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Drainage Analysis Report

For

Lake Station Plaza, LLC

1136 Kings Highway
Town of Chester
Orange County, New York

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Prepared for:

Lake Station Plaza, LLC
1136 Kings Highway
Town of Chester
Orange County, New York

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Prepared by:

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Engineering & Land Surveying P.C.



Lawrence Marshall, P.E.

Prepared:

March 8, 2018



A. Site Location

The project site is located in the Town of Chester, Orange County, New York on the easterly side of Kings Highway (County Route 13). The project site is located approximately 965' north of the intersection of Kings Highway and Darin Road. The project site consists of tax map parcel 17 - 1 - 101 and the site contains 2.00 acres of land.

B. Existing Conditions

The site contains an existing $\pm 5,050$ square foot multi-use building and $\pm 1,200$ square foot garage. The site accesses Kings Highway via an existing asphalt driveway and parking area. The garage located at the southeasterly corner of the site is accessed by a gravel driveway and parking area located at the terminus of the asphalt drive. The remainder of the site is primarily lawn.

According to the United States Department of Agriculture National Cooperative soil survey, the soils located in the development area are Bath-Nassau channery silt loam, classified as hydrologic soils group (HSG) "B" soils and Mardin gravelly silt loam, classified as HSG "D". A map of the soils groups on the site is provided in Appendix 'A'.

The site generally slopes from north to south. There are no existing drainage structures on the site and runoff generally flows from the project site to the neighboring farm fields to the south. There are no United States Army Corps of Engineers (ACOE) or New York State regulated wetlands on or directly adjacent to the project site.

C. Developed Conditions

The project involves the construction of a proposed 35' x 75' (2,450 square foot) addition extending from the rear of the easterly portion of the existing building. The existing gravel driveway and parking area are intended to be expanded to accommodate additional parking and improve vehicle access to the proposed addition. The existing sewage disposal system is intended to be abandoned and replaced to accommodate additional flows from the addition. The areas not encumbered by the proposed building addition or gravel expansion will be landscaped or have manicured lawn.

D. Drainage Areas

To analyze the impacts of the proposed development on the surrounding area, one (1) drainage area has been approximated based upon the property line of the site. The same drainage area has been utilized to analyze post-development conditions to determine the impact of the proposed development. Maps of the pre- and post-development drainage areas analyzed have been included in Appendices B and C.

E. Hydrological Analysis

The hydrological analysis for the proposed site was completed using one point of interest located a low point on the southerly edge of the project site. The associated drainage area was analyzed using the SCS TR-55 method to calculate the runoff for the 24-hour, 1-, 10-, and 100-year storms using current rainfall frequency values prepared by Cornell university in conjunction with the Northeast Regional Climate Center



(NRCC) and the Natural Resources Conservation Service (NRCS). All calculations were completed utilizing Hydrocad 10.00 software.

F. Pre-Development Drainage

Drainage Area A: Drainage Area A is 2.00 acres in size, consisting of 1.48 acres of grass/lawn, and 0.52 areas of impervious cover. Detailed information regarding the cover types, hydrological soils groups and time of concentration calculations for the drainage area is provided in Appendix D.

The following peak runoff flows were calculated for the pre-development site (See Appendix D for pre-development Hydrocad reports):

Pre-Development Drainage Area Peak Flows (c.f.s.)				
Drainage Area	Area (Ac.)	1-Year	10-Year	100-Year
A	2.00	3.08	6.47	11.31

G. Post-Development Drainage

Drainage Area A': Drainage Area A' is also 2.00 acres in size, consisting of 1.34 acres of grass/lawn, and 0.66 areas of impervious cover. Detailed information regarding the cover types, hydrological soils groups and time of concentration calculations for the drainage area is provided in Appendix E.

following peak runoff flows were calculated for the post-development site (See Appendix E for post-development Hydrocad reports):

Post-Development Drainage Area Peak Flows (c.f.s.)				
Drainage Area	Area (Ac.)	1-Year	10-Year	100-Year
A'	2.00	3.08	6.47	11.31

H. Resulting Peak Flow Comparison

The impact of the proposed development on the analyzed drainage areas has been summarized in the following charts:

Study Point A: Resulting Peak Flow Comparison (c.f.s.)				
Drainage Area	Area (Ac.)	1-Year	10-Year	100-Year
A	2.00	3.08	6.47	11.31
A'	2.00	3.08	6.47	11.31

Based upon the information above, the proposed development has no impact on the peak flow from the project site.



APPENDIX A:

SOILS MAP

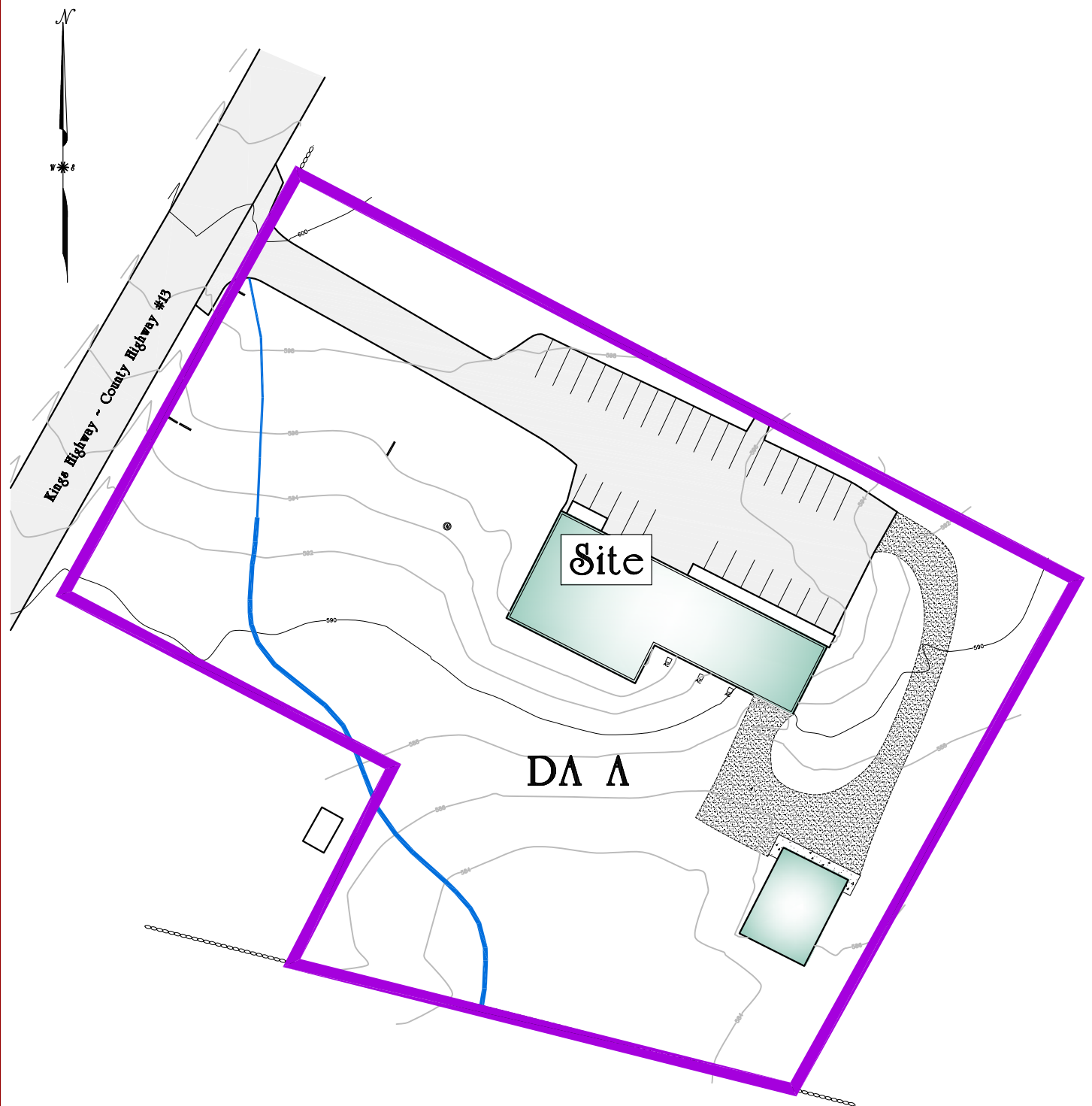


A-1: Site Soils Map

SCALE: 1" = 60'

APPENDIX B:

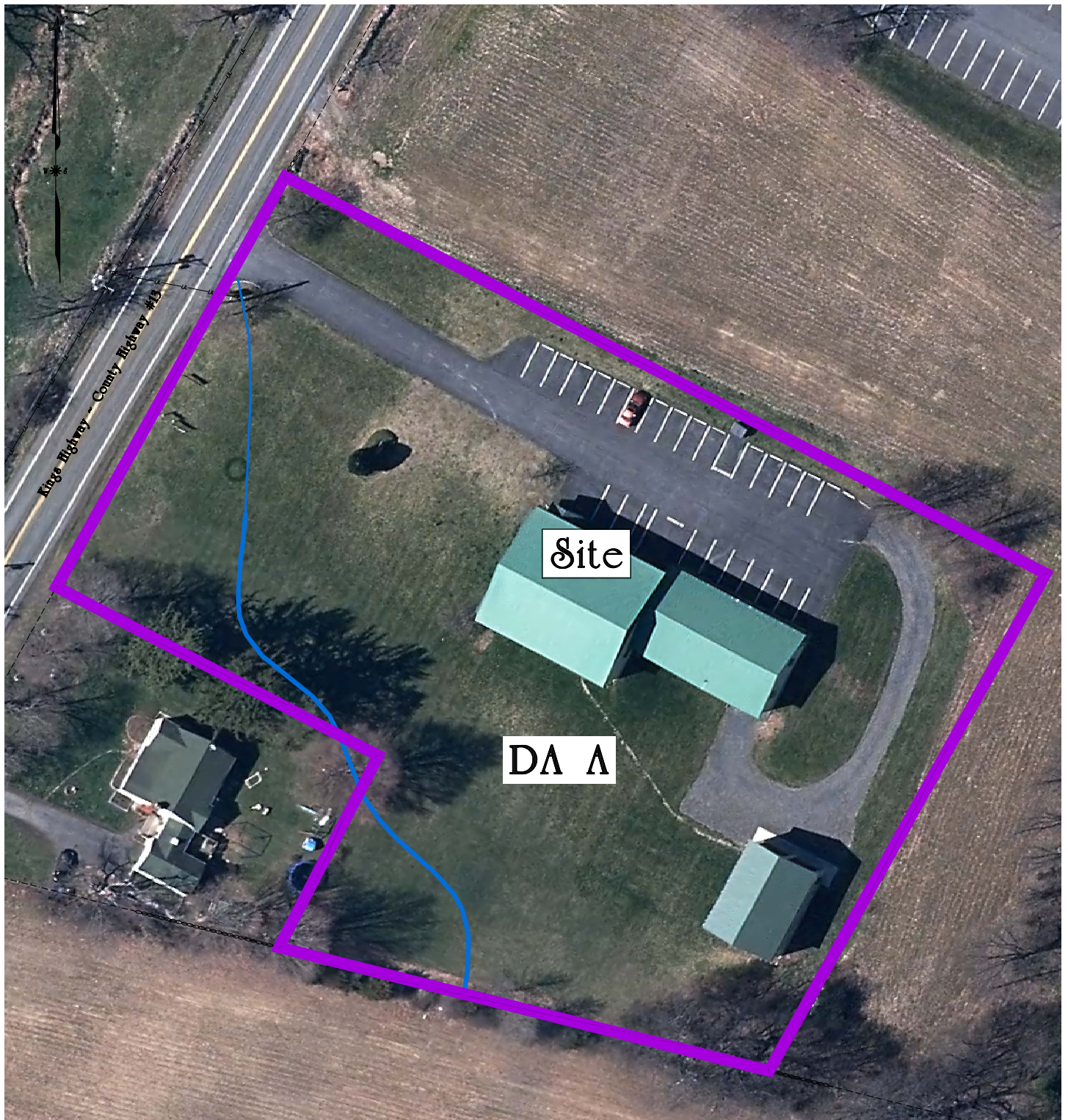
PRE-DEVELOPMENT
DRAINAGE AREA MAPS




-  LIMITS OF DRAINAGE AREA
-  TIME OF CONCENTRATION

B-1: Pre-Development Topographic Map

SCALE: 1" = 60'



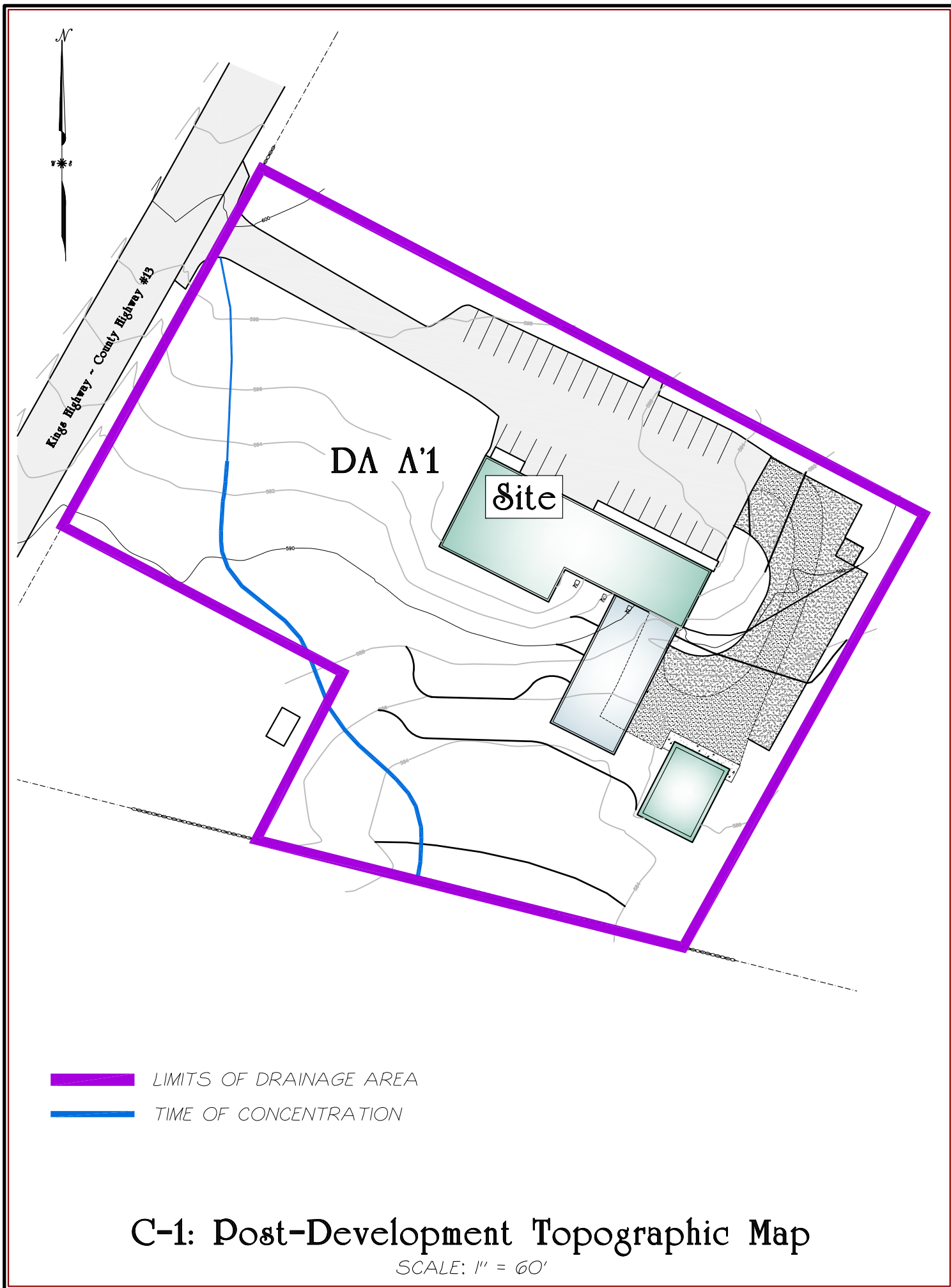
-  LIMITS OF DRAINAGE AREA
-  TIME OF CONCENTRATION

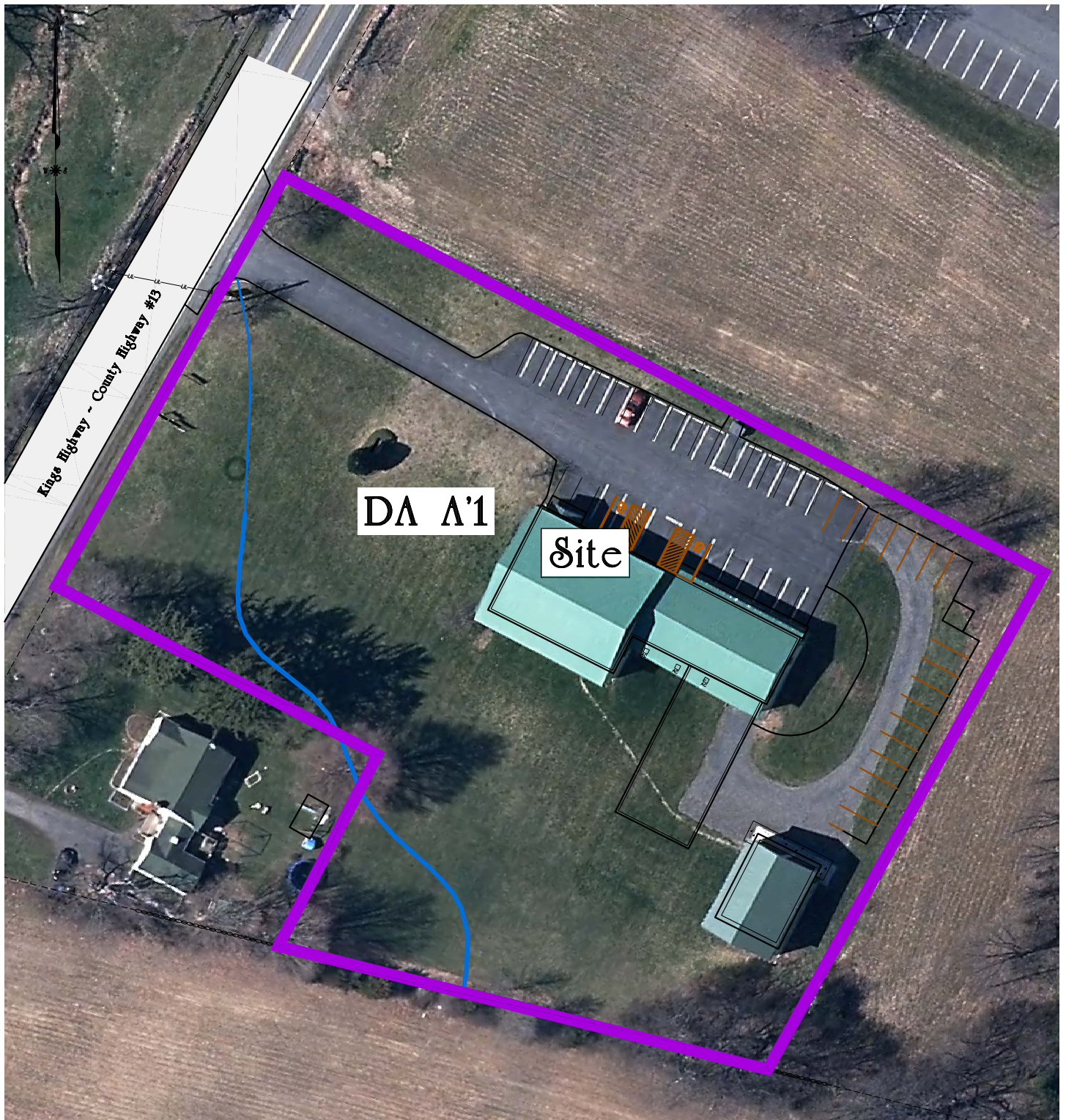
B-2: Pre-Development Aerial Map



SCALE: 1" = 60'

APPENDIX C:

POST-DEVELOPMENT
DRAINAGE AREA MAPS





-  LIMITS OF DRAINAGE AREA
-  TIME OF CONCENTRATION

C-1: Post-Development Aerial Map

SCALE: 1" = 60'

APPENDIX D:

PRE-DEVELOPMENT
RUNOFF CALCULATIONS

Summary for Subcatchment 1: A

Runoff = 3.08 cfs @ 12.11 hrs, Volume= 0.219 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

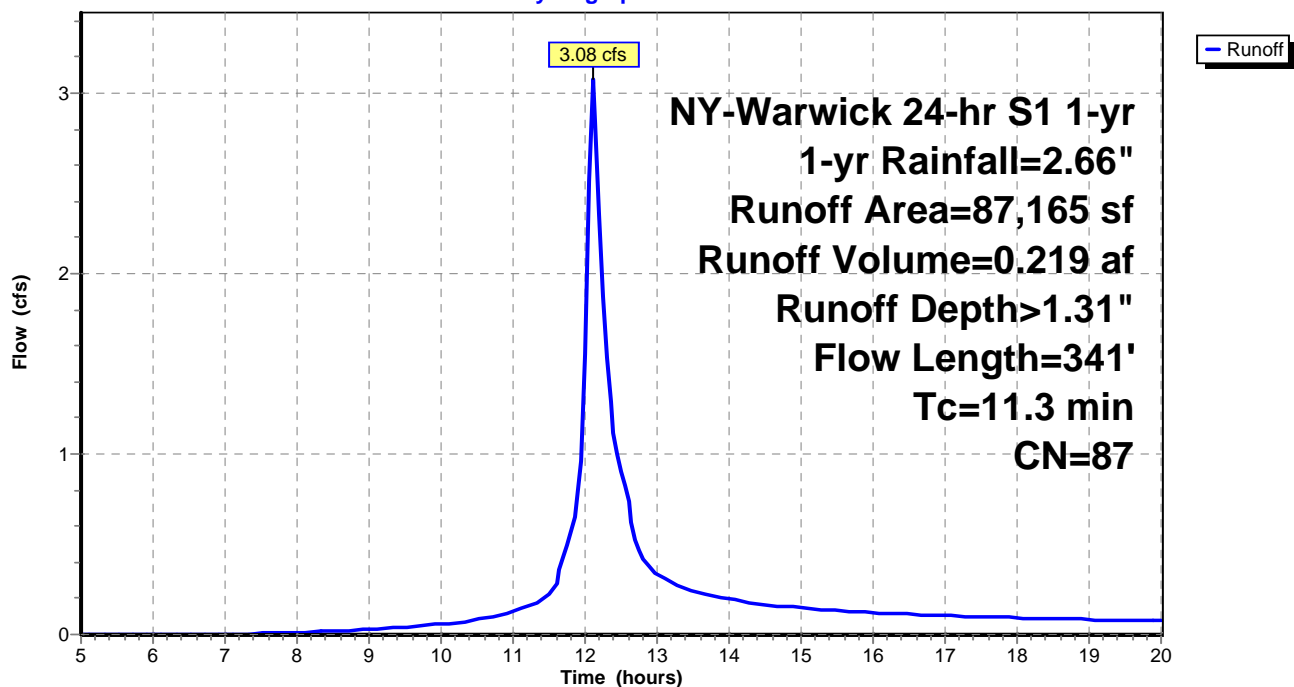
NY-Warwick 24-hr S1 1-yr 1-yr Rainfall=2.66"

Area (sf)	CN	Description
16,049	98	Paved parking, HSG D
5,512	98	Roofs, HSG D
1,210	98	Roofs, HSG D
49,962	84	50-75% Grass cover, Fair, HSG D
14,432	79	50-75% Grass cover, Fair, HSG C
87,165	87	Weighted Average
64,394		73.88% Pervious Area
22,771		26.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0600	0.20		Sheet Flow, Sheet Grass: Short n= 0.150 P2= 1.77"
2.8	241	0.0410	1.42		Shallow Concentrated Flow, Shallow Short Grass Pasture Kv= 7.0 fps
11.3	341	Total			

Subcatchment 1: A

Hydrograph



Summary for Subcatchment 1: A

Runoff = 6.47 cfs @ 12.11 hrs, Volume= 0.518 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

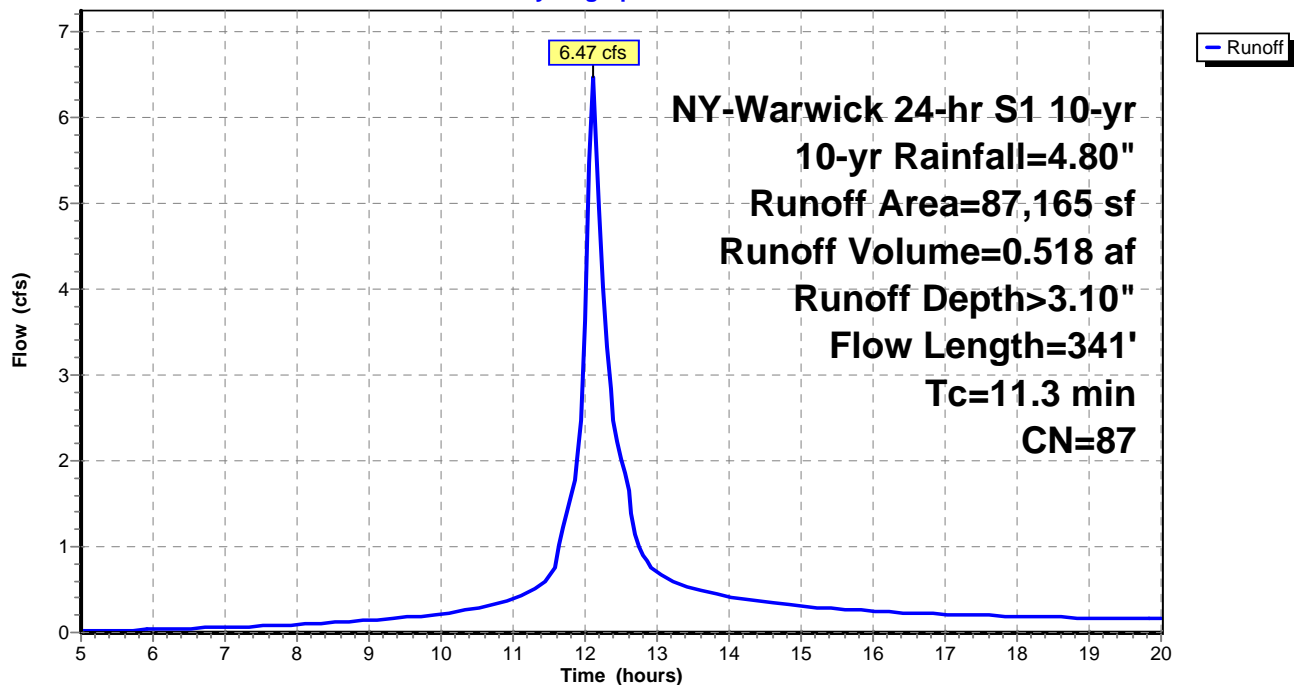
NY-Warwick 24-hr S1 10-yr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
16,049	98	Paved parking, HSG D
5,512	98	Roofs, HSG D
1,210	98	Roofs, HSG D
49,962	84	50-75% Grass cover, Fair, HSG D
14,432	79	50-75% Grass cover, Fair, HSG C
87,165	87	Weighted Average
64,394		73.88% Pervious Area
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11.3	341	Total			

Subcatchment 1: A

Hydrograph



Summary for Subcatchment 1: A

Runoff = 11.31 cfs @ 12.11 hrs, Volume= 1.063 af, Depth> 6.38"

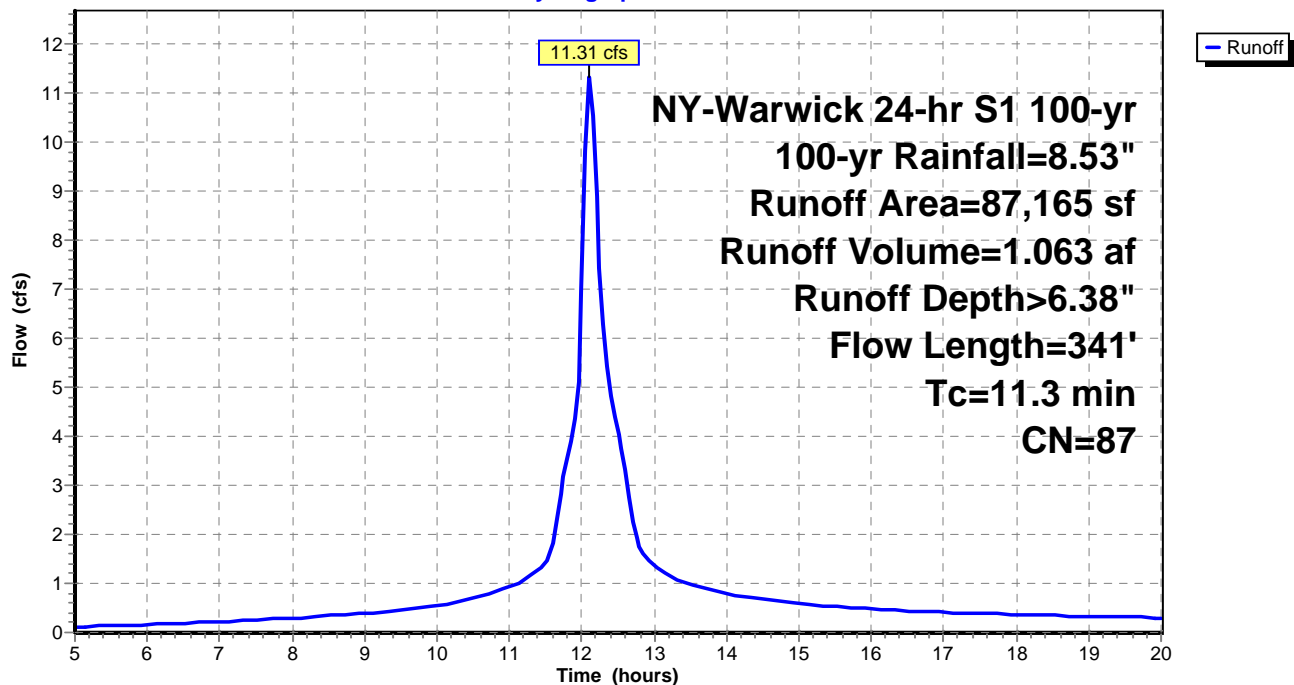
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NY-Warwick 24-hr S1 100-yr 100-yr Rainfall=8.53"

Area (sf)	CN	Description
16,049	98	Paved parking, HSG D
5,512	98	Roofs, HSG D
1,210	98	Roofs, HSG D
49,962	84	50-75% Grass cover, Fair, HSG D
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87,165	87	Weighted Average
64,394		73.88% Pervious Area
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0600	0.20		Sheet Flow, Sheet Grass: Short n= 0.150 P2= 1.77"
2.8	241	0.0410	1.42		Shallow Concentrated Flow, Shallow Short Grass Pasture Kv= 7.0 fps
11.3	341	Total			

Subcatchment 1: A

Hydrograph



APPENDIX E:

POST-DEVELOPMENT
RUNOFF CALCULATIONS

Summary for Subcatchment 2: A'

Runoff = 3.08 cfs @ 12.11 hrs, Volume= 0.219 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

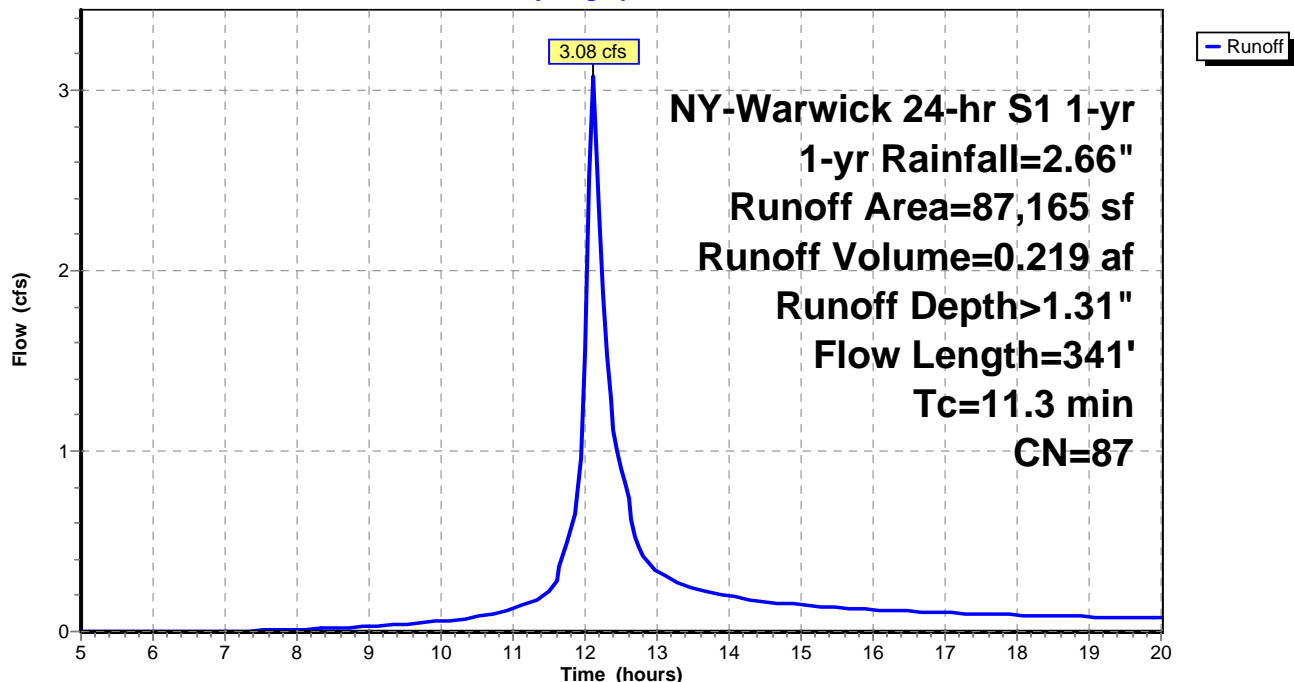
NY-Warwick 24-hr S1 1-yr 1-yr Rainfall=2.66"

Area (sf)	CN	Description
28,461	84	50-75% Grass cover, Fair, HSG D
15,704	80	>75% Grass cover, Good, HSG D
14,432	79	50-75% Grass cover, Fair, HSG C
19,396	98	Paved parking, HSG D
5,512	98	Roofs, HSG D
1,210	98	Roofs, HSG D
2,450	98	Roofs, HSG D
87,165	87	Weighted Average
58,597		67.23% Pervious Area
28,568		32.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0600	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 1.77"
2.8	241	0.0410	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.3	341	Total			

Subcatchment 2: A'

Hydrograph



Summary for Subcatchment 2: A'

Runoff = 6.47 cfs @ 12.11 hrs, Volume= 0.518 af, Depth> 3.10"

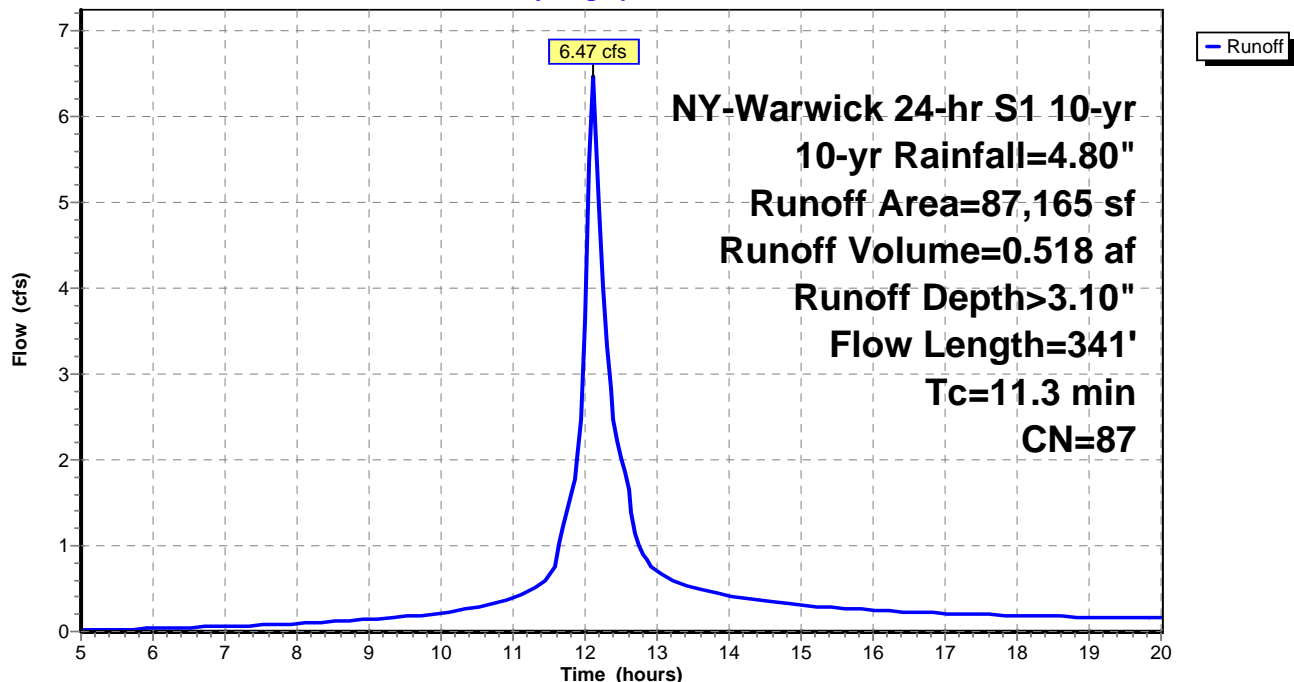
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NY-Warwick 24-hr S1 10-yr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
28,461	84	50-75% Grass cover, Fair, HSG D
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58,597		67.23% Pervious Area
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8.5	100	0.0600	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 1.77"
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Subcatchment 2: A'

Hydrograph



Summary for Subcatchment 2: A'

Runoff = 11.31 cfs @ 12.11 hrs, Volume= 1.063 af, Depth> 6.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

NY-Warwick 24-hr S1 100-yr 100-yr Rainfall=8.53"

Area (sf)	CN	Description
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Subcatchment 2: A'

Hydrograph

