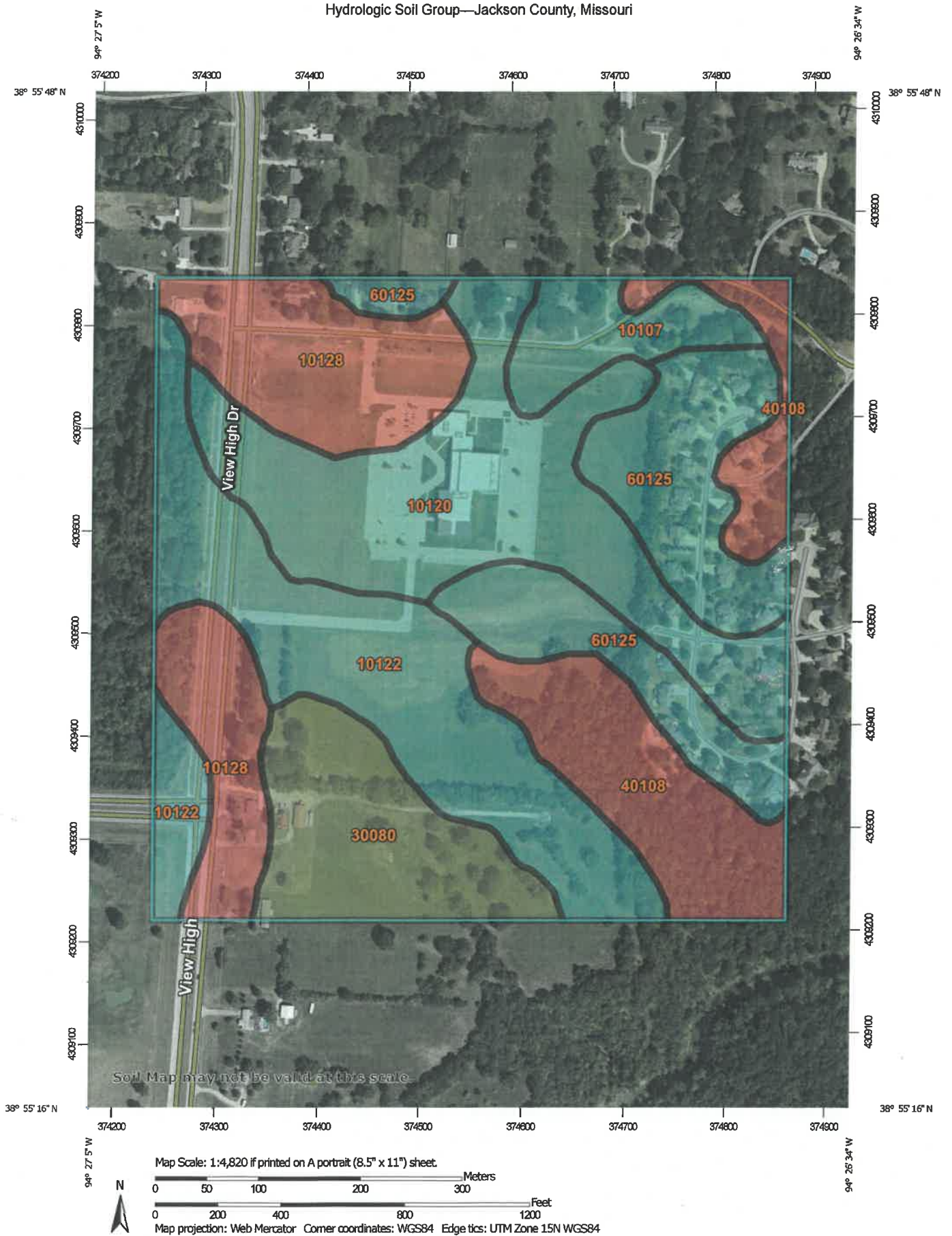
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



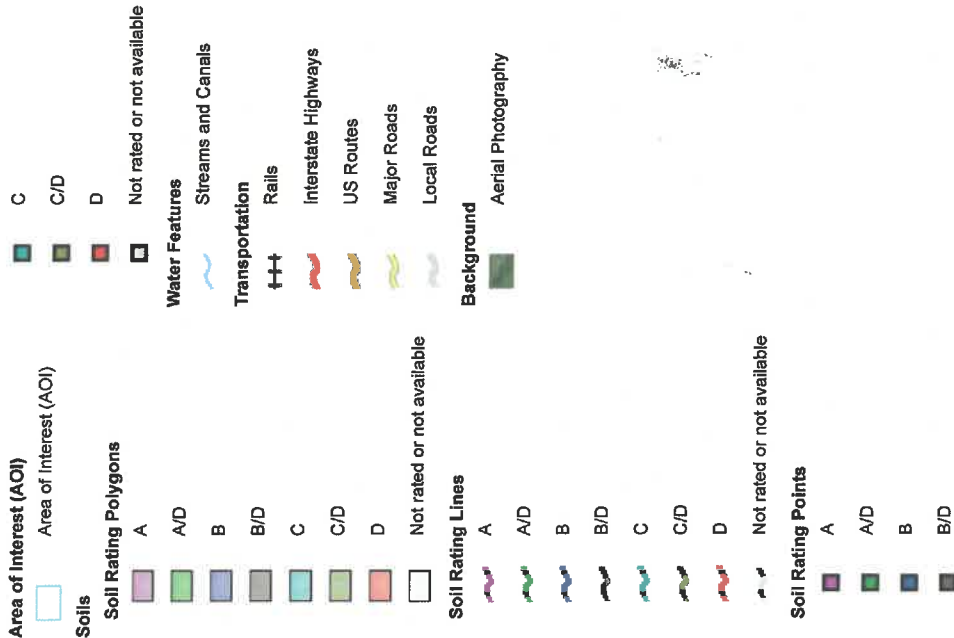
Storm Water Memorandum
November 8, 2024
View High Sports Complex
Lee's Summit, MO

Exhibit E Soil Map

Hydrologic Soil Group—Jackson County, Missouri



MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 27, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2022—Sep 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10107	Menfro silty clay loam, 9 to 14 percent slopes, severely eroded	C	4.5	4.6%
10120	Sharpsburg silt loam, 2 to 5 percent slopes	C	20.2	20.9%
10122	Sharpsburg silt loam, 5 to 9 percent slopes, eroded	C	19.4	20.1%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	D	14.6	15.1%
30080	Greenton silty clay loam, 5 to 9 percent slopes	C/D	10.0	10.3%
40108	Snead-Rock outcrop complex, warm, 14 to 30 percent slopes	D	12.5	12.9%
60125	Harvester-Urban land complex, 9 to 14 percent slopes	C	15.5	16.1%
Totals for Area of Interest			96.7	100.0%



Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Storm Water Memorandum
November 8, 2024
View High Sports Complex
Lee's Summit, MO

Exhibit F

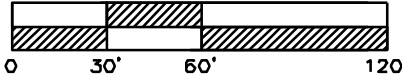
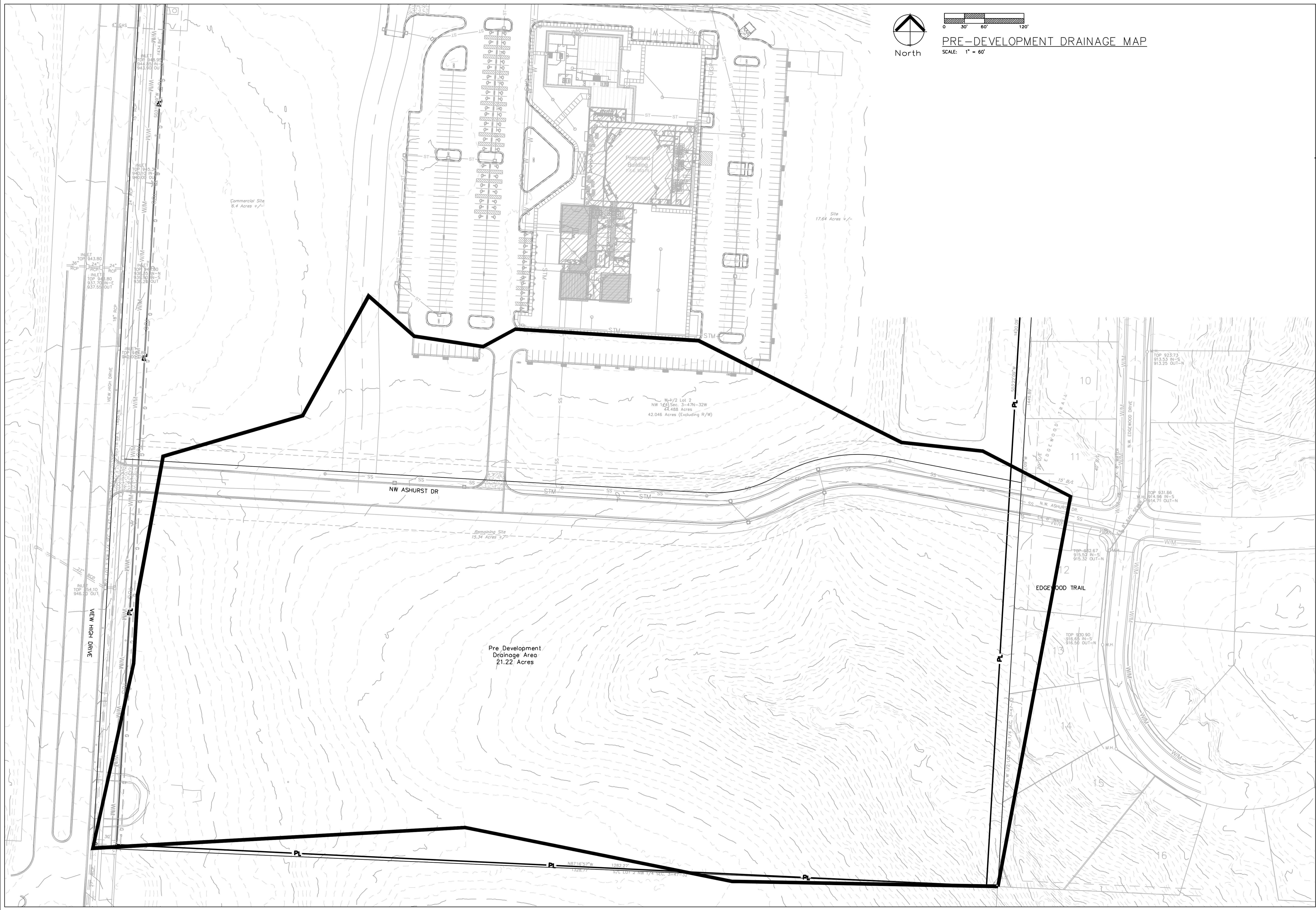
Pre-Development Drainage Area Map

Stream Buffer Map

50 SE 30th Street Lee's Summit, MO 64082

P: (816) 623-9888 F: (816) 623-9849

www.engineeringsolutionskc.com



PRE-DEVELOPMENT DRAINAGE MAP
SCALE: 1" = 60'



Professional Registration
Missouri
Engineering 202502185-D
Surveying 2025038218C-7
Kansas
Engineering 5-1886
Surveying LS-219
Oklahoma
Engineering 825-4
Nebraska
Engineering CA2621

View High Sports Complex
Lee's Summit, Jackson County, Missouri

Project: View High Sports Complex, LS/MO
Issue Date: November 7, 2024

Pre-Development Drainage Map
Construction Plans for:
View High Sports Complex
Lee's Summit, Jackson County, Missouri

Matthew J. Schlicht
MO PE 2006019708
KS PE 19071
OK PE 25226

REVISIONS
