

# SPECIAL USE PERMIT APPLICATION



TOWN OF CHAPEL HILL  
Planning Department  
405 Martin Luther King Jr. Blvd.  
Chapel Hill, NC 27514  
phone (919) 968-2728 fax (919) 969-2014  
www.townofchapelhill.org

Parcel Identifier Number (PIN): 9870 99 7083

Date: 27 July 2020

## Section A: Project Information

Project Name: Putt-Putt Fun Center

Property Address: Chapel Point Road frontage Zip Code: 27516

Use Groups (A, B, and/or C): C Existing Zoning District: MU-R-1

Project Description: indoor amusement center with outdoor min golf and go-kart spaces. Separate self storage building.

## Section B: Applicant, Owner, and/or Contract Purchaser Information

### Applicant Information (to whom correspondence will be mailed):

Name: Coulter Jewell Thames PA, Attn Wendi Ramsden

Address: 111 West Main Street

City: Durham State: NC Zip Code: 27701

Phone: 919-682-0368 Email: wramsdn@cjtpa.com

The undersigned applicant hereby certifies that, to the best of their knowledge and belief, all information supplied with this application and accurate.

Signature:  Date: 7.27.2020

### Owner/Contract Purchaser Information:

Owner

Contract Purchaser

Name: Optimal Ventures LLC, Attn John Morris

Address: 194 Finley Golf Course Road, Suite 102

City: Chapel Hill State: NC Zip Code: 27517

Phone: 919-942-1141 Email: jmorris@morriscommercial.com

The undersigned applicant hereby certifies that, to the best of their knowledge and belief, all information supplied with this application and accurate.

Signature:  Date: 7/27/2020

Click [here](#) for application submittal instructions.



# PROJECT FACT SHEET

TOWN OF CHAPEL HILL  
Planning Department

## Section A: Project Information

**Use Type:** (check/list all that apply)

Office/Institutional     Residential     Mixed-Use     Other: \_\_\_\_\_

**Overlay District:** (check all that apply)

Historic District     Neighborhood Conservation District     Airport Hazard Zone

## Section B: Land Area

Net Land Area (NLA): Area within zoning lot boundaries		NLA=	842,609.63	sq. ft.
Choose one, or both, of the following (a or b), not to exceed 10% of NLA	a) Credited Street Area (total adjacent frontage) x ½ width of public right-of-way	CSA=	84,261	sq. ft.
	b) Credited Permanent Open Space (total adjacent frontage) x ½ public or dedicated open space	COS=		sq. ft.
TOTAL: NLA + CSA and/or COS = Gross Land Area (not to exceed NLA + 10%)		GLA=	926,893	sq. ft.

## Section C: Special Protection Areas, Land Disturbance, and Impervious Area

**Special Protection Areas:** (check all those that apply)

Jordan Buffer     Resource Conservation District     100 Year Floodplain     Watershed Protection District

Land Disturbance	Total (sq. ft.)
Area of Land Disturbance (Includes: Footprint of proposed activity plus work area envelope, staging area for materials, access/equipment paths, and all grading, including off-site clearing)	335,500 SF
Area of Land Disturbance within RCD	53,941 SF
Area of Land Disturbance within Jordan Buffer	8,443 SF

Impervious Areas	Existing (sq. ft.)	Demolition (sq. ft.)	Proposed (sq. ft.)	Total (sq. ft.)
Impervious Surface Area (ISA)	0 sf	0 sf	197,606 sf	197,606 sf
Impervious Surface Ratio: Percent Impervious Surface Area of Gross Land Area (ISA/GLA)%	0%	0%	21.32%	21.32%
If located in Watershed Protection District, % of impervious surface on 7/1/1993	0			



**PROJECT FACT SHEET**

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**Section D: Dimensions**

Dimensional Unit (sq. ft.)	Existing (sq. ft.)	Demolition (sq. ft.)	Proposed (sq. ft.)	Total (sq. ft.)
Number of Buildings	0	0	3 bldg -	114,900 sf
Number of Floors	0	0	4 stories max	
Recreational Space	0	0	n/a	

**Residential Space**

Dimensional Unit (sq. ft.)	Existing (sq.ft.)	Demolition (sq. ft.)	Proposed (sq. ft.)	Total (sq. ft.)
Floor Area (all floors – heated and unheated)	n/a			
Total Square Footage of All Units				
Total Square Footage of Affordable Units				
Total Residential Density				
Number of Dwelling Units				
Number of Affordable Dwelling Units				
Number of Single Bedroom Units				
Number of Two Bedroom Units				
Number of Three Bedroom Units				

**Non-Residential Space (Gross Floor Area in Square Feet)**

Use Type	Existing	Proposed	Uses	Existing	Proposed
Commercial					
Restaurant			# of Seats		
Government					
Institutional					
Medical					
Office					
Hotel			# of Rooms		
Industrial					
Place of Worship			# of Seats		
Other	0	114,900 sf			

Dimensional Requirements		Required by Ordinance	Existing	Proposed
Setbacks (minimum)	Street	22'	n/a	174'
	Interior (neighboring property lines)	8'	n/a	28'
	Solar (northern property line)	9'	n/a	>800'
Height (maximum)	Primary	34'	n/a	
	Secondary	60'	n/a	
Streets	Frontages	40'	none	58'
	Widths	40'	avg 614'	avg 614'



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**Section F: Adjoining or Connecting Streets and Sidewalks**

*Note: For approval of proposed street names, contact the Engineering Department.*

Street Name	Right-of-Way Width	Pavement Width	Number of Lanes	Existing Sidewalk*	Existing Curb/Gutter
Chapel Point Rd	58'	28'	2	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes
				<input type="checkbox"/> Yes	<input type="checkbox"/> Yes

List Proposed Points of Access (Ex: Number, Street Name):

\*If existing sidewalks do not exist and the applicant is adding sidewalks, please provide the following information:

Sidewalk Information			
Street Names	Dimensions	Surface	Handicapped Ramps
Chapel Point Rd	10' to match existing	Concrete	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

**Section G: Parking Information**

Parking Spaces	Minimum	Maximum	Proposed
Regular Spaces	111	no maximum	163
Handicap Spaces	5	no maximum	6
Total Spaces	116		169
Loading Spaces			3 (1 at amusements, 2 at storage)
Bicycle Spaces	26	n/a	26
Surface Type	asphalt and concrete		

**Section H: Landscape Buffers**

Location (North, South, Street, Etc.)	Minimum Width	Proposed Width	Alternate Buffer	Modify Buffer
North	20'	20'	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
West	20'	20'	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
South	20' (SW) 30' (SE)	10' (SW) 20' (SE)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes
East (I-40 frontage) to start at edge of proposed greenway easement	100'	100'	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes



**Section I: Land Use Intensity**

Existing Zoning District:  
 Proposed Zoning Change (if any):

Zoning – Area – Ratio			Impervious Surface Thresholds			Minimum and Maximum Limitations	
Zoning District(s)	Floor Area Ratio (FAR)	Recreation Space Ratio (RSR)	Low Density Residential (0.24)	High Density Residential (0.50)	Non-Residential (0.70)	Maximum Floor Area (MFA) = FAR x GLA	Minimum Recreation Space (MSR) = RSR x GLA
OI-2	.264					129,556	
RCD strmsde	.01					1,910	
RCD managd	.019					2,568	
RCD upland	.264					29,043	
<b>TOTAL</b>						163,077 sf	
<b>RCD Streamside</b>	.01	0.01					
<b>RCD Managed</b>	.019	0.019					
<b>RCD Upland</b>	.264						

**Section J: Utility Service**

Check all that apply:

<b>Water</b>	<input checked="" type="checkbox"/> OWASA	<input type="checkbox"/> Individual Well	<input type="checkbox"/> Community Well	<input type="checkbox"/> Other
<b>Sewer</b>	<input checked="" type="checkbox"/> OWASA	<input type="checkbox"/> Individual Septic Tank	<input type="checkbox"/> Community Package Plant	<input type="checkbox"/> Other
<b>Electrical</b>	<input checked="" type="checkbox"/> Underground	<input type="checkbox"/> Above Ground		
<b>Telephone</b>	<input checked="" type="checkbox"/> Underground	<input type="checkbox"/> Above Ground		
<b>Solid Waste</b>	<input type="checkbox"/> Town	<input type="checkbox"/> Private		



**SPECIAL USE PERMIT APPLICATION  
SUBMITTAL REQUIREMENTS  
TOWN OF CHAPEL HILL  
Planning Department**

The following must accompany your application. Failure to do so will result in your application being considered incomplete. For assistance with this application, please contact the Chapel Hill Planning Department (Planning) at (919) 969-5066 or at [planning@townofchapelhill.org](mailto:planning@townofchapelhill.org).

X	<b>Application fee</b> ( <a href="#">including Engineering Review fee</a> ) ( <a href="#">refer to fee schedule</a> )	Amount Paid \$	<input type="text"/>
6/4	<b>Pre-application meeting</b> –with appropriate staff		
X	<b>Digital Files</b> – provide digital files of all plans and documents		
X	<b>Recorded Plat or Deed of Property</b>		
X	<b>Project Fact Sheet and Statement of Justification</b>		
X	<b>Traffic Impact Statement</b> – completed by Town’s consultant (or exemption)		
X	<b>Description of Public Art Proposal</b>		
X	<b>Confirmation of distribution of Plan Sets to OWASA and NCDOT</b>		
X	<b>Response to Community Design Commission and Town Council Concept Plan comments</b>		
N/A	<b>Affordable Housing Proposal, if applicable</b>		
N/A	<b>Provide existing Special Use Permit, if Modification</b>		
X	<b>Mailing list of owners of property within 1,000 feet perimeter of subject property</b> ( <a href="#">see GIS notification tool</a> )		
X	<b>Mailing fee for above mailing list (mailing fee is double due to 2 mailings)</b>	Amount Paid \$	<input type="text"/>
X	<b>Written Narrative describing the proposal</b>		
X	<b>Resource Conservation District, Floodplain, &amp; Jordan Buffers Determination</b> – necessary for all submittals		
n/a	<b>Jurisdictional Wetland Determination</b> – if applicable		
X	<b>Resource Conservation District Encroachment Exemption or Variance (determined by Planning)</b>		
n/a	<b>Jordan Buffer Authorization Certificate or Mitigation Plan Approval (determined by Planning)</b>		
digital	<b>Reduced Site Plan Set (reduced to 8.5” x 11”)</b>		

**Stormwater Impact Statement (1 copy to be submitted)**

- a) Written narrative describing existing & proposed conditions, anticipated stormwater impacts and management structures and strategies to mitigate impacts
- b) Description of land uses and area (in square footage)
- c) Existing and proposed impervious surface area in square feet for all subareas and project area
- d) Ground cover and uses information
- e) Soil information (classification, infiltration rates, depth to groundwater and bedrock)
- f) Time of concentration calculations and assumptions
- g) Topography (2-foot contours)
- h) Pertinent on-site and off-site drainage conditions
- i) Upstream and/or downstream volumes
- j) Discharges and velocities
- k) Backwater elevations and effects on existing drainage conveyance facilities
- l) Location of jurisdictional wetlands and regulatory FEMA Special Flood Hazard Areas
- m) Water quality volume calculations
- n) Drainage areas and sub-areas delineated
- o) Peak discharge calculations and rates (1, 2, and 25-year storms)
- p) Hydrographs for pre- & post-development without mitigation, post-development with mitigation
- q) Volume calculations and documentation of retention for 2-year storm



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- r) 85% TSS removal for post-development stormwater runoff
- s) Nutrient loading calculations
- t) BMP sizing calculations
- u) Pipe sizing calculations and schedule (include HGL & EGL calculations and profiles)

**Plan Sets (10 copies to be submitted no larger than 24" x 36")**

Plans should be legible and clearly drawn. All plan set sheets should include the following:

- Project Name
- Legend
- Labels
- North Arrow (North oriented toward top of page)
- Property boundaries with bearing and distances
- Scale (Engineering), denoted graphically and numerically
- Setbacks
- Streams, RCD Boundary, Jordan Riparian Buffer Boundary, Floodplain, and Wetlands Boundary, where applicable
- Revision dates and professional seals and signatures, as applicable

**Cover Sheet**

- a) Include Project Name, Project fact information, PIN, and Design Team

**Area Map**

- a) Project name, applicant, contact information, location, PIN, & legend
- b) Dedicated open space, parks, greenways
- c) Overlay Districts, if applicable
- d) Property lines, zoning district boundaries, land uses, project names of site and surrounding properties, significant buildings, corporate limit lines
- e) Existing roads (public & private), rights-of-way, sidewalks, driveways, vehicular parking areas, bicycle parking, handicapped parking, street names
- f) 1,000' notification boundary

**Existing Conditions Plan**

- a) Slopes, soils, environmental constraints, existing vegetation, and any existing land features
- b) Location of all existing structures and uses
- c) Existing property line and right-of-way lines
- d) Existing utilities & easements including location & sizes of water, sewer, electrical, & drainage lines
- e) Nearest fire hydrants
- f) Nearest bus shelters and transit facilities
- g) Existing topography at minimum 2-foot intervals and finished grade
- h) Natural drainage features & water bodies, floodways, floodplain, RCD, Jordan Buffers & Watershed boundaries



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**Detailed Site Plan**

- a) Existing and proposed building locations
- b) Description & analysis of adjacent land uses, roads, topography, soils, drainage patterns, environmental constraints, features, existing vegetation, vistas (on and off-site)
- c) Location, arrangement, & dimension of vehicular parking, width of aisles and bays, angle of parking, number of spaces, handicapped parking, bicycle parking. Typical pavement sections & surface type.
- d) Location of existing and proposed fire hydrants
- e) Location and dimension of all vehicle entrances, exits, and drives
- f) Dimensioned street cross-sections and rights-of-way widths
- g) Pavement and curb & gutter construction details
- h) Dimensioned sidewalk and tree lawn cross sections
- i) Proposed transit improvements including bus pull-off and/or bus shelter
- j) Required landscape buffers (or proposed alternate/modified buffers)
- k) Required recreation area/space (including written statement of recreation plans)
- l) Refuse collection facilities (existing and proposed) or shared dumpster agreement
- m) Construction parking, staging, storage area, and construction trailer location
- n) Sight distance triangles at intersections
- o) Proposed location of street lights and underground utility lines and/or conduit lines to be installed
- p) Easements
- q) Clearing and construction limits
- r) Traffic Calming Plan – detailed construction designs of devices proposed & associated sign & marking plan

**Stormwater Management Plan**

- a) Topography (2-foot contours)
- b) Existing drainage conditions
- c) RCD and Jordan Riparian Buffer delineation and boundary (perennial & intermittent streams; note ephemeral streams on site)
- d) Proposed drainage and stormwater conditions
- e) Drainage conveyance system (piping)
- f) Roof drains
- g) Easements
- h) BMP plans, dimensions, details, and cross-sections
- i) Planting and stabilization plans and specifications

**Landscape Protection Plan**

- a) Rare, specimen, and significant tree survey within 50 feet of construction area
- b) Rare and specimen tree critical root zones
- c) Rare and specimen trees proposed to be removed
- d) Certified arborist tree evaluation, if applicable
- e) Significant tree stand survey
- f) Clearing limit line
- g) Proposed tree protection/silt fence location
- h) Pre-construction/demolition conference note
- i) Landscape protection supervisor note
- j) Existing and proposed tree canopy calculations, if applicable



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**Planting Plan**

- a) Dimensioned and labeled perimeter buffers
- b) Off-site buffer easement, if applicable
- c) Landscape buffer and parking lot planting plan (including planting strip between parking and building, entryway planting, and 35% shading requirement)

**Steep Slope Plan**

- a) Classify and quantify slopes 0-10%, 10-15%, 15-25%, and 25% and greater
- b) Show and quantify areas of disturbance in each slope category
- c) Provide/show specialized site design and construction techniques

**Grading and Erosion Control Plan**

- a) Topography (2-foot contours)
- b) Limits of Disturbance
- c) Pertinent off-site drainage features
- d) Existing and proposed impervious surface tallies

**Streetscape Plan, if applicable**

- a) Public right-of-way existing conditions plan
- b) Streetscape demolition plan
- c) Streetscape proposed improvement plan
- d) Streetscape proposed utility plan and details
- e) Streetscape proposed pavement/sidewalk details
- f) Streetscape proposed furnishing details
- g) Streetscape proposed lighting detail

**Solid Waste Plan**

- a) Preliminary Solid Waste Management Plan
- b) Existing and proposed dumpster pads
- c) Proposed dumpster pad layout design
- d) Proposed heavy duty pavement locations and pavement construction detail
- e) Preliminary shared dumpster agreement, if applicable



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**Construction Management Plan**

- a) Construction trailer location
- b) Location of construction personnel parking and construction equipment parking
- c) Location and size of staging and materials storage area
- d) Description of emergency vehicle access to and around project site during construction
- e) Delivery truck routes shown or noted on plan sheets

**Energy Management Plan**

- a) Description of how project will be 20% more energy efficient than ASHRAE standards
- b) Description of utilization of sustainable forms of energy (Solar, Wind, Hydroelectric, and Biofuels)
- c) Participation in NC GreenPower program
- d) Description of how project will ensure indoor air quality, adequate access to natural lighting, and allow for proposed utilization of sustainable energy
- e) Description of how project will maintain commitment to energy efficiency and reduced carbon footprint over time
- f) Description of how the project's Transportation Management Plan will support efforts to reduce energy consumption as it affects the community

**Exterior Elevations**

- a) An outline of each elevation of the building, including the finished grade line along the foundation (height of building measured from mean natural grade)

# Putt-Putt Fun Center

Special Use Permit Application

27 July 2020

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## Statement of Justification

The proposed Putt-Putt Fun Center project is located north of the Carraway Village development, adjacent to I-40 and with vehicular access from the west via the new public street Chapel Point Drive. The triangular parcel is bisected by a stream running southeast to northwest, and the associated resource conservation district (RCD). This project proposes to develop the portion of the site south of the stream. The full build out being requested in this application is for an indoor/outdoor amusement center located on the majority of the development area, and also a self-storage building tucked away from the road toward the south-eastern corner of the site.

The specific findings and justification are provided below.

### **Required Findings of Fact (LUMO 4.5.2 (a))**

- **The use or development is located, designed, and proposed to be operated so as to maintain or promote the public health, safety, and general welfare**

The proposed project is located with access from a public street and will include interior circulation providing full access for emergency vehicles. The new buildings will be constructed in compliance with current health and safety codes to protect employees and the general public.

The project will be served by OWASA water and sanitary sewer services. This project will include water and sewer main extensions but both services and capacity are available to this site.

No FEMA regulated floodplain is located on the site as shown on FEMA Firm panel 9870, though it starts just west of the site beyond the power line easements. There is however a jurisdictional perennial stream, and the development will comply with LUMO regulations for the associated resource conservation district (RCD).

Putt-Putt Fun Center will provide in Town a unique and inclusive indoor and outdoor recreational and participatory experience for all age ranges of individuals, groups, organizations, schools (public, charter, and private)/faith-based centers, and families including such activities as go-karts, mini-golf, laser tag, other recreational activities, an arcade and redemption/prize area, as well as accessory uses such as dining and event spaces in a tobacco-free wholesome environment. By providing a safe family-oriented atmosphere for active recreation, it will promote public health.

- **The use or development complies with all required regulations and standards of this chapter, including all applicable provisions of articles 3 and 5, the applicable specific standards contained in the supplemental use regulations (article 6), and with all other applicable regulations**

The applicant has submitted a concurrent request for rezoning the property to allow the intended uses. The project design is intended to comply with all regulations and standards of the LUMO, as well as applicable State or Federal requirements.

Article 6.23 defines special regulations for conditioned self-storage facilities:

- There is enough land on site to allocate so that the self-storage portion complies with the 0.29 FAR
  - The parcel is not at the intersection of an arterial street
  - The building is not close to a frontage
  - The self-storage facility is not the principal use on the site
  - The self-storage building is set more than 200' from the I-40 ROW
  - Access to all storage units is from the building interior only
  - Doors do not face residentially zoned properties. None of the doors are garage-type.
  - Units are intended for storage, not occupied uses as listed in LUMO 6.23.8
  - All storage is within the enclosed building
  - Parking is not located on the frontage nearest the closest ROW
  - Electrical outlets are provided in public spaces within the building only, not within individual storage units.
  - There will be no outdoor display of merchandise or goods.
  - Outdoor lighting will comply with Town codes.
  - Signs shall not face residentially zoned or occupied parcels.
  - Fencing will comply with Town codes.
  - Building construction will comply with Town design codes per LUMO 6.23.17
- **The use or development is located, designed, and proposed to be operated so as to maintain or enhance the value to contiguous property, or that the use of development is a public necessity**

Putt-Putt Fun Center will provide recreation and entertainment facilities which are generally not offered elsewhere in town. In fact the amusement center may well be used by many residents of the contiguous property developed as apartments. Currently Chapel Hill residents travel to Durham, RTP and beyond for the proposed combination of activities but nearby neighbors will be able to walk or bike to this facility. It will also provide employment opportunities for teens and adults in the community.

- **The use or development conforms with the general plans for the physical development of the town as embodied in this appendix and in the comprehensive plan.**

This property conforms to the general plans for the physical development of the Town. It supports many of the Comprehensive Plan's themes and goals. We believe the development will meet 5 of the 6 goals identified and will not contradict the 6<sup>th</sup>.

- *A Place for Everyone*

Putt-Putt Fun Center will provide in Town a unique and inclusive indoor and outdoor recreational and participatory experience for all age ranges of individuals, groups, organizations, schools (public, charter, and private)/faith-based centers, and families including such activities as go-karts, mini-golf, laser tag, other recreational activities, an arcade and redemption/prize area, as well as accessory uses such as dining and event spaces in a tobacco-free wholesome environment.(PFE.1) .

- *Community Prosperity and Engagement*

Putt-Putt Fun Center will provide recreation and entertainment facilities which are generally not offered elsewhere in town. Currently Chapel Hill residents travel to Durham, RTP and beyond for the proposed combination of activities. The project will apply for annexation into the Town and will be served by utilities from Eubanks Road and from the west. The project parcel is located outside Town limits but within the Urban Services boundary. The project will apply for annexation (CPE.1).

The project will provide wholesome and positive employment opportunities for teens and adults in the community, as well as provide access for local organizations to increase their fundraising and awareness efforts and outreach.

- *Getting Around*

Putt-Putt Fun Center will be located near the new Carraway Village development. There will be sidewalks on site which connect to the new pedestrian systems recently constructed here. The site is a few minutes' walk / less than 1000' to the Town Park & Ride lot providing public transit access throughout Town and also to adjacent cities via the regional bus system. (GA.1, GA.2)

No greenway trails currently exist, but the project site would be designed to connect to planned greenways nearby and to the trails and pedestrian system within Carraway Village. The project will provide a 20' wide easement to the Town for future trail construction.

- *Good Places, New Spaces*

This property has until recently lacked access to public utilities and was considered a rural part of Chapel Hill (although not in the rural buffer). With the construction of the CHCT Maintenance and CH Public Works operations center northwest of the site, and construction of Carraway Village to the south, the property is now accessible and provides an opportunity to create an entertainment accessory use for the other developments and a destination use for the rest of the Town population. (GPNS.6 and GPNS.8)

- *Nurturing Our Community*

The project will implement sustainable design measures in an effort to lower the construction impact and maximize the long-term life cycle benefits to the Owner. These will include, but not be limited to the building materials, HVAC systems, lighting, and preservation of at least half of the existing forest. The project will install stormwater mitigation facility to treat runoff from impervious surfaces and will also protect the buffer adjacent to the jurisdictional stream on site (NOC.2). The project will retain more than the required amount of tree coverage as well as installing additional plantings. (NOC.3)

In addition to the sustainable building and development efforts, the project will incorporate eco-friendly amusement attractions as the majority of these small-scale attractions are electric and battery-powered, including the go-kart equipment.



Coulter Jewell Thames, PA

MAIN OFFICE  
111 WEST MAIN STREET  
DURHAM, NC 27701  
p 919.682.0368 f 919.688.5646

Planning for the Future

July 27, 2020

Mr Jake Lowman  
Town of Chapel Hill Planning Department  
405 Martin Luther King Jr Blvd  
Chapel Hill, NC 27514

RE: SPECIAL USE PERMIT APPLICATION – PROJECT NARRATIVE  
PUTT-PUTT FUN CENTER, Chapel Point Road

Mr. Lowman:

Enclosed is the submittal for the Special Use Permit application for the Putt-Putt Fun Center multi-use project.

The project site is located north of the Carraway Village development west of I-40 at the end of a newly built street, Chapel Point Road. The site is currently wooded / vacant with a jurisdictional stream buffer running southeast to northwest leaving approximately 11.2 acres south of the stream. The only vehicular access to the site is via the new Chapel Point Road right of way, which ends at the parcel property line. There is a 10' wide sidewalk on that street, which dead ends at the parcel and will be extended in a 5' wide configuration to connect to the site facilities

The proposed development will include a 1.5 story building at the west end which will house amusements and public spaces for the Putt-Putt Fun Center. That area will also include outdoor facilities, specifically a mini-golf facility and a go-kart track. Further east on the site will be a 4-story self-storage building.

Total square footage for the buildings will not exceed 114,900 square feet broken down as approximately 28,500 sf for the amusement buildings, and 86,400 sf for the self-storage building. There will be sufficient parking on site distributed between both facilities. All parking will be in surface lots broken up by landscaped areas. The site has a high point near the southeast point, and falls at a fairly even 5% slope toward the northwest. For this reason, all the new impervious on site will be treated in a single pond at the low point to the northwest of the built spaces.

Service for the amusement center will be located north of the amusement building. Trash for all site uses will be located at the south end of the project and not visible from the road. It will be located below a tall retaining wall built on the adjacent property, and therefore will not be visible from most of that development unless viewed from the top of the wall at the property line. The vehicular layout allows service and emergency vehicle access to all facilities. Bicycle parking will be accommodated at both building locations on site. The bike racks at the amusement center will be located under a roof canopy near the entry. For the self-storage use, there will be one bike rack in front of the office, and additional racks inside the building.

There is a requirement for 30% tree coverage on site. This project proposes to retain more than 50% of the site in existing trees. There will also be some additional trees saved on the southern and western property boundaries, and tree and shrub plantings will be added to the buffers along those two property lines. The eastern 100' wide landscape buffer against I-40 will remain undisturbed.

The applicant is requesting two modifications. The first is a reduction of the southern landscape buffer width by 10' as that portion of the buffer is being provided by the adjacent development, currently under construction. The second modification request is for construction of a portion of the storm pond in the managed and upland RCD zones. An RCD Encroachment application has been submitted concurrent with this SUP submittal.

A traffic impact study has been completed for this project, and is being submitted separately.

A rezoning application to change this site from MU-R-1 to OI-2 with a PD-MU overlay is being submitted concurrently with this SUP application to allow for a development with both a recreation use and a self-storage building.

The project has gone through the Town's Concept review process. It was presented to the Community Design Commission in August 2019 and there is a separate document responding to the board members' comments. The project also was reviewed by Town Council in October 2019, and a separate document addresses and responds to their comments and concerns.

Sincerely,  
Coulter Jewell Thames, PA  
Wendi Ramsden RLA



cc. Scott Morris, Optimal Ventures LLC



Coulter Jewell Thames, PA

MAIN OFFICE  
111 WEST MAIN STREET  
DURHAM, NC 27701  
p919.682.0368 f919.688.5646

Planning for the Future

## RESPONSE TO CONCEPT PLAN REVIEW, COUNCIL PUTT-PUTT FUN CENTER

Town File 9788-20-4502

July 27, 2020

The concept plan was original presented to the TOWN COUNCIL on October 30, 2019

Council Members Present: Pam Hemminger, Donna Bell, Allen Buansi, Hongbin Gu, Nancy Oates, Michael Parker, Karen Stegman

Absent: Rachel Schaevitz

### BOARD COMMENTS

Donna Bell

- Make sure the pedestrian route from the bus area into our site is safe.
- Would like to see the interior of the site softer – more park-like

*RESPONSE: The existing sidewalk on Chapel Point Drive has been extended to our site and this project will extend the sidewalk through to the main entry. Planting areas have been added within the parking lot (between aisles) and also within the outdoor amusement areas.*

Allen Buensi

- Also wants to see pedestrian connections
- Appreciates the commitment to the forest buffer against I-40
- Town will want to see electric charging stations
- Can we reduce parking as we're so close to transit?

*RESPONSE: The many pedestrian routes are shown on the SUP drawings, as are electric charging station locations. The project continues to keep 100' wide existing forest buffer against the I-40 property line. Parking proposed is based on the owner's experience at their other locations. They do anticipate some traffic reduction and use of public transit at this location.*

Nancy Oates

- Pleased to see this use put forward – she thinks it's a good fit with the Town.
- Would like to see a commitment to a zone that will not be clear cut.
- Would like to see shade in the mini-golf area
- Pleased to see consideration of battery powered go-karts vs. diesel
- Would like to see any trails on site stay natural surface, or for mountain biking, not more paved trail.

*RESPONSE: The area to be developed will be clear cut – there are large areas of cleared level space that are needed to accommodate the outdoor facilities proposed. But a large portion of the site (over half) is being left undisturbed, and not just land within the RCD. There are accommodations for landscape areas and especially shade trees within the mini golf area.*

*The go-kart area as proposed is designed for battery power vehicles.*

*The project is not proposing any trail construction at this point. But the developer expects that any project-related trails on site will be unpaved nature trails.*

*There is an easement proposed for the Town's multimodal trail at the eastern property line.*

Michael P

- Would like to see some green space brought into the golf area.

*RESPONSE: The golf area design allows for some tree and groundcover plantings.*

Karen Stegman

- Feels the fun center is a good use for Chapel Hill
- Bikability and walkability to this facility is important
- Worried about the effect of light and noise against the Carraway Village residential uses

*RESPONSE: The site will be accessible by bike routes and sidewalk, and covered bike facilities are proposed in front of the building so that first time visitors will be aware of bike parking accommodations.*

*Lighting will be directed toward the outdoor activities, not toward the property lines. There will be some buffer remaining between the new project and the recently constructed apartments at Carraway Village, and additional plantings will be installed.*

Hongbin Gu

- Worried about the significant removal of trees and hopes we can preserve lots of green space and natural forest features
- Agree with the CDC comments that there is too much parking and not enough nature

*RESPONSE: More than half the existing trees will remain on site so that much of the natural forest will be preserved. Parking has been broken up into smaller areas and many new trees and landscape areas are proposed within the parking areas.*

Pam Hemminger

- Would like to see conduit for roof solar potential in the future
- Would like to see the pond more central to the project, more integrated
- Wants to see walkability and safe navigation for pedestrians on site
- Would like to see the site rearranged somewhat so that storage is closer to the apartments and elements with more light and noise further away

*RESPONSE: The building and roof design will be developed during final plan processes.*

*The pond needs to be located at the low point of the site to be able to collect runoff from all new impervious areas, and that low point is at the northwest corner of the development. The pond area may be incorporated into future nature trails on site.*

*The site plan shows the pedestrian connections throughout the site.*

*The storage building has been moved toward the non-residential portion of the Carraway Village development, and the golf and go-karts moved further away from the property line. Additionally, some existing buffer will remain and be augmented with additional plantings, and a secondary evergreen buffer is proposed between the parking lot and the mini-golf space.*



Coulter Jewell Thames, PA

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Planning for the Future

## RESPONSE TO CONCEPT PLAN REVIEW, COMMUNITY DESIGN COMMISSION PUTT-PUTT FUN CENTER

Town File 9788-20-4502

July 27, 2020

The concept plan was original presented to the COMMUNITY DESIGN COMMISSION on AUGUST 27, 2019. The project as presented included 16,000 sf amusement center and an 84,000 sf 3-story self-storage building on the 19-acre site. Additional outdoor amusement areas include a mini-golf course, go-kart space, and other outdoor activities. Parking for 200 cars was shown, as well as a storm pond

Board Members in attendance: Chris Berndt, Susan Lyons, Polly Van de Velde, Susanna Dancy, Megan Patnaik, Ted Hoskins, John Weis

### BOARD COMMENTS

John Weis

- Appreciates the recreation idea but doesn't see how it fits into the Town land use plan
- Concerned about signage for the project
- Wants to wait to see what Carraway village proposed for the eastern portion of their site so see if it's compatible with the fun center, especially where the go-karts will be located.
- Doesn't see how the use integrates into the community
- likes the 100' buffer against the highway

*RESPONSE: The Town's Land Use 2020 plan calls out this area as a Development Opportunity Area. The development team feels that an indoor/outdoor activity family-friendly facility very much fits into the Town's plan for development. This type of facility is not currently available in Town and the large size requirement for the use lends itself to be located in a growing area.*

Megan Patnaik

- would like to see a bigger buffer against the go-kart area
- would like a bigger buffer against the parking, or to put the parking in a stacked facility (deck??)
- likes the closeness of the park & ride
- likes that the view from the highway won't be "cheapened"
- wants to see what the pedestrian connectivity would be

*RESPONSE: The go kart area has been moved north and the current design proposes the property line buffer as well as an additional evergreen planted buffer between the parking and the mini-golf area to put multiple layers of uses between the adjacent property and the go-kart space.*

*The economics of this project do not support a parking deck. But the parking has been broken up into smaller lots with more landscaping opportunities.*

*This design continues to keep a 100' wide undisturbed buffer between the project and the I-40 property line.*

*The plans show pedestrian connections throughout the site and between this use and the nearby facilities, including the park & ride.*

Ted Hoskins

- Likes that we want to be architecturally compatible with Carraway village but would like to see something distinctive to this site
- Architecture – primary use is the 1 story building – would like to see how we can make that stand out and reduce the presence of the 3 story self storage
- Site – troubled by the proximity of the parking lot to the Carraway Village parking lot
- Will want to see the non-car connectivity at the next phase

*RESPONSE: The architecture will be more developed during the final plan phase of design.*

*The 1 story building representing the main use on this site has been moved forward so it is more visible to people entering the site. And it will be 1.5 stories, with a mezzanine in a portion of the building, thereby increasing the volume of that building visually. Additionally, the self-storage building has been moved to the far east end of the site so that it is not a large building mass visible as amusement customers enter the site.*

*The proposed parking lot has been broken down into smaller lots. Some of it will be near the existing Carraway Village parking, but those two lots have a 3'-15' vertical separation as well as a 25'-35' wide planted area spanning the upper and lower levels.*

*Non-vehicular connections are shown on the existing conditions and site plans.*

Susanna Dancy

- Likes the use and thinks it highly appropriate and needed by the community
- Site design – concerns about the dominance of the parking at the entrance and would like to see cars come in and not be dumped into a huge lot
- Would like to see more of the active uses at the entrance
- Not concerned about future Carraway Village uses – they're not here tonight to comment or raise issues/concerns
- Town noise ordinance will apply
- At SUP stage will want to see elevations, signage, and architecture, and pedestrian plan with greenway trails, etc.
- Would like to see the pedestrian connections, likes the ability of non-drivers to have access to the fun center

*RESPONSE: The site has been redesigned to bring the amusement center closer to the site entry, and the parking lots have been broken into smaller chunks with more opportunities for landscaping and for visibility of the outdoor activity uses.*

*Building elevations have been included in the application materials.*

*Pedestrian connections are shown on the plans, including connections to the park & ride and to the transit stops.*

Polly Van De Walde

- Concerns about light and sound pollution
- Good that bumper cars will be indoors
- Gas go-kart engines produce pollution

*RESPONSE: Some existing vegetation will be retained at the property line, and additional buffer vegetation added. Also the go-karts have been moved north so they are separated from adjacent properties. The go-karts will be battery operated, not diesel so that will reduce both noise and pollution.*

Susan Lyons

- Would like to see the larger Carraway Village plan to see what's near the proposed Putt-Putt elements
- Would like to see the pond incorporated into the woodsy feel and nature trails
- Concerned about the sea of parking
- 20' buffer doesn't feel like enough between this use and the adjacent residential at Carraway Village

*RESPONSE: The adjacent built and under construction layout is shown on the plans now. The whole extent of that development is best seen on the area plan. There are some blank spaces on the south side of our shared property line as Northwood Raven has not made a formal submittal to the Town indicating potential uses there. It is unlikely to be residential as the project is near its residential percentage limit. There is some landscape buffer on the Carraway Village side of the shared property line (10' width) and they have also construction a large retaining wall between their residential uses and the proposed Putt-Putt development. The proposed pond will be located at the northwest corner of the development, which is the low spot. The elevation of the pond needs to be such that it can collect all runoff from new impervious surfaces. There will be some additional plantings made to the non-dam areas of the disturbed pond area.*

*The parking has been broken up so that it is not all in one large lot. The smaller lots also have more opportunities for landscaping.*

*The buffer between the proposed development and the recently completed Carraway Village development is 25'-40' wide. Where it is narrower, there is also a 3'-25' vertical separation.*

Chris Berndt

- Could parking go under buildings or amusement building be incorporated into the taller self-storage building?
- Would like to see the tree clearance and impervious area both reduced
- Likes that trees will be saved along the highway frontage
- This is a sensitive site and she wouldn't support rezoning of this parcel
- Wants parking under the buildings
- Would want the storage building to NOT be visible from the highway
- Wants us to look at the Town's gateway plan, p29 – old field trail – She'd like to see this space interconnected with paths and the greenway system

*RESPONSE: The economics of the project do not allow for underground parking, but the parking lot has been broken up in to smaller chunks with more landscaping opportunities.*

*Tree clearance will be limited to less than half the site and impervious area is much below what is allowed by the LUMO.*

*The storage building has been moved east so that it is well into the site and not prominent to people and vehicles entering the site. There is a 100' wide landscape buffer between the building and the highway, and in fact at least 150' of undisturbed existing forest will remain after construction. The majority of the self-storage building will not be visible from the highway.*

*The project will provide an easement along the eastern property line for the portion of the old field trail greenway shown in the Town's Greenway master plan.*

NAB



20180604000102820 DEED  
Bk:RB6474 Pg:209  
06/04/2018 12:15:42 PM 1/3

FILED Mark Chilton  
Register of Deeds, Orange Co., NC  
Recording Fee: \$26.00  
NC Real Estate TX: \$540.00

aw

AREA ABOVE LINE RESERVED FOR REGISTER OF DEEDS

PREPARED BY: DEAN P. BROZ, ATTORNEY-AT-LAW, HIGGINS, FRANKSTONE, GRAVES & MORRIS,  
P.A., 1414 RALEIGH ROAD - SUITE 320, THE EXCHANGE WEST  
AT MEADOWMONT, CHAPEL HILL, NC 27517 (WITHOUT TITLE  
EXAMINATION)

AND RETURN TO: GRANTEE AT 194 FINLEY GOLF COURSE RD., STE. 102  
CHAPEL HILL, NC 27517-4401

PIN: 9880-09-6500  
Excise Tax: \$540.00

NAB

### SPECIAL WARRANTY DEED

THIS DEED is made this 30<sup>th</sup> day of May, 2018, by and between **ERBER LLC**, a North Carolina limited liability company, hereinafter referred to as "Grantor", whose address is 3055 Big Ridge Road, Baker, WV 26801-8310; and **1031 SOLUTIONS, LLC**, a North Carolina limited liability company, hereinafter referred to as "Grantee", whose address is 194 Finley Golf Course Rd., Ste. 102, Chapel Hill, NC 27517-4401.

WITNESSETH, that the Grantor, for a valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, grants, bargains, sells and conveys unto the Grantee in fee simple all that certain tract or parcel of land situated, lying and being in Chapel Hill Township, Orange County, North Carolina, and more particularly described as follows:

For a legal description of the property conveyed by this deed see Exhibit "A" attached to this deed and incorporated herein by reference.

TO HAVE AND TO HOLD this tract or parcel of land and all privileges and appurtenances thereunto belonging to the Grantee in fee simple forever.



SPECIAL WARRANTY DEED

And the Grantor covenants with the Grantee, that Grantor has done nothing to impair such title as Grantor received, and that Grantor will warrant and defend the title against the lawful claims of all persons claiming by, under or through Grantor, except for the exceptions hereinafter stated.

Title to the property described above is subject to ad valorem taxes for the current year and easements, rights of way and restrictions of record.

The designation Grantor and Grantee as used herein shall include the parties hereto, their heirs, successors, assigns and legal and/or personal representatives.

N/A If initialed, the property includes the primary residence of at least one of the Grantors, otherwise, note as N/A. (per NC GS § 105-317.2.).

IN WITNESS WHEREOF, the Grantor has duly executed the foregoing as of the day and year first above written.

ERBER LLC, a North Carolina limited liability company

By: Robert Arthur Erber (SEAL)  
ROBERT ARTHUR ERBER, Manager of Erber LLC, a North Carolina limited liability company

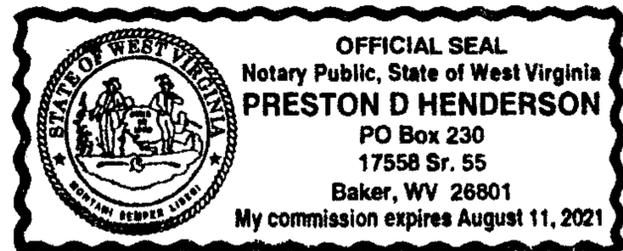
STATE OF West Virginia  
COUNTY OF Hardy

I certify that the following person appeared before me this day acknowledging to me that he signed the foregoing document: **ROBERT ARTHUR ERBER**, Manager of Erber LLC, a North Carolina limited liability company.

WITNESS my hand and notarial stamp or seal, this the 30th day of May, 2018, 2018.

Preston D Henderson  
Official Signature of Notary Public

(NOTARIAL SEAL)  
My commission expires: August 11, 2021





SPECIAL WARRANTY DEED

---

**Exhibit "A"**

Being all that parcel of land located in Chapel Hill Township, Orange County, North Carolina, and being more particularly described as follows:

BEGINNING at an existing concrete monument lying on the northeast right-of-way of Ramp 'B' of westbound I-40 (a variable width public right-of-way) NCDOT project #8.1457902, as shown on Plat Book 1, Pages 84 and 85 and Plat Book 2, Page 112, Orange County Register of Deeds and having a NC Grid Coordinates (NAD 83) of N: 809,042.88', E: 1,981,079.58'; thence with the northeast right-of-way of Ramp 'B', North 69°53'48" West a distance of 199.97 feet to an existing concrete monument; thence North 58°26'27" West a distance of 152.49 feet to a calculated point; thence North 69°06'53" West a distance of 21.37 feet to an existing concrete monument (disturbed); thence along a spiral curve to the right, having a chord bearing and distance of North 69°04'40" West, 113.20 feet to a calculated point; thence along a curve to the right a radius of 1,527.02 feet, with an arc length of 660.97 feet, and a chord bearing and distance of North 55°16'56" West, 655.82 feet to a calculated point; thence along a spiral curve to the right, having a bearing and distance of North 42°37'41" West, 97.58 feet to an existing concrete monument; thence along a curve to the right a radius of 3,662.72 feet, with an arc length of 252.41 feet, and a chord bearing and distance of North 38°34'38" West, 252.36 feet to an existing concrete monument marking the southwest corner of lands owned by now or formerly Robert W. Hogan (Deed Book 1710, Page 352 and Plat Book 80, Page 54, Orange County Register of Deeds); thence with the southern line of Hogan, North 75°46'48" East a distance of 660.77 feet to an existing iron pipe marking the southwest corner of lands owned by now or formerly Fuqua Parks Timber and Development Company, LLC (Deed Book 4642, Page 423, Orange County Register of Deeds); thence with the southern line of Fuqua Parks Timber and Development Company, LLC, North 75°46'48" East a distance of 377.20 feet to an iron pipe set along the western right-of-way of NC Highway 86 (a 120' public right-of-way); thence with the western right-of-way of NC Highway 86, South 13°51'20" East a distance of 572.81 feet to a calculated corner (beginning with Controlled Access point); thence continuing South 13°51'20" East a distance of 395.21 feet to an iron pipe set; thence along a spiral curve to the right, having a bearing and distance of South 13°51'24" East a distance of 6.32 feet to a calculated point; thence South 08°13'55" East a distance of 99.45 feet to a calculated point; thence South 43°50'51" West a distance of 68.98 feet to the point of Beginning, containing an area of 728,318 square feet or 16.72 acres, more or less.

This is the same land conveyed to C.O. Hogan in Deed Book 80, P. 584, Orange County Registry, and devised by the said Charlie Oscar Hogan to Jean Hogan Cox, described in his will as "Charlie O. Hogan place and consisting of about fifty-five (55) acres." See 69E 84, Orange County Clerk of Court Office. LESS AND EXCEPT those parcels of land previously conveyed in the deeds of record at Deed Book 464, Page 566, Deed Book 1593, Page 580, and Deed Book 6373, Page 61, Orange County Registry.



**PUBLIC WORKS DEPARTMENT  
STORMWATER MANAGEMENT DIVISION**

405 Martin Luther King, Jr. Blvd.  
Chapel Hill, NC 27514-5705  
Telephone (919) 969-7246  
Fax (919) 969-7276  
[www.townofchapelhill.org](http://www.townofchapelhill.org)

March 16, 2020

Mr. Scott Morris  
Morris Commercial, Inc.  
194 Finley Golf Course Road, Suite 102  
Chapel Hill, NC 27517  
[smorris@morriscommercial.com](mailto:smorris@morriscommercial.com)

**RE: Stream Determination for 2200 Eubanks Road, Chapel Hill, NC  
PIN 9870-99-7083**

Dear Mr. Morris:

As requested, the Town Public Works Department has performed a stream determination for the property identified on the attached forms. This determination indicates whether different types of streams (perennial, intermittent, and/or ephemeral) or perennial waterbodies are present on the property in question or on nearby properties. These streams and their classifications are shown on the accompanying map. Stream segments regulated by the Town's Jordan Lake Watershed Riparian Buffer regulations are highlighted. **Locations of all features on the map are approximate and must be field surveyed for precise location.**

This stream determination information is used to determine the location and extent of the Resource Conservation District (RCD) and Jordan Lake Watershed Riparian Buffers. Specific land use regulations and restrictions apply within the boundaries of these protected areas. If you are considering any kind of work on this property, including clearing vegetation, paving, grading, or building, please consult with the Town Planning Department to determine the possible extent of the Resource Conservation District (RCD) and Jordan Lake Watershed Riparian Buffer on this property and the applicable corresponding regulations.

This stream determination will remain in effect for five years from the date of the site visit, after which a new stream determination with site visit will be required.

In accordance with the Town's procedures, you may appeal this administrative decision to the Town Manager. If you wish to do so, you must file your written appeal accompanied by any materials you believe support your appeal, within **30 days** of receipt of this letter.

If you have questions regarding stream determinations, please contact me at (919) 969-7202 or [aweakley@townofchapelhill.org](mailto:aweakley@townofchapelhill.org). If you have questions regarding the Town's Resource Conservation District (RCD) or the Jordan Watershed Riparian Buffer regulations, please contact the Planning Department at (919) 968-2728, or view information online at: <https://www.townofchapelhill.org/town-hall/departments-services/public-works/stormwater-management/construction-stormwater-regulations>.

Regards,

A handwritten signature in black ink that reads "Allison Schwarz Weakley".

Allison Schwarz Weakley  
Stormwater Analyst



**PUBLIC WORKS DEPARTMENT  
STORMWATER MANAGEMENT DIVISION**

405 Martin Luther King, Jr. Blvd.

Chapel Hill, NC 27514-5705

Telephone (919) 969-7246

Fax (919) 969-7276

www.townofchapelhill.org

## STREAM DETERMINATION SITE VISIT RESULTS

Property Information	
Parcel ID Number (PIN)	Address / Location Description
9870-99-7083	2200 Eubanks Road, Chapel Hill

These are the results of a site visit to the properties listed above for a stream determination conducted on 3/2/2020 & 3/9/2020 by Town Staff:

No perennial, intermittent, or ephemeral streams or perennial waterbodies were identified on or near the property(ies) in question.

Perennial, intermittent, or ephemeral streams, or perennial waterbodies, were identified on or near the property(ies) in question and shown on the attached map(s).

**A map showing water features, their Town flow classifications, presence of Jordan Watershed Riparian Buffers, and their approximate locations is attached. Origins or breakpoints that have been flagged in the field are marked on the map. Stream classification forms and additional site visit notes and maps are also attached.**

Other conditions exist which may affect the location of the Resource Conservation District or Jordan Watershed Riparian Buffer:

FEMA floodzone is mapped in the area. Precise location of the Base Flood Elevation and associated Resource Conservation District must be determined by a field survey commissioned by the owner or a representative.

Segments of perennial or intermittent stream are piped in the area, as shown on the map. These segments do not have an associated Jordan Watershed Riparian Buffer.

Possible Jurisdictional Wetlands have been identified in the area. A formal review by a professional certified in Jurisdictional Wetland Delineation is recommended.

*Allison Weasley*

Town Staff Signature

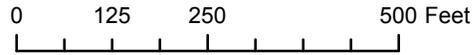
3/16/2020

Date

# Stream Determination Area Map

Address: 2200 Eubanks Road, Chapel Hill, NC

Parcel ID: 9870-99-7083



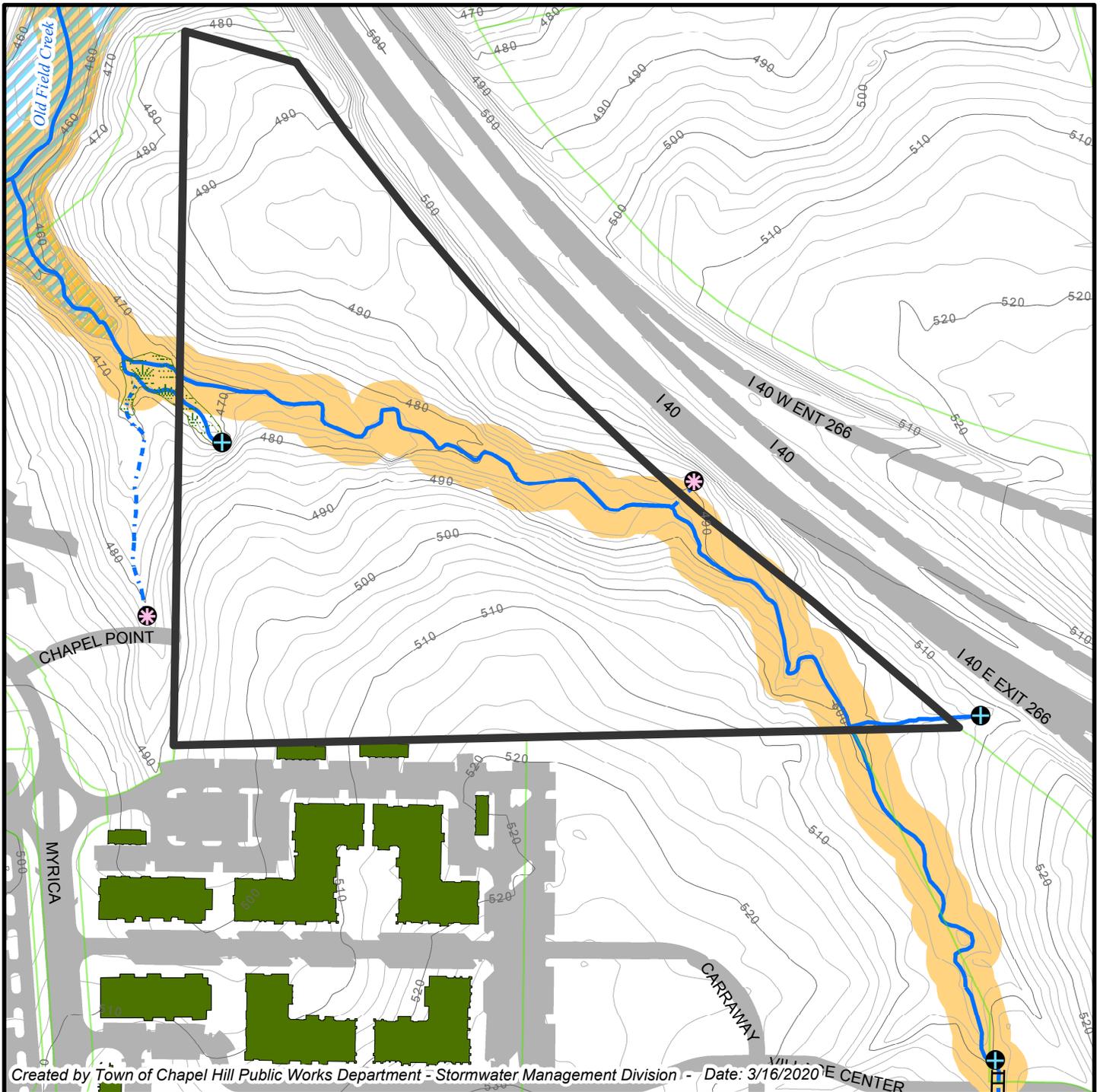
1 inch = 250 feet

- ⋯ Unclassified Stream
- - - Ephemeral Stream
- · — · Intermittent Stream
- Perennial Stream
- Culverts
- 2-foot Contours
- 10-foot Contours
- Buildings
- Parcels
- Approximate Jordan Buffer
- Possible Jurisdictional Wetlands
- Subject Property

### Flood Zones

- 500-year floodplain
- 100-year floodplain
- Ephemeral Breakpoint
- Intermittent Breakpoint
- Perennial Breakpoint

**Stream locations are approximate and must be verified by survey.  
Buffers are measured from top of bank. RCD buffers may apply.  
Please contact the Town of Chapel Hill Planning Department to verify.**



# USGS 24K Topographic / County Soil Survey Maps

 Subject Property

**Address:** 2200 Eubanks Road, Chapel Hill, NC

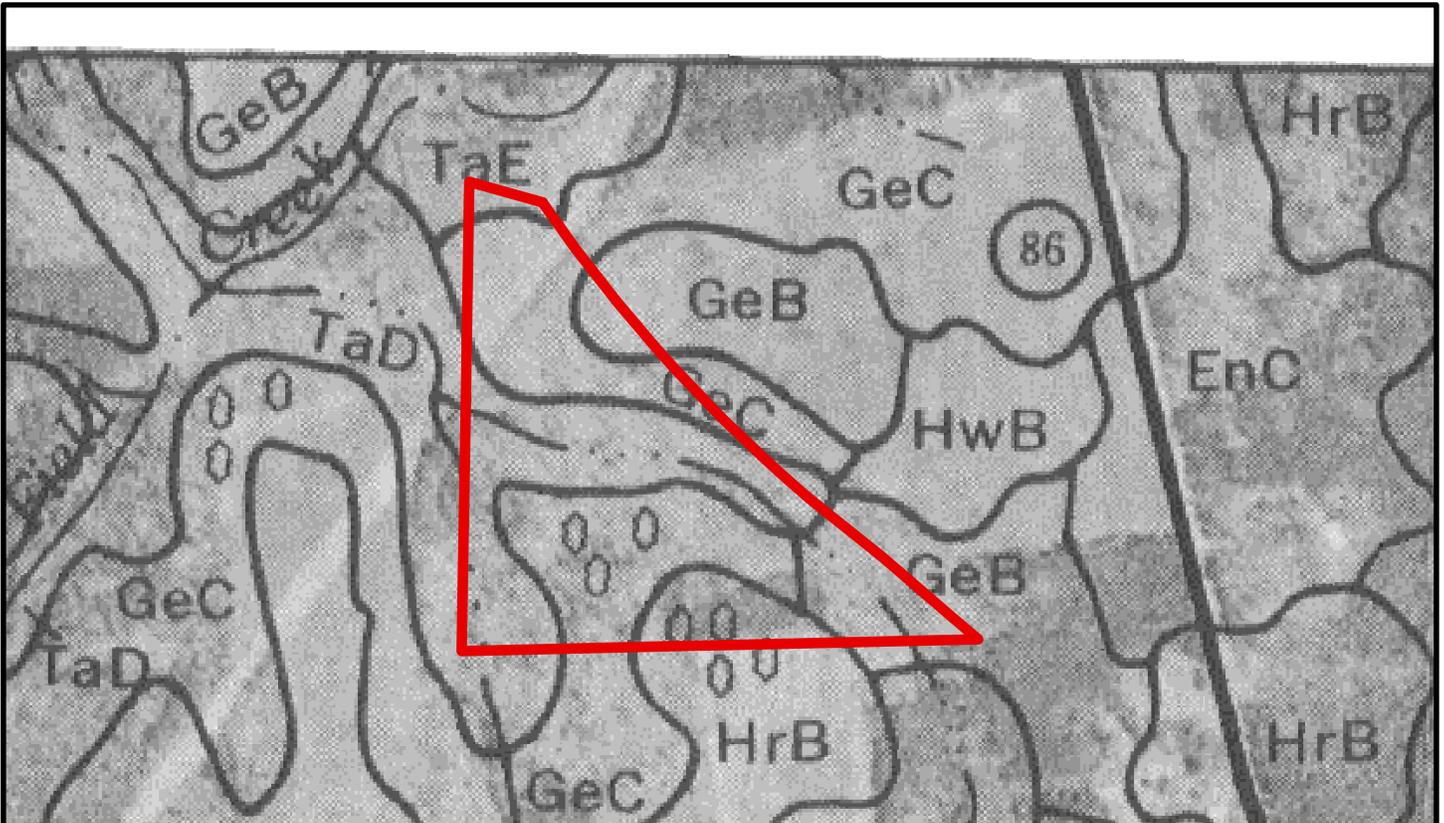
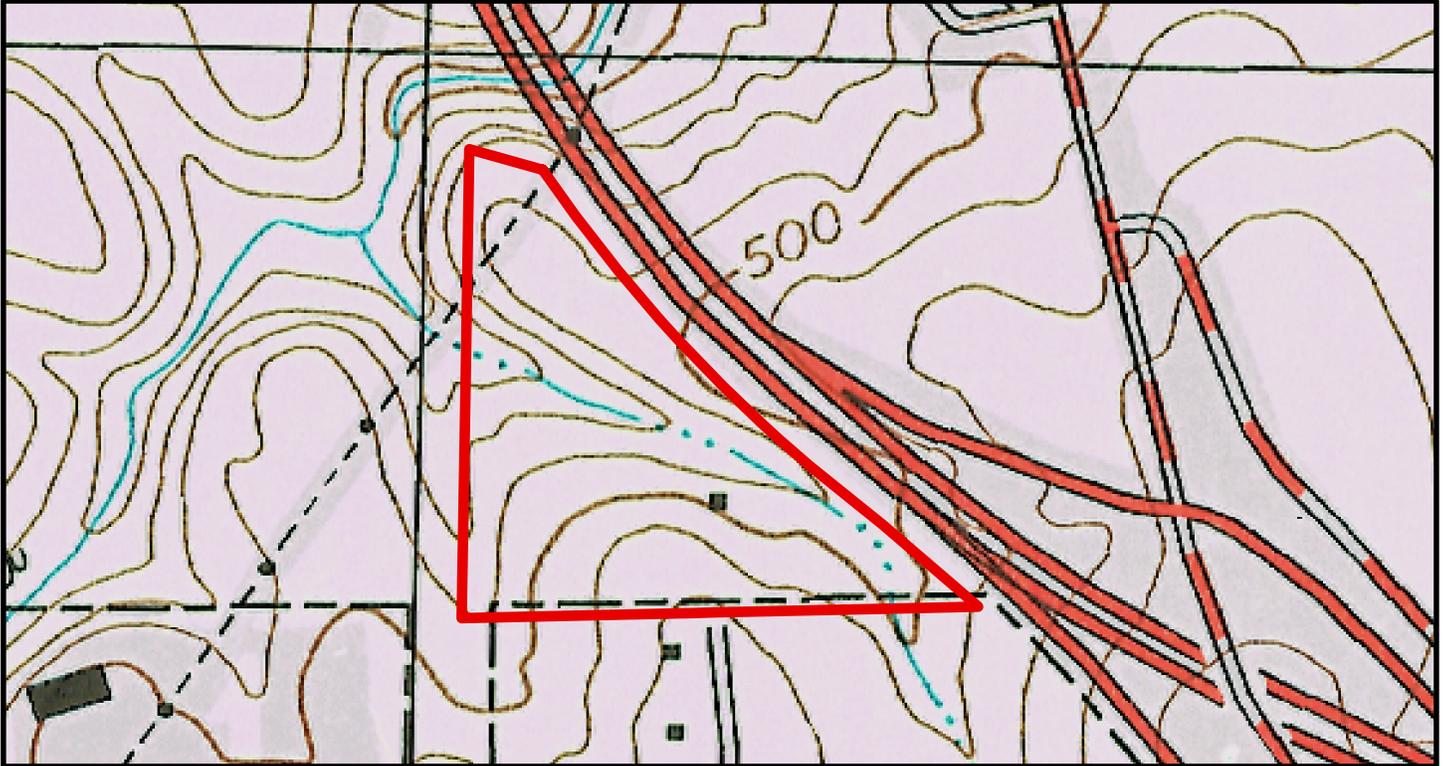
0 150 300 450 600 Feet

**Parcel ID:** 9870-99-7083



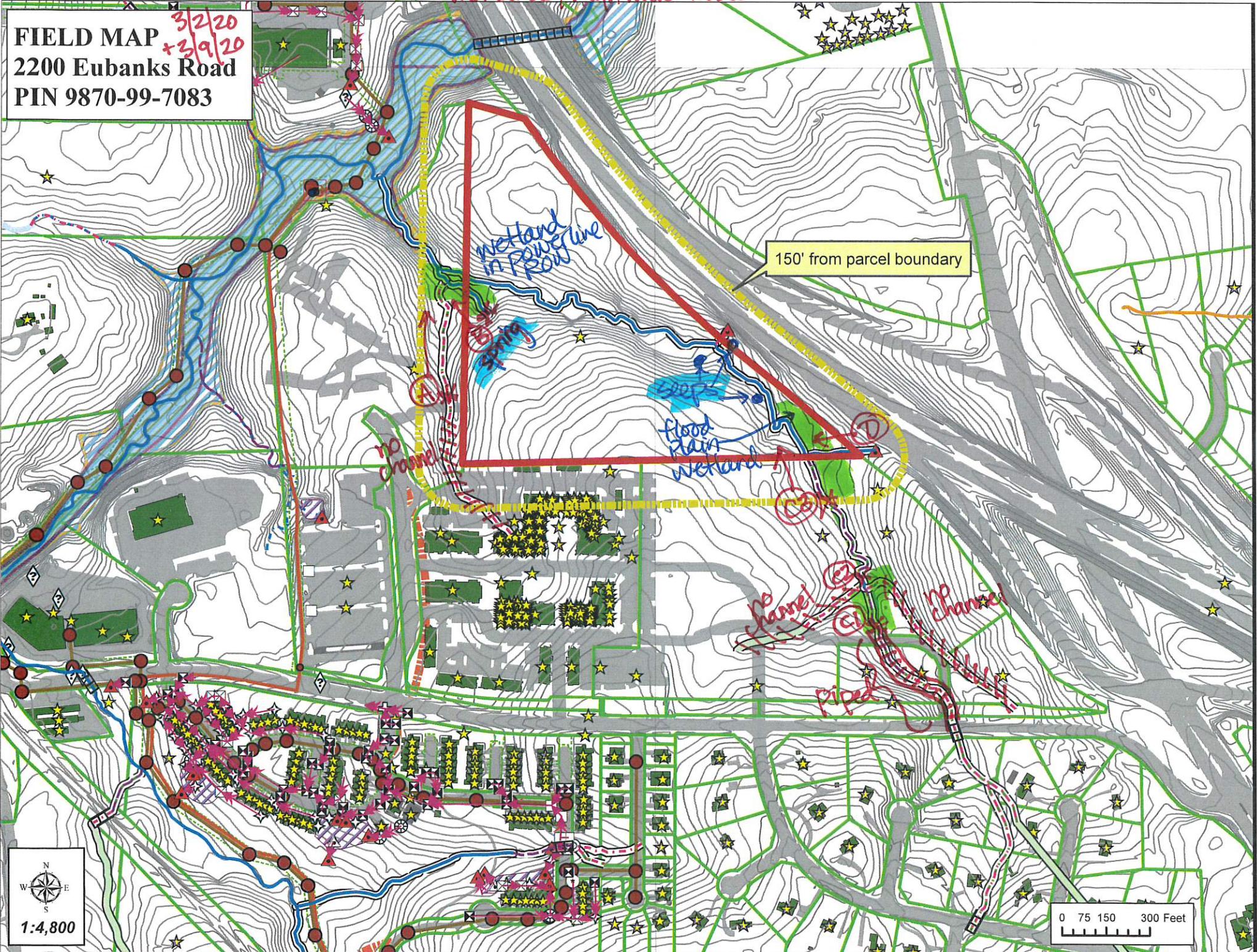
1 inch = 500 feet

Created by Town of Chapel Hill Public Works Department - Stormwater Management Division- 2/25/2020



= wetlands / high water table

FIELD MAP  
2200 Eubanks Road  
PIN 9870-99-7083  
3/2/20  
+3/9/20



wetland in power line ROW

150' from parcel boundary

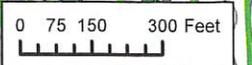
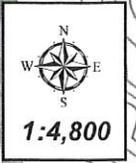
no channel

flood plain wetland

no channel

no channel

pipelined





202003021454

NC DWQ Stream Identification Form Version 4.11

Feature A

Date: 3/2/2020	Project/Site: <sup>2200</sup> Eubanks	Latitude: 35.972419
Evaluator: Weakley & Salat	County: Orange	Longitude: -79.069945
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 11.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 7.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	(1)	2	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate <i>bed rock boulders gravel</i>	0	(1)	2	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 1)

12. Presence of Baseflow	(0)	1	2	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	1	0.5	(0)
15. Sediment on plants or debris	0	(0.5) →	1	1.5
16. Organic debris lines or piles	0	(0.5) →	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 3)

18. Fibrous roots in streambed	3	2	(1)	0
19. Rooted upland plants in streambed	3	(2)	1	0
20. Macroinvertebrates (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch: Feature begins @ outfall of erosion control fence north of Chapel Point Dr. - see field map. Lots of silt deposition from upslope construction. ~~Water~~ flows into wetland in powerline ROW.

202003021505

NC DWQ Stream Identification Form Version 4.11

Feature (B)

Date: 3/2/2020	Project/Site: 2200 Eubanks	Latitude: 35.9732
Evaluator: Weakley & Salat	County: Orange	Longitude: 79.0695
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 30.25	Stream Determination (circle one) Ephemeral Intermittent (Perennial)	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 10)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate (lots of silt)	0	(1)	2	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	0.5	1	(1.5)
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

12. Presence of Baseflow (active flow)	0	1	(2)	3
13. Iron oxidizing bacteria (throughout)	0	1	2	(3)
14. Leaf litter	1.5	1	0.5	(0)
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 11.5)

18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	(1)	(2)	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	(0.5)	1	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae (Sambucus)	0	0.5	1	(1.5)
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

<sup>a</sup> perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Tipula, larval salamanders (1), crayfish, isopods, amphipods, Phantom crane flies (1)

Sketch: Feature begins @ prominent grade control / Spring & ends @ confluence w/ Feature (C).  
Upper reach wide, ponded - active flow from spring & throughout ponded reach.

\* Perennial indicators: Psychopteraidae, Tipulidae, larval salamanders per DWQ



202003021454

NC DWQ Stream Identification Form Version 4.11

Feature A

Date: 3/2/2020	Project/Site: <sup>2200</sup> Eubanks	Latitude: 35.972419
Evaluator: Weakley & Salat	County: Orange	Longitude: -79.069945
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 11.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 7.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	(1)	2	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate <i>bed rock boulders gravel</i>	0	(1)	2	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 1)

12. Presence of Baseflow	(0)	1	2	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	1	0.5	(0)
15. Sediment on plants or debris	0	(0.5) →	1	1.5
16. Organic debris lines or piles	0	(0.5) →	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 3)

18. Fibrous roots in streambed	3	2	(1)	0
19. Rooted upland plants in streambed	3	(2)	1	0
20. Macroinvertebrates (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch: Feature begins @ outfall of erosion control fence north of Chapel Point Dr. - see field map. Lots of silt deposition from upslope construction. ~~Water~~ flows into wetland in powerline ROW.

202003021505

NC DWQ Stream Identification Form Version 4.11

Feature (B)

Date: 3/2/2020	Project/Site: 2200 Eubanks	Latitude: 35.9732
Evaluator: Weakley & Salat	County: Orange	Longitude: 79.0695
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 30.25	Stream Determination (circle one) Ephemeral Intermittent (Perennial)	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 10)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate (lots of silt)	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

12. Presence of Baseflow (active flow)	0	1	2	3
13. Iron oxidizing bacteria (throughout)	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 11.5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae (Sambucus)	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

<sup>a</sup> perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Tipula, larval salamanders (1), crayfish, isopods, amphipods, Phantom crane flies (1)

Sketch: Feature begins @ prominent grade control / Spring & ends @ confluence w/ Feature (C). Upper reach wide, ponded - active flow from spring & throughout ponded reach.

\* Perennial indicators: Pteronarcys, Tipulidae, larval salamanders per DWQ



202003091448

NC DWQ Stream Identification Form Version 4.11

Feature (C2)

Date: 3/9/2020	Project/Site: 2200 Eubanks	Latitude: 35.9707
Evaluator: Weakley & Salat	County: Orange	Longitude: -79.0652
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 35.5	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 14)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	(2) →	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1) →	2	3
4. Particle size of stream substrate gravel, sand, silt	0	(1) →	2	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10)

12. Presence of Baseflow active flow thru riffles	0	1	(2)	3
13. Iron oxidizing bacteria	0	1	(2) →	3
14. Leaf litter	1.5	(1) →	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 11.5)

18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	(3)
21. Aquatic Mollusks	0	(1)	2	3
22. Fish	(0)	0.5	1	(1.5)
23. Crayfish	0	0.5	1	(1.5)
24. Amphibians	(0)	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed Juncus, Typha on banks	FACW = 0.75; OBL = 1.5 Other = 0			

<sup>a</sup> perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: crayfish, dragonfly nymphs, damselfly nymphs, limpet  
(HH) (III) Gomphidae (HHI) (I)

Sketch: stonefly (I) Nemouridae gill tufts on neck  
alderflies (HH) Sialidae  
midges abundant, Neophylax case  
predaceous diving beetle

Feature begins @ confluence of former stream channel (see field map) - flagged.

\* Perennial indicators: Sialidae, Gomphidae, Calopterygidae, Arctocoleidae  
per DWQ

202003091502

NC DWQ Stream Identification Form Version 4.11

Feature (C3)

Date: 3/9/2020	Project/Site: <sup>2200</sup> Eubanks	Latitude: 35.9715
Evaluator: Weakley & Salat	County: Orange	Longitude: -79.0657
Total Points: 38.5 <small>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30^*</math></small>	Stream Determination (circle one) Ephemeral Intermittent <b>Perennial</b>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 17.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	(2) →	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2) →	3
4. Particle size of stream substrate <i>gravel, cobble</i>	0	1	2	(3)
5. Active/relict floodplain <i>sand, silt</i>	0	1	(2)	3
6. Depositional bars or benches <i>bedrock</i>	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	0.5	(1) →	1.5
10. Natural valley	0	(0.5) →	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 5.5+3)

12. Presence of Baseflow	0	1	(2) →	3
13. Iron oxidizing bacteria	0	(1) →	2	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 12.5)

18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	(2) →	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians <i>"fish spawn"</i>	0	0.5	(1)	1.5
25. Algae <i>filamentous</i>	0	0.5	(1)	1.5
26. Wetland plants in streambed <i>Golden Club</i>	0	0.5	(1)	1.5
*perennial streams may also be identified using other methods. See p. 35 of manual.				

FACW = 0.75; (OBL = 1.5) Other = 0

Notes: larval salamanders, crayfish, Tipula

Sketch: caddisfly, long-toed water beetle (1), Hydropsychid-1, Dryopidae, midges (Chironomidae), rat tailed maggot w/out tail?

Feature begins @ prominent grade control, upstream from rip rap stormwater outfall (flagged) - see field map.

\*Perennial indicators: Hydropsychidae, Dryopidae, larval salamanders, Tipulidae per DWQ

202003091549

NC DWQ Stream Identification Form Version 4.11

Feature (D)

Date: 3/9/2020	Project/Site: 2200 Eubanks	Latitude: 35.9719
Evaluator: Weakley & Salat	County: Orange	Longitude: -79.0652
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 34	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 4.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	1	(2) →	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2) →	3
4. Particle size of stream substrate <i>boulders, gravel, cobble, sand, silt</i>	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel ?	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7+3)

12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	1	(2)	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 9.5)

18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	1	(1.5)
24. Amphibians	(0)	0.5	1	1.5
25. Algae	0	0.5	(1) →	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: crayfish, aquatic worms, amphipods, isopods, stonefly  
(1) (1) abundant abundant 2 tail

Sketch: Feature begins @ pipe outfall & ends @ confluence w/ Feature (C)

(1)  
Tipula  
(1)

\* Perennial indicators : Tipulidae, per DWR

202003091502

NC DWQ Stream Identification Form Version 4.11

Feature (C3)

Date: 3/9/2020	Project/Site: <sup>2200</sup> Eubanks	Latitude: 35.9715
Evaluator: Weakley & Salat	County: Orange	Longitude: -79.0657
Total Points: 38.5 <small>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</small>	Stream Determination (circle one) Ephemeral Intermittent <b>Perennial</b>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 17.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2 →	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2 →	3
4. Particle size of stream substrate <i>gravel, cobble</i>	0	1	2	3
5. Active/relict floodplain <i>sand, silt</i>	0	1	2	3
6. Depositional bars or benches <i>bedrock</i>	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1 →	1.5
10. Natural valley	0	0.5 →	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 5.5+3)

12. Presence of Baseflow	0	1	2 →	3
13. Iron oxidizing bacteria	0	1 →	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 12.5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2 →	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians <i>"fish spawn"</i>	0	0.5	1	1.5
25. Algae <i>filamentous</i>	0	0.5	1	1.5
26. Wetland plants in streambed <i>Golden Club</i>	0	0.5	1	1.5
*perennial streams may also be identified using other methods. See p. 35 of manual.				

FACW = 0.75; OBL = 1.5 Other = 0

Notes: larval salamanders, crayfish, Tipula

Sketch: caddisfly, long-toed water beetle (1), Hydropsychid-1, Dryopidae, midges (Chironomidae), rat tailed maggot w/out tail?

Feature begins @ prominent grade control, upstream from rip rap stormwater outfall (flagged) - see field map.

\*Perennial indicators: Hydropsychidae, Dryopidae, larval salamanders, Tipulidae per DWQ

202003091549

NC DWQ Stream Identification Form Version 4.11

Feature (D)

Date: 3/9/2020	Project/Site: 2200 Eubanks	Latitude: 35.9719
Evaluator: Weakley & Salat	County: Orange	Longitude: -79.0652
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 34	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 4.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuity of channel bed and bank	0	1	(2) →	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2) →	3
4. Particle size of stream substrate <i>boulders, gravel, cobble, sand, silt</i>	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7+3)

12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	1	(2)	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 9.5)

18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	1	(1.5)
24. Amphibians	(0)	0.5	1	1.5
25. Algae	0	0.5	(1) →	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: crayfish, aquatic worms, amphipods, isopods, stonefly  
(1) abundant, abundant, 2 tail

Sketch: Feature begins @ pipe outfall & ends @ confluence w/ Feature (C)

(1)  
Tipula  
(1)

\* Perennial indicators: Tipulidae, per DWR



PUBLIC WORKS DEPARTMENT
STORMWATER MANAGEMENT DIVISION

405 Martin Luther King, Jr. Blvd.
Chapel Hill, NC 27514-5705
Telephone (919) 969-7246
Fax (919) 969-7276
www.townofchapelhill.org

REQUEST FOR STREAM DETERMINATION

Stream determinations provide information used to determine whether the Town's Resource Conservation District (RCD) or Jordan Watershed Riparian Buffer Protection regulations apply to a property. Town staff will typically conduct a field visit to classify streams on the property(ies) indicated below within two weeks of a request, depending on weather conditions, staff availability, and scope of the request. Please note that stream determinations cannot be conducted within 48 hours of a rain event. There is no fee for stream determinations conducted by Town staff.

A stream determination report indicates the results of a stream classification. Stream classifications expire after five years. If a stream determination has been completed on or near the property(ies) listed below within the last five years, a site visit may not be required unless local hydrology has changed significantly or the stream classification has expired. If a site visit is not required, the stream determination will be based on a records review.

Requests may be emailed (aweakley@townofchapelhill.org), faxed, dropped off at Town Hall or the Stormwater Office, or mailed to the above address in care of the "Stormwater Analyst."

Requestor's Name: Scott Morris

Mailing Address: 194 Finley Golf Course Rd., Suite 102

City, State, ZIP: Chapel Hill, NC 27517

Phone / FAX / Email: 919-942-1141 smorris@morriscommercial.com

Check method(s) for report to be sent: [ ] US Mail [X] Email [ ] FAX [ ] Call for pickup

Signature of property owner or designated legal agent granting permission to Town Staff to enter the property(ies) indicated below for purposes of a Stream Determination:

[Handwritten Signature] 2/18/2020
(Signature) (Date)

Owner Name(s): Scott Morris (Agent & Contract Purchaser)

(Please print)

Company Name (if applicable): Morris Commercial Inc. (Agent) Optimal Ventures, LLC (Contract Purchaser)

Table with 2 columns: Parcel ID Number (PIN), Address / Location Description. Row 1: 9870 99 7083, triangular property north of Carraway Village facing I-40 and accessed by Chapel Point Road.

Where the total area of the property(ies) to visit is over 3 acres, please attach an as-built drawing or a topographic map with current landmarks.



PUBLIC WORKS DEPARTMENT  
 STORMWATER MANAGEMENT DIVISION  
 405 Martin Luther King, Jr. Blvd.  
 Chapel Hill, NC 27514-5705  
 Telephone (919) 969-7246  
 Fax (919) 969-7276  
 www.townofchapelhill.org

**Stream Determination Request  
 AUTHORIZED AGENT FOR LEGAL REPRESENTATION FORM**

**PROPERTY LEGAL DESCRIPTION:**

PARCEL ID (PIN) 9870 99 7083

STREET ADDRESS: triangular property north of Carraway Village facing I-40 and accessed by Chapel Point Road.

Please print:

**Property Owner:** Erber, LLC (Mr. Robert A. Erber)

**Property Owner:** \_\_\_\_\_

The undersigned, owner(s) of the above described property, do hereby authorize

Scott Morris, of Morris Commercial & Optimal Ventures, LLC  
 (Contractor/Agent) (Name of consulting firm if applicable)

to request a stream determination on this property and to act on my/our behalf and take all actions, I/we could have taken if present, necessary for the processing, issuance and acceptance of the stream determination for this property.

**Property Owner's Address** (if different than property above):

3055 BIG RIDGE RD., BAKER, WV 26801

Owner Telephone: 304-897-6610 Email: \_\_\_\_\_

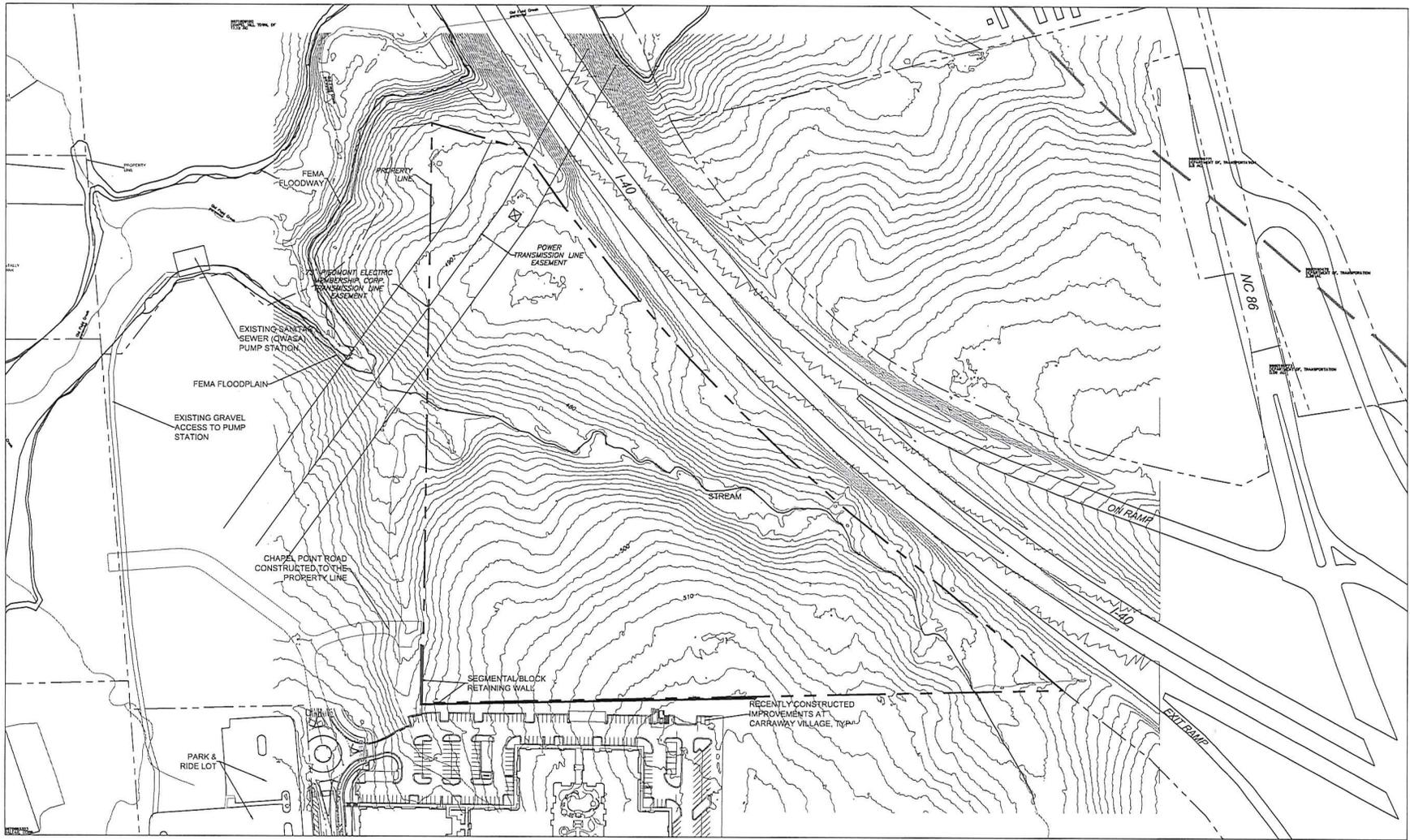
We hereby certify the above information submitted is true and accurate to the best of our knowledge.

\_\_\_\_\_  
 Owner Authorized Signature Date

\_\_\_\_\_  
 Owner Authorized Signature Date

*Scott Morris*  
 Contractor/Agent Authorized Signature Date  
2/18/2020

Please return form by email ([aweakley@townofchapelhill.org](mailto:aweakley@townofchapelhill.org)), fax, or mail to the above address in care of the "Stormwater Analyst." The form may also be dropped off at the Stormwater Management office at 208 N. Columbia Street, Chapel Hill, NC. For questions, please call (919) 969-RAIN.



NORTH  
 EXISTING CONDITIONS PLAN  
 1"=100'





REALTOR® North Carolina Association of REALTORS®

AGREEMENT FOR PURCHASE AND SALE OF REAL PROPERTY

THIS AGREEMENT, including any and all addenda attached hereto ("Agreement"), is by and between

Optimal Ventures, LLC or assigns

a(n) limited liability corporation ("Buyer"), and  
(individual or State of formation and type of entity)

Erber, LLC

a(n) Limited Liability Corporation ("Seller").  
(individual or State of formation and type of entity)

FOR AND IN CONSIDERATION OF THE MUTUAL PROMISES SET FORTH HEREIN AND OTHER GOOD AND VALUABLE CONSIDERATION, THE RECEIPT AND SUFFICIENCY OF WHICH ARE HEREBY ACKNOWLEDGED, THE PARTIES HERETO AGREE AS FOLLOWS:

**Section 1. Terms and Definitions:** The terms listed below shall have the respective meaning given them as set forth adjacent to each term.

(a) **"Property":** (Address) W/O HWY 86

Plat Reference: Lot(s) \_\_\_\_\_, Block or Section \_\_\_\_\_, as shown on Plat Book or Slide  
344 at Page(s) 265, Orange County, consisting of 18.75 acres.

If this box is checked, "Property" shall mean that property described on **Exhibit A** attached hereto and incorporated herewith by reference,

(For information purposes: (i) the tax parcel number of the Property is: 9870997083 ;  
and, (ii) some or all of the Property, consisting of approximately 18.75 acres, is described in Deed Book  
344, Page No. 265, Orange County.)

together with all buildings and improvements thereon and all fixtures and appurtenances thereto and all personal property, if any, itemized on **Exhibit A**.

(b) **"Purchase Price"** shall mean the sum \_\_\_\_\_ Dollars,

*payable on the following terms:*

(i) **"Earnest Money"** shall mean \_\_\_\_\_ Dollars  
or terms as follows: \_\_\_\_\_

Upon this Agreement becoming a contract in accordance with Section 14, the Earnest Money shall be promptly deposited in escrow with Morris Commercial Trust Account (name of person/entity with whom deposited- "Escrow Agent"), to be applied as part payment of the Purchase Price of the Property at Closing, or disbursed as agreed upon under the provisions of Section 10 herein.



This form jointly approved by:  
North Carolina Bar Association  
North Carolina Association of REALTORS®, Inc.

Buyer Initials \_\_\_\_\_ Seller Initials \_\_\_\_\_

STANDARD FORM 580-T  
Revised 7/2017  
© 7/2018

ANY EARNEST MONEY DEPOSITED BY BUYER IN A TRUST ACCOUNT MAY BE PLACED IN AN INTEREST BEARING TRUST ACCOUNT, AND: (check only ONE box)

ANY INTEREST EARNED THEREON SHALL BE APPLIED AS PART PAYMENT OF THE PURCHASE PRICE OF THE PROPERTY AT CLOSING, OR DISBURSED AS AGREED UPON UNDER THE PROVISIONS OF SECTION 10 HEREIN. (Buyer's Taxpayer Identification Number is: \_\_\_\_\_ )

ANY INTEREST EARNED THEREON SHALL BELONG TO THE ACCOUNT HOLDER IN CONSIDERATION OF THE EXPENSES INCURRED BY MAINTAINING SUCH ACCOUNT AND RECORDS ASSOCIATED THEREWITH.

\$ \_\_\_\_\_ N/A (ii) **Proceeds of a new loan** in the amount of \_\_\_\_\_ Dollars for a term of \_\_\_\_\_ years, with an amortization period not to exceed \_\_\_\_\_ years, at an interest rate not to exceed \_\_\_\_\_ % per annum with mortgage loan discount points not to exceed \_\_\_\_\_ % of the loan amount, or such other terms as may be set forth on **Exhibit B**. Buyer shall pay all costs associated with any such loan.

\$ \_\_\_\_\_ N/A (iii) **Delivery of a promissory note** secured by a deed of trust, said promissory note in the amount of \_\_\_\_\_ Dollars being payable over a term of \_\_\_\_\_ years, with an amortization period of \_\_\_\_\_ years, payable in monthly installments of principal, together with accrued interest on the outstanding principal balance at the rate of \_\_\_\_\_ percent ( \_\_\_\_\_ %) per annum in the amount of \$ \_\_\_\_\_, with the first principal payment beginning on the first day of the month next succeeding the date of Closing, or such other terms as may be set forth on **Exhibit B**. At any time, the promissory note may be prepaid in whole or in part without penalty and without further interest on the amounts prepaid from the date of such prepayment. (NOTE: In the event of Buyer's subsequent default upon a promissory note and deed of trust given hereunder, Seller's remedies may be limited to foreclosure of the Property. If the deed of trust given hereunder is subordinated to senior financing, the material terms of such financing must be set forth on Exhibit B. If such senior financing is subsequently foreclosed, the Seller may have no remedy to recover under the note.)

\$ \_\_\_\_\_ N/A (iv) **Assumption** of that unpaid obligation of Seller secured by a deed of trust on the Property, such obligation having an outstanding principal balance of \$ \_\_\_\_\_ and evidenced by a note bearing interest at the rate of \_\_\_\_\_ percent ( \_\_\_\_\_ %) per annum, and a current payment amount of \$ \_\_\_\_\_.

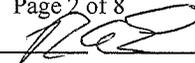
\$ \_\_\_\_\_ (v) **Cash, balance of Purchase Price**, at Closing in the amount of \_\_\_\_\_  
re Thousand

(c) **"Closing"** shall mean the date of completion of the process detailed in Section 11 of \_\_\_\_\_ or before See Addendum A or \_\_\_\_\_.

(d) **"Contract Date"** means the date this Agreement has been fully executed by both Buyer and Seller.

(e) **"Examination Period"** shall mean the period beginning on the first day after the Contract Date and extending through 5:00pm (based upon time at the locale of the Property) on \_\_\_\_\_  
90 days from Contract Date

**TIME IS OF THE ESSENCE AS TO THE EXAMINATION PERIOD.**

Buyer Initials  Seller Initials 

(f) **"Broker(s)"** shall mean: Morris Commercial, Inc. ("Listing Agency"),  
Scott Morris ("Listing Agent" - License # 281994)  
 Acting as:  Seller's Agent;  Dual Agent  
 and N/A ("Selling Agency"),  
N/A ("Selling Agent" - License # N/A)  
 Acting as:  Buyer's Agent;  Seller's (Sub) Agent;  Dual Agent

(g) **"Seller's Notice Address"** shall be as follows:  
3055 Big Ridge Rd.  
Baker, WV 26801  
 e-mail address: \_\_\_\_\_ fax number: \_\_\_\_\_  
 except as same may be changed pursuant to Section 12.

(h) **"Buyer's Notice Address"** shall be as follows:  
194 Finley Golf Course Rd., Suite 102  
Chapel Hill, NC 27517  
 e-mail address: smorris@morriscommercial.com fax number: \_\_\_\_\_  
 except as same may be changed pursuant to Section 12.

- (i) If this block is marked, additional terms of this Agreement are set forth on **Exhibit B** attached hereto and incorporated herein by reference. (Note: Under North Carolina law, real estate agents are not permitted to draft conditions or contingencies to this Agreement.)
- (j) If this block is marked, additional terms of this Agreement are set forth on the Additional Provisions Addendum (Form 581-T) attached hereto and incorporated herein by reference.

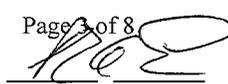
**Section 2. Sale of Property and Payment of Purchase Price:** Seller agrees to sell and Buyer agrees to buy the Property for the Purchase Price.

**Section 3. Proration of Expenses and Payment of Costs:** Seller and Buyer agree that all property taxes (on a calendar year basis), leases, rents, mortgage payments and utilities or any other assumed liabilities as detailed on attached **Exhibit B**, if any, shall be prorated as of the date of Closing. Seller shall pay for preparation of a deed and all other documents necessary to perform Seller's obligations under this Agreement, excise tax (revenue stamps), any deferred or rollback taxes, and other conveyance fees or taxes required by law, and the following:  
any other customary Seller expenses

Buyer shall pay recording costs, costs of any title search, title insurance, survey, the cost of any inspections or investigations undertaken by Buyer under this Agreement and the following:  
any other customary Buyer expenses

Each party shall pay its own attorney's fees.

**Section 4. Deliveries:** Seller agrees to use best efforts to deliver to Buyer as soon as reasonably possible after the Contract Date copies of all material information relevant to the Property in the possession of Seller, including but not limited to: title insurance policies (and copies of any documents referenced therein), surveys, soil test reports, environmental surveys or reports, site plans, civil drawings, building plans, maintenance records and copies of all presently effective warranties or service contracts related to the Property. Seller authorizes (1) any attorney presently or previously representing Seller to release and disclose any title insurance policy in such attorney's file to Buyer and both Buyer's and Seller's agents and attorneys; and (2) the Property's title insurer or its agent to release and disclose all materials in the Property's title insurer's (or title insurer's agent's) file to Buyer and both Buyer's and Seller's agents and attorneys. If Buyer does not consummate the Closing for any reason other than Seller default, then Buyer shall return to Seller all materials delivered by Seller to Buyer pursuant to this Section 4 (or Section 7, if applicable), if any, and shall, upon Seller's request, provide to Seller copies of (subject to the ownership and copyright interests of the preparer thereof) any and all studies, reports, surveys and other information relating directly to the Property prepared by or at the request of Buyer, its employees and agents, and shall deliver to Seller, upon the release of the Earnest Money, copies of all of the foregoing without any warranty or representation by Buyer as to the contents, accuracy or correctness thereof.

Buyer Initials  Seller Initials 

**Section 5. Evidence of Title:** Seller agrees to convey fee simple insurable title to the Property without exception for mechanics' liens, free and clear of all liens, encumbrances and defects of title other than: (a) zoning ordinances affecting the Property, (b) Leases (as defined in Section 7, if applicable) and (c) specific instruments on the public record at the Contract Date agreed to by Buyer (not objected to by Buyer prior to the end of the Examination Period), which specific instruments shall be enumerated in the deed referenced in Section 11 (items 5(a), 5(b) and 5(c) being collectively "Permitted Exceptions"); provided that Seller shall be required to satisfy, at or prior to Closing, any encumbrances that may be satisfied by the payment of a fixed sum of money, such as deeds of trust, mortgages or statutory liens. Seller shall not enter into or record any instrument that affects the Property (or any personal property listed on **Exhibit A**) after the Contract Date without the prior written consent of Buyer, which consent shall not be unreasonably withheld, conditioned or delayed.

**Section 6. Conditions:** This Agreement and the rights and obligations of the parties under this Agreement are hereby made expressly conditioned upon fulfillment (or waiver by Buyer, whether explicit or implied) of the following conditions:

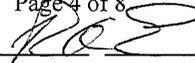
(a) **New Loan:** The Buyer must be able to obtain the loan, if any, referenced in Section 1(b)(ii). Notwithstanding, after N/A, Seller may request in writing from Buyer a copy of the commitment letter. If Buyer fails to provide Seller a copy of the commitment letter within five (5) days of receipt of Seller's request, then Seller may terminate this Agreement by written notice to Buyer at any time thereafter, provided Seller has not then received a copy of the commitment letter, and Buyer shall receive a return of Earnest Money.

(b) **Qualification for Assumption:** The obligations of Buyer under this Agreement are conditioned upon Buyer being able to assume the existing loan described above. If such assumption requires the lender's approval, Buyer agrees to use its best efforts to secure such approval and to advise Seller immediately upon receipt of the lender's decision. Approval must be granted on or before N/A. On or before this date, Buyer has the right to terminate this Agreement for failure to be able to assume the loan described above by delivering to Seller written notice of termination by the above date, *time being of the essence*. If Buyer delivers such notice, this Agreement shall be null and void and Earnest Money shall be refunded to Buyer. If Buyer fails to deliver such notice, then Buyer will be deemed to have waived this condition. Unless provided otherwise in Section 3 hereof, Buyer shall pay all fees and costs associated with any such assumption, including any assumption fee charged by the lender. At or before Closing, Seller shall assign to Buyer all interest of Seller in any current reserves or escrows held by the lender, any property management company and/or Seller, including but not limited to any tenant improvement reserves, leasing commission reserves, security deposits and operating or capital reserves for which Seller shall be credited said amounts at Closing.

(c) **Title Examination:** After the Contract Date, Buyer shall, at Buyer's expense, cause a title examination to be made of the Property before the end of the Examination Period. In the event that such title examination shall show that Seller's title is not fee simple insurable, subject only to Permitted Exceptions, then Buyer shall promptly notify Seller in writing of all such title defects and exceptions, in no case later than the end of the Examination Period, and Seller shall have thirty (30) days to cure said noticed defects. If Seller does not cure the defects or objections within thirty (30) days of notice thereof, then Buyer may terminate this Agreement and receive a return of Earnest Money (notwithstanding that the Examination Period may have expired). If Buyer is to purchase title insurance, the insuring company must be licensed to do business in the state in which the Property is located. Title to the Property must be insurable at regular rates, subject only to standard exceptions and Permitted Exceptions.

(d) **Same Condition:** If the Property is not in substantially the same condition at Closing as of the date of the offer, reasonable wear and tear excepted, then the Buyer may (i) terminate this Agreement and receive a return of the Earnest Money or (ii) proceed to Closing whereupon Buyer shall be entitled to receive, in addition to the Property, any of the Seller's insurance proceeds payable on account of the damage or destruction applicable to the Property.

(e) **Inspections:** Buyer, its agents or representatives, at Buyer's expense and at reasonable times during normal business hours, shall have the right to enter upon the Property for the purpose of inspecting, examining, conducting timber cruises, and surveying the Property; provided, however, that Buyer shall not conduct any invasive testing of any nature without the prior express written approval of Seller as to each specific invasive test intended to be conducted by Buyer. Buyer shall conduct all such on-site inspections, examinations, testing, timber cruises and surveying of the Property in a good and workmanlike manner, at Buyer's expense, shall repair any damage to the Property caused by Buyer's entry and on-site inspections and shall conduct same in a manner that does not unreasonably interfere with Seller's or any tenant's use and enjoyment of the Property. In that respect, Buyer shall make reasonable efforts to undertake on-site inspections outside of the hours Seller's or any tenant's business is open to the public. Buyer shall provide Seller or any tenant (as applicable) reasonable advance notice of and Buyer shall cause its agents or representatives and third party service providers (e.g. inspectors, surveyors, etc.) to give reasonable advance notice of any entry onto the Property. Buyer shall be obligated to observe and comply with any terms of any tenant lease which conditions access to such tenant's space at the

Buyer Initials  Seller Initials 

Property. Upon Seller's request, Buyer shall provide to Seller evidence of general liability insurance. Buyer shall also have a right to review and inspect all contracts or other agreements affecting or related directly to the Property and shall be entitled to review such books and records of Seller that relate directly to the operation and maintenance of the Property, provided, however, that Buyer shall not disclose any information regarding this Property (or any tenant therein) unless required by law and the same shall be regarded as confidential, to any person, except to its attorneys, accountants, lenders and other professional advisors, in which case Buyer shall obtain their agreement to maintain such confidentiality. Buyer assumes all responsibility for the acts of itself, its agents or representatives in exercising its rights under this Section 6(e) and agrees to indemnify and hold Seller harmless from any damages resulting therefrom. This indemnification obligation of Buyer shall survive the Closing or earlier termination of this Agreement. Except as provided in Section 6(c) above, Buyer shall have from the Contract Date through the end of the Examination Period to perform the above inspections, examinations and testing. **IF BUYER CHOOSES NOT TO PURCHASE THE PROPERTY, FOR ANY REASON OR NO REASON, AND PROVIDES WRITTEN NOTICE TO SELLER THEREOF PRIOR TO THE EXPIRATION OF THE EXAMINATION PERIOD, THEN THIS AGREEMENT SHALL TERMINATE, AND BUYER SHALL RECEIVE A RETURN OF THE EARNEST MONEY.**

**Section 7. Leases (Check one of the following, as applicable):**

If this box is checked, Seller affirmatively represents and warrants that there are no Leases (as hereinafter defined) affecting the Property.

If this box is checked, Seller discloses that there are one or more leases affecting the Property ("Leases") and the following provisions are hereby made a part of this Agreement.

(a) A list of all Leases shall be set forth on **Exhibit B**. Seller represents and warrants that as of the Contract Date, there are no other Leases, oral or written, recorded or not, nor any subleases affecting the Property, except as set forth on **Exhibit B**;

(b) Seller shall deliver copies of any Leases to Buyer pursuant to Section 4 as if the Leases were listed therein;

(c) Seller represents and warrants that as of the Contract Date there are no current defaults (or any existing situation which, with the passage of time, or the giving of notice, or both, or at the election of either landlord or tenant could constitute a default) either by Seller, as landlord, or by any tenant under any Lease ("Lease Default"). In the event there is any Lease Default as of the Contract Date, Seller agrees to provide Buyer with a detailed description of the situation in accordance with Section 4. Seller agrees not to commit a Lease Default as Landlord after the Contract Date, and agrees further to notify Buyer immediately in the event a Lease Default arises or is claimed, asserted or threatened to be asserted by either Seller or a tenant under the Lease.

(d) In addition to the conditions provided in Section 6 of this Agreement, this Agreement and the rights and obligations of the parties under this Agreement are hereby made expressly conditioned upon the assignment of Seller's interest in any Lease to Buyer in form and content acceptable to Buyer (with tenant's written consent and acknowledgement, if required under the Lease). Seller agrees to deliver an assignment of any Lease at or before Closing, with any security deposits held by Seller under any Leases to be transferred or credited to Buyer at or before Closing. The assignment shall provide: (i) that Seller shall defend, indemnify and hold Buyer harmless from claims, losses, damages and liabilities (including, without limitation, court costs and attorneys' fees) asserted against or incurred by Buyer which are caused by or the result of any default by Seller under any Lease prior to the date of Closing, and (ii) that Buyer shall defend, indemnify and hold Seller harmless from claims, losses, damages and liabilities (including, without limitation, court costs and attorneys' fees) asserted against or incurred by Seller which are caused by or the result of any default by Buyer under any Lease after the date of Closing.

(e) Seller also agrees to execute and deliver (and work diligently to obtain any tenant signatures necessary for same) any estoppel certificates and subordination, nondisturbance and attornment agreements in such form as Buyer may reasonably request.

**Section 8. Environmental:** Seller represents and warrants that it has no actual knowledge of the presence or disposal, except as in accordance with applicable law, within the buildings or on the Property of hazardous or toxic waste or substances, which are defined as those substances, materials, and wastes, including, but not limited to, those substances, materials and wastes listed in the United States Department of Transportation Hazardous Materials Table (49 CFR Part 172.101) or by the Environmental Protection Agency as hazardous substances (40 CFR Part 302.4) and amendments thereto, or such substances, materials and wastes, which are or become regulated under any applicable local, state or federal law, including, without limitation, any material, waste or substance which is (i) petroleum, (ii) asbestos, (iii) polychlorinated biphenyls, (iv) designated as a Hazardous Substance pursuant to Section 311 of the Clean Water Act of 1977 (33 U.S.C. §1321) or listed pursuant to Section 307 of the Clean Water Act of 1977 (33 U.S.C. §1317), (v) defined as a hazardous waste pursuant to Section 1004 of the Resource Conservation and Recovery Act of 1976 (42 U.S.C. §6903) or (vi) defined as a hazardous substance pursuant to Section 101 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. §9601). Seller has no actual knowledge of any contamination of the Property from such substances as may have been disposed of or stored on neighboring tracts.

Buyer Initials



Seller Initials

Page 5 of 8  


**STANDARD FORM 580-T**  
**Revised 7/2017**

© 7/2018

Optimal Ventures,

**Section 9. Risk of Loss/Damage/Repair:** Until Closing, the risk of loss or damage to the Property, except as otherwise provided herein, shall be borne by Seller. Except as to maintaining the Property in its same condition, Seller shall have no responsibility for the repair of the Property, including any improvements, unless the parties hereto agree in writing.

**Section 10. Earnest Money Disbursement:** In the event that any condition hereto is not satisfied, then the Earnest Money shall be refunded to Buyer. In the event of breach of this Agreement by Seller, the Earnest Money shall be refunded to Buyer upon Buyer's request, but such return shall not affect any other remedies available to Buyer for such breach. In the event of breach of this Agreement by Buyer, the Earnest Money Deposit shall be paid to Seller as liquidated damages and as Seller's sole and exclusive remedy for such breach, but without limiting Seller's rights under Section 6(e) or Section 22 of this Agreement. It is acknowledged by the parties that payment of the Earnest Money to Seller in the event of a breach of this Agreement by Buyer is compensatory and not punitive, such amount being a reasonable estimation of the actual loss that Seller would incur as a result of such breach. The payment of the Earnest Money to Seller shall not constitute a penalty or forfeiture but actual compensation for Seller's anticipated loss, both parties acknowledging the difficulty determining Seller's actual damages for such breach.

NOTE: In the event of a dispute between Seller and Buyer over the disposition of the Earnest Money held in escrow, a licensed real estate broker is required by state law (and Escrow Agent, if not a broker, hereby agrees) to retain the Earnest Money in the Escrow Agent's trust or escrow account until Escrow Agent has obtained a written release from the parties consenting to its disposition or until disbursement is ordered by a court of competent jurisdiction. Alternatively, if a broker or an attorney licensed to practice law in North Carolina is holding the Earnest Money, the broker or attorney may deposit the disputed monies with the appropriate clerk of court in accordance with the provisions of N.C.G.S. §93A- 12.

Seller and Buyer hereby agree and acknowledge that the Escrow Agent assumes no liability in connection with the holding of the Earnest Money pursuant hereto except for negligence or willful misconduct of Escrow Agent. Escrow Agent shall not be responsible for the validity, correctness or genuineness of any document or notice referred to under this Agreement. Seller and Buyer hereby agree to indemnify, protect, save and hold harmless Escrow Agent and its successors, assigns and agents pursuant to this Agreement, from any and all liabilities, obligations, losses, damages, claims, actions, suits, costs or expenses (including attorney fees) of whatsoever kind or nature imposed on, incurred by or asserted against Escrow Agent which in any way relate to or arise out of the execution and delivery of this Agreement and any action taken hereunder; provided, however, that Seller and Buyer shall have no such obligation to indemnify, save and hold harmless Escrow Agent for any liability incurred by, imposed upon or established against it as a result of Escrow Agent's negligence or willful misconduct.

**Section 11. Closing:** At or before Closing, Seller shall deliver to Buyer a special warranty deed unless otherwise specified on Exhibit B and other documents customarily executed or delivered by a seller in similar transactions, including without limitation, a bill of sale for any personalty listed on Exhibit A, an owner's affidavit, lien waiver forms (and such other lien related documentation as shall permit the Property to be conveyed free and clear of any claim for mechanics' liens) and a non-foreign status affidavit (pursuant to the Foreign Investment in Real Property Tax Act), and Buyer shall cause to be delivered the funds necessary to pay to Seller the Purchase Price. The Closing shall be conducted by Buyer's attorney or handled in such other manner as the parties hereto may mutually agree in writing. Possession shall be delivered at Closing, unless otherwise agreed herein. The Purchase Price and other funds to be disbursed pursuant to this Agreement shall not be disbursed until the Buyer's attorney's (or other designated settlement agent's) receipt of authorization to disburse all necessary funds.

**Section 12. Notices:** Unless otherwise provided herein, all notices and other communications which may be or are required to be given or made by any party to the other in connection herewith shall be in writing (which shall include electronic mail) and shall be deemed to have been properly given and received (i) on the date delivered in person or (ii) the date deposited in the United States mail, registered or certified, return receipt requested, to the addresses set out in Section 1(g) as to Seller and in Section 1(h) as to Buyer, or at such other addresses as specified by written notice delivered in accordance herewith, (iii) upon the sender's receipt of evidence of complete and successful transmission of electronic mail or facsimile to the electronic mail address or facsimile number, if any, provided in Section 1(g) as to Seller and in Section 1(h) as to Buyer or (iv) on the date deposited with a recognized overnight delivery service, addressed to the addresses set out in Section 1(g) as to Seller and in Section 1(h) as to Buyer, or at such other addresses as specified by written notice delivered in accordance herewith. If a notice is sent by more than one method, it will be deemed received upon the earlier of the dates of receipt pursuant to this Section.

**Section 13. Counterparts; Entire Agreement:** This Agreement may be executed in one or more counterparts, which taken together, shall constitute one and the same original document. Copies of original signature pages of this Agreement may be exchanged via facsimile or e-mail, and any such copies shall constitute originals. This Agreement constitutes the sole and entire agreement among the parties hereto and no modification of this Agreement shall be binding unless in writing and signed by all parties hereto. The invalidity of one or more provisions of this Agreement shall not affect the validity of any other provisions hereof and this Agreement shall be construed and enforced as if such invalid provisions were not included.

Buyer Initials  Seller Initials 

Page 6 of 8

**STANDARD FORM 580-T**  
Revised 7/2017  
© 7/2018  
Optimal Ventures,

**Section 14. Enforceability:** This Agreement shall become a contract when signed by both Buyer and Seller and such signing is communicated to both parties; it being expressly agreed that the notice described in Section 12 is not required for effective communication for the purposes of this Section 14. The parties acknowledge and agree that: (i) the initials lines at the bottom of each page of this Agreement are merely evidence of their having reviewed the terms of each page, and (ii) the complete execution of such initials lines shall not be a condition of the effectiveness of this Agreement. This Agreement shall be binding upon and inure to the benefit of the parties, their heirs, successors and assigns and their personal representatives.

**Section 15. Adverse Information and Compliance with Laws:**

(a) **Seller Knowledge:** Seller has no actual knowledge of (i) condemnation(s) affecting or contemplated with respect to the Property; (ii) actions, suits or proceedings pending or threatened against the Property; (iii) changes contemplated in any applicable laws, ordinances or restrictions affecting the Property; or (iv) governmental special assessments, either pending or confirmed, for sidewalk, paving, water, sewer, or other improvements on or adjoining the Property, and no pending or confirmed owners' association special assessments, except as follows (Insert "None" or the identification of any matters relating to (i) through (iv) above, if any):

None

**Note:** For purposes of this Agreement, a "confirmed" special assessment is defined as an assessment that has been approved by a governmental agency or an owners' association for the purpose(s) stated, whether or not it is fully payable at time of closing. A "pending" special assessment is defined as an assessment that is under formal consideration by a governing body. Seller shall pay all owners' association assessments and all governmental assessments confirmed as of the date of Closing, if any, and Buyer shall take title subject to all pending assessments disclosed by Seller herein, if any.

Seller represents that the regular owners' association dues, if any, are \$ N/A per N/A.

(b) **Compliance:** To Seller's actual knowledge, (i) Seller has complied with all applicable laws, ordinances, regulations, statutes, rules and restrictions pertaining to or affecting the Property; (ii) performance of the Agreement will not result in the breach of, constitute any default under or result in the imposition of any lien or encumbrance upon the Property under any agreement or other instrument to which Seller is a party or by which Seller or the Property is bound; and (iii) there are no legal actions, suits or other legal or administrative proceedings pending or threatened against the Property, and Seller is not aware of any facts which might result in any such action, suit or other proceeding.

**Section 16. Survival of Representations and Warranties:** All representations, warranties, covenants and agreements made by the parties hereto shall survive the Closing and delivery of the deed. Seller shall, at or within six (6) months after the Closing, and without further consideration, execute, acknowledge and deliver to Buyer such other documents and instruments, and take such other action as Buyer may reasonably request or as may be necessary to more effectively transfer to Buyer the Property described herein in accordance with this Agreement.

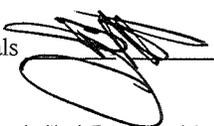
**Section 17. Applicable Law:** This Agreement shall be construed under the laws of the state in which the Property is located. This form has only been approved for use in North Carolina.

**Section 18. Assignment:** This Agreement is freely assignable unless otherwise expressly provided on Exhibit B.

**Section 19. Tax-Deferred Exchange:** In the event Buyer or Seller desires to effect a tax-deferred exchange in connection with the conveyance of the Property, Buyer and Seller agree to cooperate in effecting such exchange; provided, however, that the exchanging party shall be responsible for all additional costs associated with such exchange, and provided further, that a non-exchanging party shall not assume any additional liability with respect to such tax-deferred exchange. Seller and Buyer shall execute such additional documents, at no cost to the non-exchanging party, as shall be required to give effect to this provision.

**Section 20. Memorandum of Contract:** Upon request by either party, the parties hereto shall execute a memorandum of contract in recordable form setting forth such provisions hereof (other than the Purchase Price and other sums due) as either party may wish to incorporate. Such memorandum of contract shall contain a statement that it automatically terminates and the Property is released from any effect thereby as of a specific date to be stated in the memorandum (which specific date shall be no later than the date of Closing). The cost of recording such memorandum of contract shall be borne by the party requesting execution of same.

**Section 21. Authority:** Each signatory to this Agreement represents and warrants that he or she has full authority to sign this Agreement and such instruments as may be necessary to effectuate any transaction contemplated by this Agreement on behalf of the party for whom he or she signs and that his or her signature binds such party.

Buyer Initials  Seller Initials 

**Section 22. Brokers:** Except as expressly provided herein, Buyer and Seller agree to indemnify and hold each other harmless from any and all claims of brokers, consultants or real estate agents by, through or under the indemnifying party for fees or commissions arising out of the sale of the Property to Buyer. Buyer and Seller represent and warrant to each other that: (i) except as to the Brokers designated under Section 1(f) of this Agreement, they have not employed nor engaged any brokers, consultants or real estate agents to be involved in this transaction and (ii) that the compensation of the Brokers is established by and shall be governed by separate agreements entered into as amongst the Brokers, the Buyer and/or the Seller.

**Section 23. Attorneys Fees:** If legal proceedings are instituted to enforce any provision of this Agreement, the prevailing party in the proceeding shall be entitled to recover from the non-prevailing party reasonable attorneys fees and court costs incurred in connection with the proceeding.

**EIFS/SYNTHETIC STUCCO:** If the adjacent box is checked, Seller discloses that the Property has been clad previously (either in whole or in part) with an "exterior insulating and finishing system" commonly known as "EIFS" or "synthetic stucco". Seller makes no representations or warranties regarding such system and Buyer is advised to make its own independent determinations with respect to conditions related to or occasioned by the existence of such materials at the Property.

THE NORTH CAROLINA ASSOCIATION OF REALTORS®, INC. AND THE NORTH CAROLINA BAR ASSOCIATION MAKE NO REPRESENTATION AS TO THE LEGAL VALIDITY OR ADEQUACY OF ANY PROVISION OF THIS FORM IN ANY SPECIFIC TRANSACTION. IF YOU DO NOT UNDERSTAND THIS FORM OR FEEL THAT IT DOES NOT PROVIDE FOR YOUR LEGAL NEEDS, YOU SHOULD CONSULT A NORTH CAROLINA REAL ESTATE ATTORNEY BEFORE YOU SIGN IT.

**BUYER:**

**SELLER:**

**Individual**

**Individual**

\_\_\_\_\_  
Date: \_\_\_\_\_

\_\_\_\_\_  
Date: \_\_\_\_\_

\_\_\_\_\_  
Date: \_\_\_\_\_

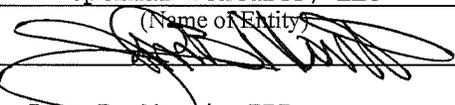
\_\_\_\_\_  
Date: \_\_\_\_\_

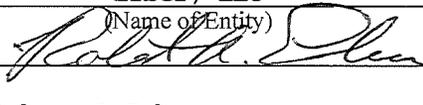
**Business Entity**

**Business Entity**

Optimal Ventures, LLC  
(Name of Entity)

Erber, LLC  
(Name of Entity)

By: 

By: 

Name: John B. Morris III

Name: Robert A Erber

Title: Manager

Title: Manager

Date: \_\_\_\_\_

Date: 4/19/19

**The undersigned hereby acknowledges receipt of the Earnest Money set forth herein and agrees to hold said Earnest Money in accordance with the terms hereof.**

Morris Commercial Inc Trust Account  
(Name of Escrow Agent)

Date: 4/19/19

By: 

## Addendum A

### 1) Cooperation Regarding Required Approvals:

Seller agrees that Buyer may apply for: (i) allocation of the necessary utilities in sufficient capacities to serve the Buyer's intended development, (ii) curb cut approvals or driveway permits from the applicable governmental authority; (iii) all governmental permits or approvals (including any permits or approvals from the Army Corps of Engineers) necessary to develop Buyer's intended development; and (iv) all necessary approvals required to construct and operate Buyer's intended development from any private architectural review authority with architectural approval rights pursuant to applicable restrictive covenants; (v) any permits or approvals required by Buyer in connection with Buyer's intended project, including rezoning, site plan, special use permit, zoning compliance permit from the town of Chapel Hill and record plat approvals and grading and building permits (collectively, "**Required Approvals**"). Seller agrees to cooperate with Buyer's efforts to obtain the Required Approvals, including, without limitation, allowing applications to be made in Seller's name. Buyer shall have full authority and discretion to make all other decisions required in connection with Required Approvals. Seller agrees to execute all reasonable and customary documents and petitions required to obtain the Required Approvals. Notwithstanding the foregoing, Seller will not be obligated to incur any material expense in connection with obtaining the Required Approvals.

Provided that this Contract is not earlier terminated, Buyer shall submit its application for a Special Use Permit no later than the sixtieth (60th) day following the end of the Inspection Period (the "**SUP Filing Deadline**"). Following such filing, Buyer shall use its commercially reasonable efforts to pursue the approval of the Special Use Permit.

### 2) Closing Date:

On or before sixty (60) days after Buyer's receipt of the Required Approvals

Seller: Erber, LLC



By: Robert A. Erber

Buyer: Optimal Ventures, LLC



By: John B. Morris III



Search Results Layers

Results List

Details

PIN	9870997083
PINSTATUS	ACTIVE
OWNER_TYPE	
INTEREST OWNERS	
PROPERTY ADDRESS	
OWNER	ERBER LLC
MAILING ADDRESS	3055 BIG RIDGE RD
CITY	BAKER
STATE	WV
ZIPCODE	26801
TOWNSHIP	CHAPEL HILL (7)
SIZE	18.75 A
CALCULATED ACRES	18.8
SUBCODE	
LEGAL_DESC	<b>W/O HWY 88</b>
RATECODE	07
LANDVALUE	670100
BLDGVALUE	0
BLOGCNT	
VALUATION	670100
TAXSTATUS	A1
FARMUSE	
USEVALUE	0
DEEDREF	6373/61
LEGALREF	
DATESOLD	10/2/2017
TAXSTAMPS	
STAMPVALUE	
YEAR BUILT	
SOFT	0
SUBDIVISION_NAME	
CONDO NAME	
SCHOOL_SYSTEM	Chapel Hill/Carrboro Schools
NBC	7003

- Documents and Prior Owners
- Building Information
- Zoning Map
- Zoning Report

Zoom To Clear Tools



Road Map Terrain



# ORANGE COUNTY NORTH CAROLINA

**Disclaimer: Orange County Tax Office provides property tax information as a public service. This information is date sensitive. Any data obtained from this site should not be construed as an official receipt or as legal proof of property ownership.**

Vehicle Property Taxes paid to the North Carolina Division of Motor Vehicles (NCDMV) are not available on this website. To obtain a vehicle property tax statement from NCDMV, call 919-814-1779 or [email NCDMV](#).

By North Carolina statute, real and personal property taxes are due annually on September 1st of the tax year and are current if paid by January 5th of the following year. Solid Waste Programs and Stormwater Fees do not constitute a lien on the real property. To pay by mail, search for and print your bill, then mail it with your check or money order to: **Orange County Tax Office, PO Box 8181, Hillsborough, NC 27278-8181.** [Contact Orange County Tax](#) to verify current payment status.

Beginning with 2016 taxes, Orange County is billing and collecting Mebane City Taxes for properties located within Orange County. For prior year taxes, contact the City of Mebane at 919-563-5901. Mebane offers a 0.5% discount for Mebane City Taxes paid by August 31st each year and is the only jurisdiction offering a discount in Orange County. Partial payments submitted by August 31st are applied proportionately between the Mebane City and Orange County taxes. Only the portion applied to Mebane City taxes is eligible for the discount.

[Bill Search](#) [Special Assessment Search](#) [Delinquent Bill Search](#) [Personal Property Search](#)

[Research Property](#) [GIS](#)

[Go To Abstract](#) [New Search](#) [Return](#)

### Property Tax Collections Bill Detail

ERBER LLC		Property Tax	Real Property		
Description:	W/O HWY 86	Bill Status:	PAID		
Location:	ORANGE COUNTY NC	Bill Flag:			
Mailing Address:	3055 BIG RIDGE RD BAKER WV 26801	Bill #:	0000083423-2018-2018-0000-00		
Parcel #:	9870997083	Old Bill #:			
Lender:		Old Account #:			
		Due Date:	9/1/2018		
		Interest Begins:	1/8/2019		
	<b>Value</b>	<b>Rate</b>	<b>Tax Districts</b>	<b>Description</b>	<b>Amount</b>
Real	\$670,100	.8504	ORANGE	Tax	\$5,698.53
Deferred	\$0				
Use	\$670,100	.2018	CH-CARR SCHOOL	Tax	\$1,352.26
Personal	\$0	.0994	NEW HOPE FIRE	Tax	\$666.08
Exempt & Exclusion	\$0				
					Interest: \$0.00
<b>Total Assessed Value</b>	<b>\$670,100</b>				<b>Total Billed: \$7,716.87</b>

Last Payment Date : 08/28/2018

**Current Due: \$0.00**

Correct if paid by

[Recalculate Interest](#)

[Pay Tax On-line](#)

#### HELPFUL HINTS FOR SEARCH BY OPTIONS:

- **OLD BILL NUMBER:** Bills received prior to September 30, 2010 have bill numbers in the OLD BILL NUMBER format. These bill numbers are 5-10 digits long and begin with the year of the bill. Enter the entire bill number like this: 2009102456
- **BILL NUMBER:** Bills received after September 30, 2010 have bill numbers in the new BILL NUMBER format. These bill numbers are in this format: **0000123456-2010-2010-0000**. Enter the **first section** of the bill number.

## Wendi Ramsden

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**From:** Wendi Ramsden  
**Sent:** Tuesday, July 28, 2020 5:39 PM  
**To:** 'Nick Parker'  
**Cc:** 'Jake Lowman'  
**Subject:** Putt-Putt Fun Center SUP submittal

Nick

Here is a link to the dropbox with the application materials. I have included the drawings, application and project narratives. I assume you don't need the SIA, TIA, art proposal etc. But if you need access to those files also please let me know and I'll send you a more extensive link.

<https://www.dropbox.com/sh/hpgj1860zgy7je0/AADAI94LZOmARvqcsS4hW1v3a?dl=0>

Please let me know if you have any trouble opening these files or if you need paper copies.  
Thank you.

Wendi

*Wendi Ramsden, RLA*

[Coulter Jewell Thames PA](#)

111 W Main Street, Durham NC 27701

Ph: 919-682-0368      Email: [wramsdn@cjtpe.com](mailto:wramsdn@cjtpe.com)

## Wendi Ramsden

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**From:** Wendi Ramsden  
**Sent:** Tuesday, July 28, 2020 5:43 PM  
**To:** Jones, DeAngelo J (djones1@ncdot.gov); cnedwards@ncdot.gov  
**Cc:** 'Jake Lowman'  
**Subject:** Putt-Putt Fun Center SUP

DeAngelo and Chuck

Here is a link to the Putt-Putt Fun Center SUP submittal. I have included the drawings, application form, and project narratives, but have not included the SIA. Craig Scheffler with HNTB is finishing up the TIA and will be submitting that to Kumar when it's done – hopefully this week. When I get a copy I'll forward that along to you as well.

I'm putting a paper copy (full size plans) of this into the mail for you tomorrow, but just in case the pdf files are useful here's the link.

<https://www.dropbox.com/sh/hpgj1860zgy7je0/AADAi94LZOmARvqcsS4hW1v3a?dl=0>

Wendi

*Wendi Ramsden, RLA*

[Coulter Jewell Thames PA](#)

111 W Main Street, Durham NC 27701

Ph: 919-682-0368 Email: [wramsdn@cjtpa.com](mailto:wramsdn@cjtpa.com)

**Coulter Jewell Thames, PA**  
**ENGINEERING LAND SURVEYING LANDSCAPE ARCHITECTURE**

**LETTER OF TRANSMITTAL**

**Date:** 7/28/2020

**To:** NC DOT

**Attn:** DeAngelo Jones  
Chuck Edwards

**Project:** Putt-Putt Fun Center  
Chapel Point Road  
Chapel Hill

**WE TRANSMIT TO YOU HEREWITH:**

<u># Copies</u>	<u>Sheet No.</u>	<u>Date</u>	<u>Description</u>
<u>1</u>	<u></u>	<u>7/27/2020</u>	<u>SUP Submittal</u>
<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>

**Remarks:**

DeAngelo

Enclosed are the drawings and narratives sent to the Town today for the SUP submittal for this project. The TIA is in process and I'll forward a copy when Kumar releases it.

Please let me know if you need anything else to complete your review.

Wendi

**Copies To:**

Jake Lowman - TOCH Planning

**From:** Wendi Ramsden  
[wramsdn@cjtpe.com](mailto:wramsdn@cjtpe.com)

Daniel A. Jewell, ASLA, RLA  
James W. Thames, PE  
Jeffrey P. Williams, PLS

**Main Office:** 111 West Main Street, Durham, NC 27701  
**Phone:** 919.682.0368      **Fax:** 919.688.5646  
**Email:** [design@cjtpe.com](mailto:design@cjtpe.com)

**PUTT-PUTT FUN CENTER  
CHAPEL HILL, NORTH CAROLINA  
ENERGY MANAGEMENT PLAN**

The current Town of Chapel Hill Energy Management Plan Section of the Special Use Permit Application list of requests are reproduced here, accompanied by its response (in italics):

- a) “Description of how project will be 20% more energy efficient than ASHRAE Standards”
  - a. *Design of the project will incorporate the following elements to will increase building energy efficiency:*
    - i. *LED Lighting*
    - ii. *Enhanced exterior wall insulation*
    - iii. *Energy recovery HVAC systems*
    - iv. *High-efficiency domestic hot water system*
    - v. *Heat-absorbing, low-emissivity or tinted window strategies*
    - vi. *Use of energy star appliances and equipment*
- b) “Description of utilization of sustainable forms of energy (Solar, Wind, Hydroelectric, and Biofuels)”
  - a. *The possible use of a solar energy source hot water system is the only current option to explore*
- c) “Participation in NC GreenPower program”
  - a. *Participation in the program will be explored through either a probable contribution or solar*
- d) “Description of how project will ensure indoor air quality, adequate access to natural lighting, and allow for proposed utilization of sustainable energy”
  - a. *A 100% outdoor air make-up system is proposed*
  - b. *The design of non-entertainment spaces for the Entertainment Building such as lobby, offices, all party rooms and potentially the kitchen will receive exterior windows for natural light*
- e) “Description of how project will maintain commitment to energy efficiency and reduced carbon footprint over time”
  - a. *Open Space: through incorporation of LEED-compliant forms of open space design practices to create exterior open space that encourages interaction with the environment, social interaction, passive recreation and physical activities*
  - b. *Light Pollution Reduction: through of LEED-compliant forms of light pollution reduction design practices to improve nighttime visibility and reduce the consequences of development for wildlife and people*
  - c. *Heat Island Reduction: through LEED-compliant forms of heat island reduction design practices involving reflective cart track pavements and roofing materials*
  - d. *Outdoor Water Use Reduction: through LEED-compliant forms of outdoor water use reduction design practices involving limiting irrigation areas and careful selection of planting materials that should thrive in years of normal rainfall*
  - e. *Indoor Water Use Reduction: through LEED-compliant forms of indoor water use reduction design practices involving specification of water-saving plumbing fixtures*
  - f. *Fundamental Refrigerant Management: through LEED-compliant forms of fundamental refrigerant management design practices to reduce stratospheric ozone depletion*
  - g. *Construction and Demolition Waste Management Planning: through LEED-compliant forms of demolition and construction waste management planning and practices*
  - h. *PBT Source Reduction—Mercury: through LEED-compliant forms of reduction of mercury-containing products and devices through product substitution*



# Putt-Putt Fun Center

Special Use Permit Application

27 July 2020

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Public Art Proposal

The proposed Putt-Putt Fun Center project proposes to offer public art near the site entry and associated with the amusement center. The project will offer recreation and entertainment facilities and is aimed at families and users of all ages. In the spirit of the project being activity based, the owners are investigating some kind of participatory art installation outside the building.



**Putt-Putt Fun Center**  
**STORMWATER IMPACT STATEMENT**

**PIN:**  
**9870997083**



**Calculations By: Preston B. Royster, PE**

**7/22/2020**

**Coulter Jewell Thames, P.A.**  
**111 West Main Street**  
**Durham, NC 27701**  
**Ph: 919-682-0368**  
**Fax: 919-688-5646**  
**NC Board of Engineers & Surveyors License #C-1209**

**CJT Project # 1952**

**July 21, 2020**

## **Project Description and Summary**

The Putt-Putt Fun Center project is located on Chapel Point Rd north of Eubanks Rd and along the I-40 frontage in Chapel Hill. The project involves the construction of a miniature golf course, go-cart race rack, entertainment facility and storage building along with the associated parking and infrastructure. Calculations for peak discharge, runoff volume, and water quality treatment for all of the proposed improvements are provided.

Soils on the site include Georgeville, Herndon, and Tarrus (hydrologic soil group B). The proposed site is located in the Cape Fear River Basin within the Jordan Lake watershed protection district.

Per the Town of Chapel Hill stormwater ordinance, the stormwater runoff rate leaving the site under post-development conditions may not exceed the stormwater runoff rate under pre-development conditions for the 1-year, 2-year, and 25-year storms. The additional runoff volume from the pre-development to post-development conditions for the 2-year storm must also be captured on-site.

## **Methodology**

- The Orange County Soil Survey is used to identify the soil types located on the site.
- HydroCAD software is used to calculate pre- and post-development peak flow rates and volumes for each sub-basin. HydroCAD uses the SCS TR-20 method to develop hydrographs.
- HydroCAD software is used to calculate the composite curve number for each sub-basin. HydroCAD uses the NRCS TR-55 method for calculation composite curve numbers.

## **Discussion of Results**

### **Q1/Q2/Q25:**

For the peak discharge calculations, the site was analyzed as two basins. Basin 1 includes the majority of the site and the bulk of the proposed development. An analysis point was set at the lowest point on the western property line where a stream exits the site. Under pre-development conditions, the time of concentration for the site was calculated to be 19.1 minutes. Under post-development conditions, the time of concentration reduced to 13.5 minutes. As a result of the proposed improvements, there is an increase in runoff from the 1-year, 2-year, and 25-year storms. A wet detention pond is proposed to provide attenuation.

With the addition of the wet detention pond, the peak flow rate still shows a small increase in flow for the 1-year and 2-year storms. This is due primarily due to the construction of a greenway trail along the eastern property line. The trail is proposed on the opposite side of a stream that bisects the site and prevents drainage into the proposed pond. The flows that will

bypass the pond are slightly higher than the pre-development flows for the entire basin. With that said, the increase in bypass flow is less than 0.5 cfs for both storm events. In fact, the outflow from the pond is minimal for both of these events (0.34 cfs and 0.39 cfs, respectively). Given that the increase in flow is minimal and the pond essentially reduces the flow to a negligible level, we feel the intent of the peak flow requirements are met. There is a reduction in peak flow rate for the 25-yr storm of 12.0%. The pond is also designed to safely pass the 100-yr storm.

Basin 2 includes the northern portion of the site. This area drains to the west into Old Field Creek. The only development proposed in this basin is the construction of a greenway trail along the east side of the property. For both pre- and post-development, the time of concentration was calculated to be 19.4 minutes. As a result of the trail construction, the peak flow rate increases for the 1-year, 2-year, and 25-year storms. While there is an increase in flow, the calculated increase is less than 0.5 cfs for each storm event. Given that the increase is relatively small, there are no adverse impacts to downstream property as a result of the proposed development in this basin. In addition, given the linear nature of the trail and the minimal flow increase, installing a BMP for detention is not practical.

### **2-yr Runoff Volume:**

Per the Town of Chapel Hill Design Manual, “the post-development stormwater runoff rate leaving the site shall not exceed the pre-development (existing conditions) stormwater runoff rate leaving the site for the local 1-year, 2-year, and 25-year storm events.” In addition, “the post-development stormwater runoff volume leaving the site shall not exceed the pre-development (existing conditions) stormwater runoff volume leaving the site for the local 2-year frequency, 24-hour duration storm event.” The stormwater runoff volume for the site under pre-development conditions was calculated to be 27,312 cf, and the post-development volume was calculated to be 64,033 cf. Because there is an increase of 36,721 cf, stormwater control measures are proposed to provide detention. The proposed wet detention pond provides 35,067 cf of storage during the 2-yr storm. While this is slightly less than the required storage volume, the increase in runoff is due to the proposed greenway trail on the east side of the site. As mentioned above, the outflow from the pond during the 2-year storm is negligible. This means that the majority of the 2-year runoff volume from the more densely developed portion of the site is captured and released slowly. So, we feel that the proposed pond meets the intent of the runoff volume requirements despite the slight increase in runoff volume.

### **85% TSS Removal:**

The Town of Chapel Hill Design Manual states that BMP's shall be designed to remove 85% average total suspended solids from the post-development stormwater runoff.

The proposed project results in an increase in impervious surface of approximately 197,606 sf. As a result, a BMP must be installed to treat for 85% TSS removal for the additional impervious surface added.

In order to meet this requirement, a wet detention pond is proposed. The total impervious area that drains to the pond is 180,791 sf. Approximately 11,954 sf of proposed impervious

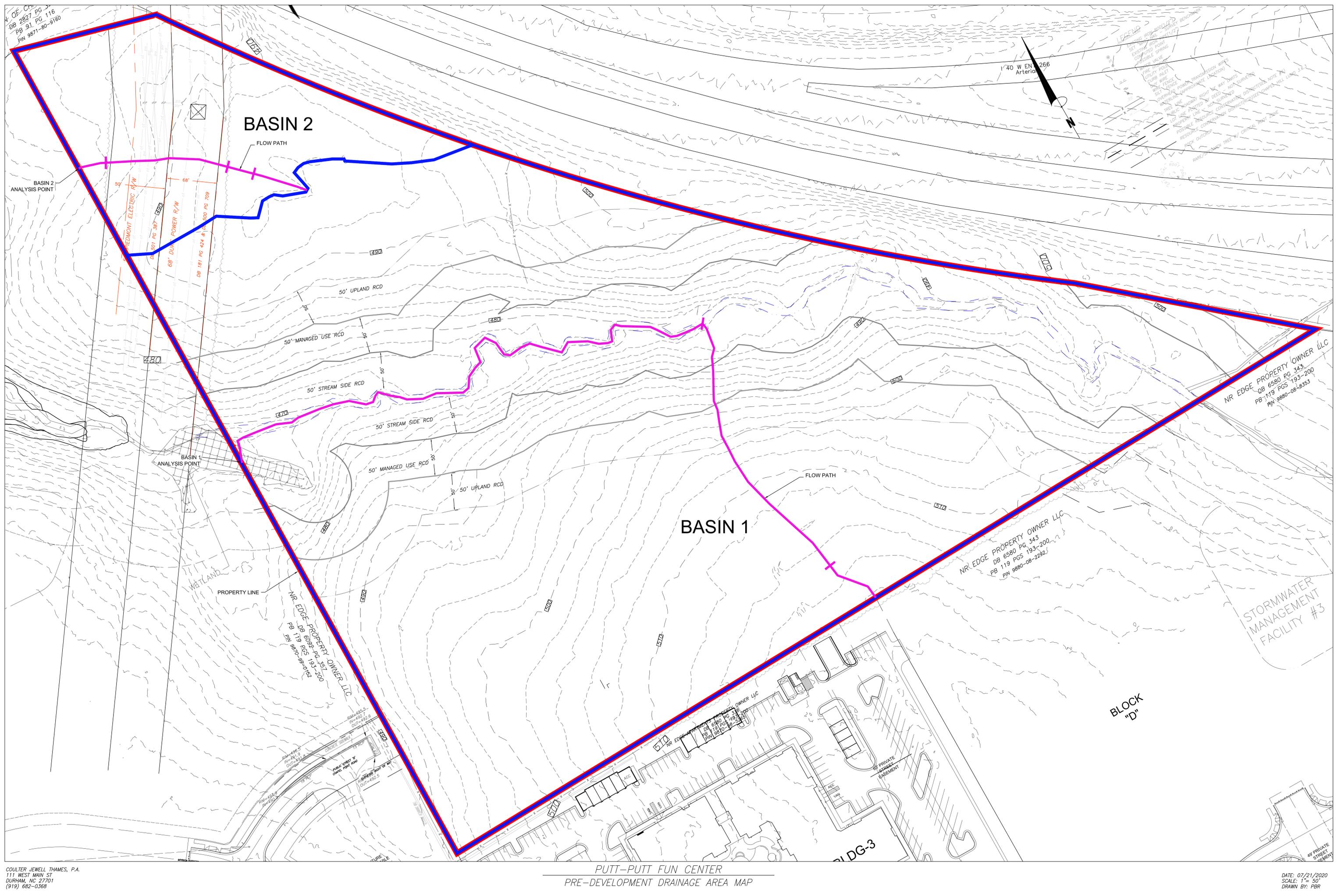
surface bypasses treatment. This area includes a small section of the driveway on the west side of the site that cannot reasonably be captured by the proposed inlets. The majority of the area that bypasses treatment is the proposed greenway trail on the east side of the site. As mentioned, the trail is located such that it cannot drain to the proposed pond. With that said, the trail is designed to sheet flow into the stream buffer with no piped flow. So, some treatment is provided by the sheet flow through the existing riparian buffer. While the proposed pond doesn't treat all of the added impervious surface, we feel that it is designed to treat the maximum amount of impervious surface that can reasonably be directed to it. SO, we feel that the intent of the water quality requirements are met.

Preliminary sizing calculations for the pond are included.

**Conclusion:**

Because the increase in impervious surfaces as a result of this project resulted in an increase in peak flow for the 1-year, 2-year, and 25-year storms, and in runoff volume for the 2-year storm, detention and treatment are proposed in the form of a wet detention pond to meet the requirements of the Town's stormwater ordinance.

# **DRAINAGE AREA MAPS**



BASIN 2

BASIN 1

FLOW PATH

FLOW PATH

BASIN 2 ANALYSIS POINT

BASIN 1 ANALYSIS POINT

PROPERTY LINE

NR EDGE PROPERTY OWNER LLC  
DB 6580 PG 343  
PB 1119 PGS 193-200  
PIN 9880-08-8353

NR EDGE PROPERTY OWNER LLC  
DB 6580 PG 343  
PB 1119 PGS 193-200  
PIN 9880-08-2292

NR EDGE PROPERTY OWNER LLC  
DB 6092 PG 357  
PB 119 PGS 193-200  
PIN 9870-08-0102

STORMWATER  
MANAGEMENT  
FACILITY #3

BLOCK  
"D"



**STORMWATER PEAK  
RUNOFF CALCULATIONS**

## Run-off Summary

Drainage Basin	Pre-Dev						Post-Dev						Percentage Increase			Remark
	Tc	Area	CN	Q1	Q2	Q25	Tc	Area	CN	Q1	Q2	Q25	Q1	Q2	Q25	
	<i>min</i>	<i>ac</i>		<i>cfs</i>	<i>cfs</i>	<i>cfs</i>	<i>min</i>	<i>ac</i>		<i>cfs</i>	<i>cfs</i>	<i>cfs</i>	%	%	%	
Basin 1	19.1	17.16	55	1.10	3.94	31.47	13.5	17.16	68	12.66	20.85	68.50	1050.9	429.2	117.7	DETENTION REQUIRED
To Detention							5.0	6.30	86	0.34	0.39	5.35				
Bypass Detention							13.5	10.86	57	1.53	4.40	27.21				
Total (Combined Hydrograph)								17.16		1.83	4.74	27.70	66.4	20.3	-12.0	
Basin 2	19.4	2.18	58	0.31	0.80	4.71	19.4	2.18	58	0.46	1.03	5.20	48.4	28.8	10.4	NO DETENTION REQUIRED



PRE-DEV BASIN 1



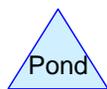
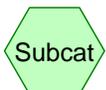
PRE-DEV BASIN 2



POST-DEV BASIN 1



POST-DEV BASIN 2



**STORM STUDY - 1952**

Prepared by Coulter Jewell Thames, PA

HydroCAD® 10.00-25 s/n 02108 © 2019 HydroCAD Software Solutions LLC

Type II 24-hr 1-Year Rainfall=3.00"

Printed 7/21/2020

Page 2

**Summary for Subcatchment 1S: PRE-DEV BASIN 1**

Runoff = 1.10 cfs @ 12.24 hrs, Volume= 0.275 af, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 1-Year Rainfall=3.00"

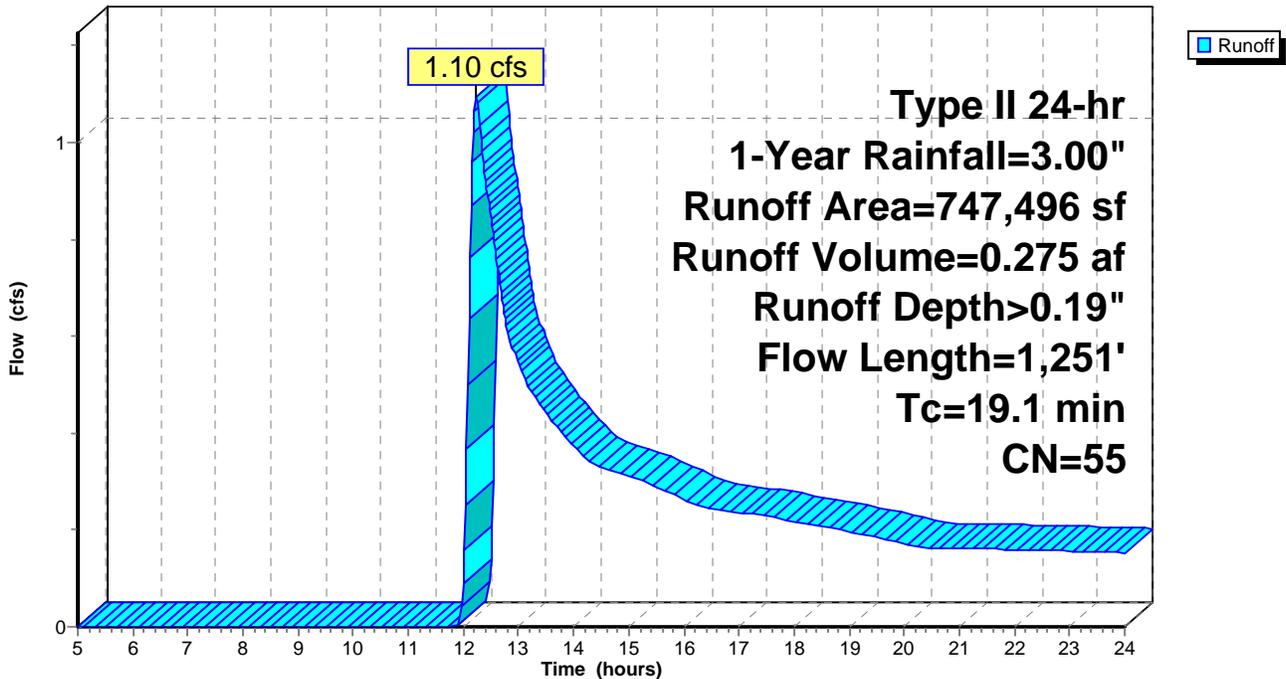
Area (sf)	CN	Description
15,948	61	>75% Grass cover, Good, HSG B
731,548	55	Woods, Good, HSG B
747,496	55	Weighted Average
747,496		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	75	0.0470	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
4.3	385	0.0880	1.48		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.2	791	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
19.1	1,251	Total			

**Subcatchment 1S: PRE-DEV BASIN 1**

Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 1-Year Rainfall=3.00"

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**Summary for Subcatchment 2S: PRE-DEV BASIN 2**

Runoff = 0.31 cfs @ 12.20 hrs, Volume= 0.049 af, Depth> 0.27"

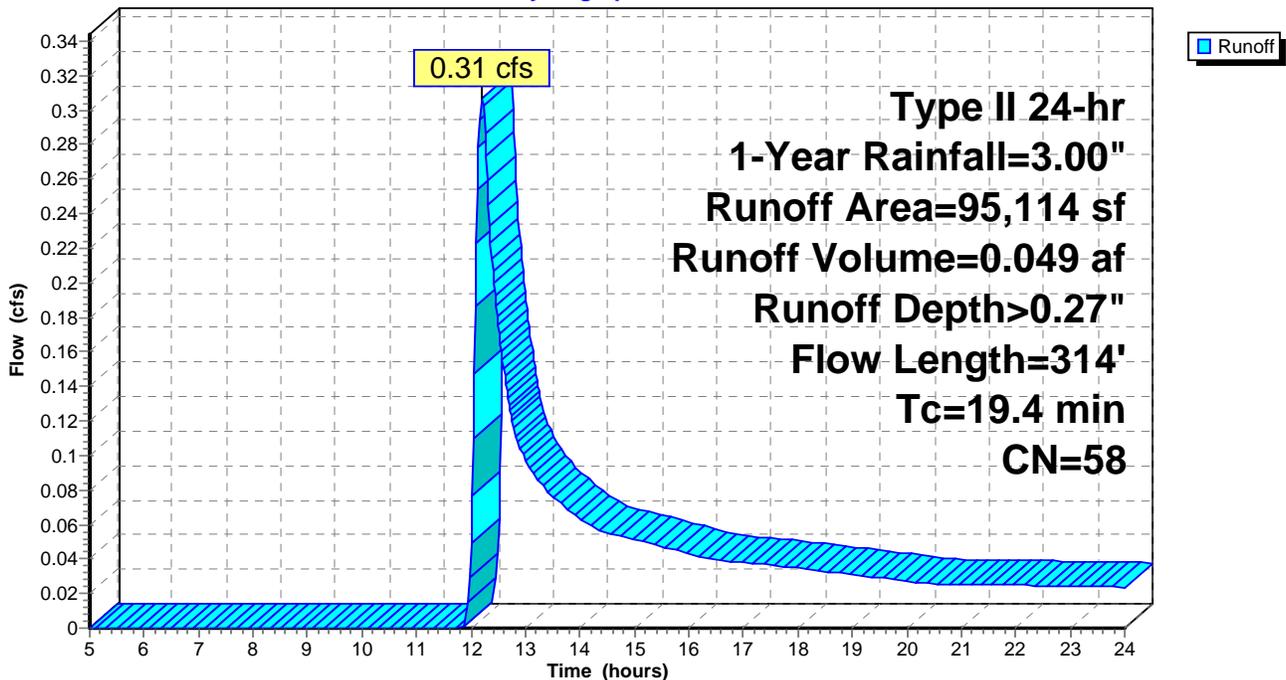
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
45,950	61	>75% Grass cover, Good, HSG B
49,164	55	Woods, Good, HSG B
95,114	58	Weighted Average
95,114		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

**Subcatchment 2S: PRE-DEV BASIN 2**

Hydrograph



**STORM STUDY - 1952**

Type II 24-hr 1-Year Rainfall=3.00"

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**Summary for Subcatchment 3S: POST-DEV BASIN 1**

Runoff = 12.66 cfs @ 12.08 hrs, Volume= 0.891 af, Depth&gt; 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
192,745	98	Paved parking, HSG B
137,734	61	>75% Grass cover, Good, HSG B
408,717	55	Woods, Good, HSG B
8,300	98	Water Surface, HSG B
747,496	68	Weighted Average
546,451		73.10% Pervious Area
201,045		26.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	48	0.0310	0.18		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.50"
1.7	182	0.0220	1.77	0.33	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.25' Z= 3.0 '/' Top.W=1.50' n= 0.030
2.8	297	0.0710	1.79	0.18	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.10' Z= 10.0 '/' Top.W=2.00' n= 0.030
4.6	1,126	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
13.5	1,653	Total			

**STORM STUDY - 1952**

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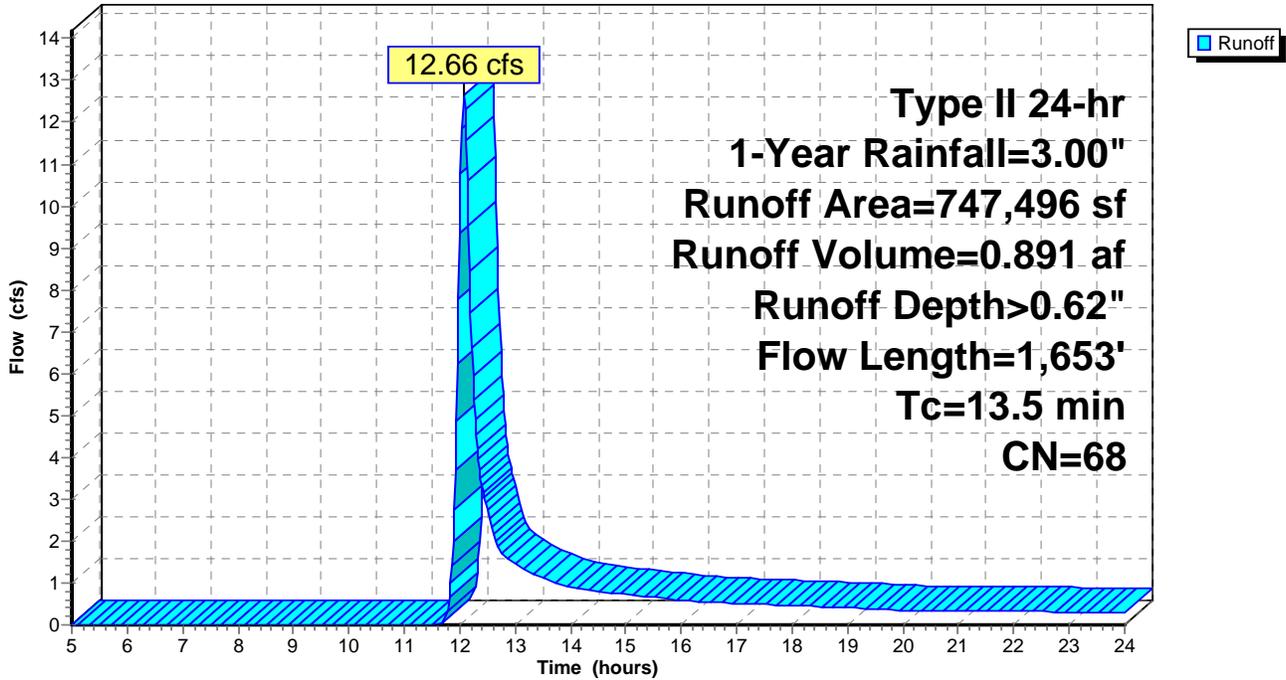
Type II 24-hr 1-Year Rainfall=3.00"

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**Subcatchment 3S: POST-DEV BASIN 1**

Hydrograph



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Type II 24-hr 1-Year Rainfall=3.00"

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**Summary for Subcatchment 4S: POST-DEV BASIN 2**

Runoff = 0.46 cfs @ 12.18 hrs, Volume= 0.060 af, Depth> 0.33"

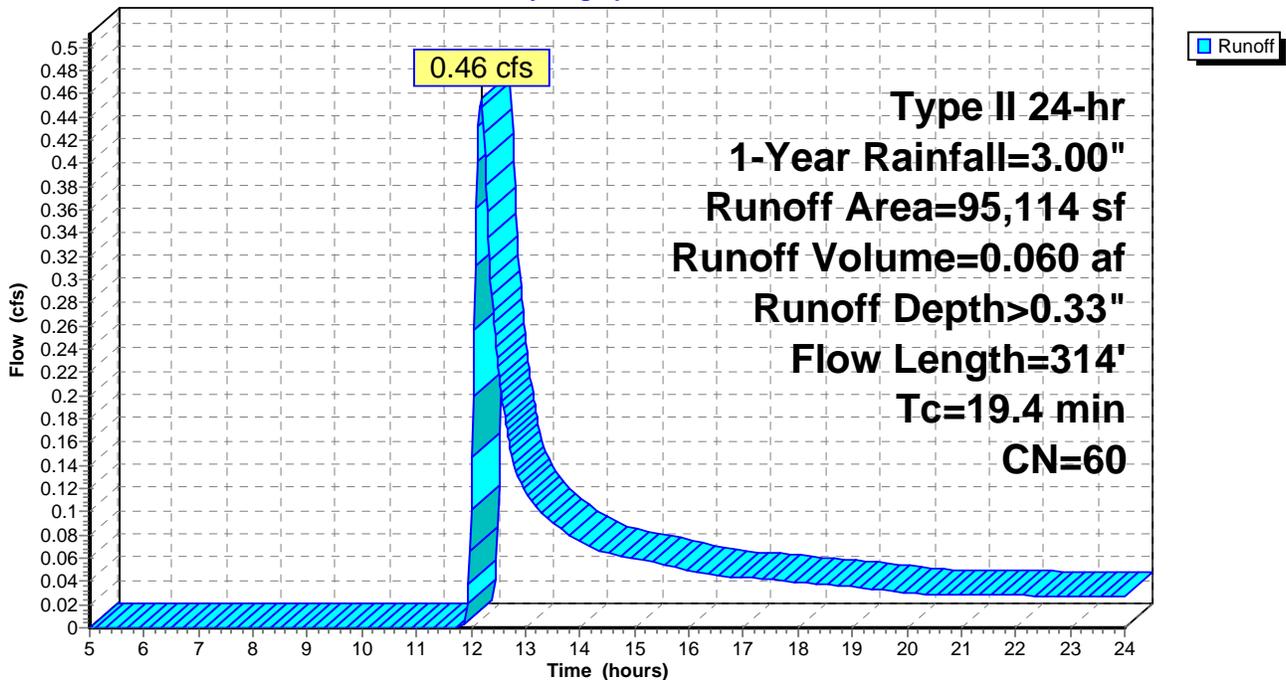
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
4,861	98	Paved parking, HSG B
43,791	61	>75% Grass cover, Good, HSG B
46,462	55	Woods, Good, HSG B
95,114	60	Weighted Average
90,253		94.89% Pervious Area
4,861		5.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

**Subcatchment 4S: POST-DEV BASIN 2**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Subcatchment 1S: PRE-DEV BASIN 1**

Runoff = 3.94 cfs @ 12.18 hrs, Volume= 0.538 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

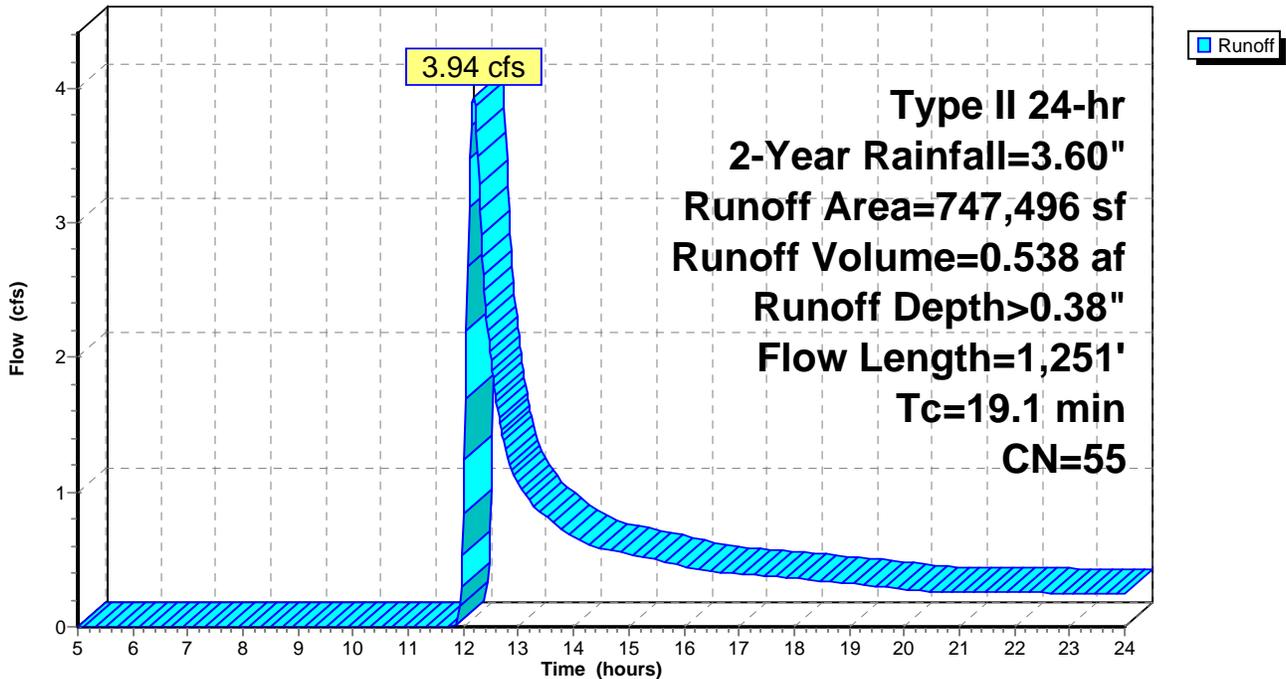
Area (sf)	CN	Description
15,948	61	>75% Grass cover, Good, HSG B
731,548	55	Woods, Good, HSG B
747,496	55	Weighted Average
747,496		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	75	0.0470	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
4.3	385	0.0880	1.48		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.2	791	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
19.1	1,251	Total			

**Subcatchment 1S: PRE-DEV BASIN 1**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Subcatchment 2S: PRE-DEV BASIN 2**

Runoff = 0.80 cfs @ 12.17 hrs, Volume= 0.089 af, Depth> 0.49"

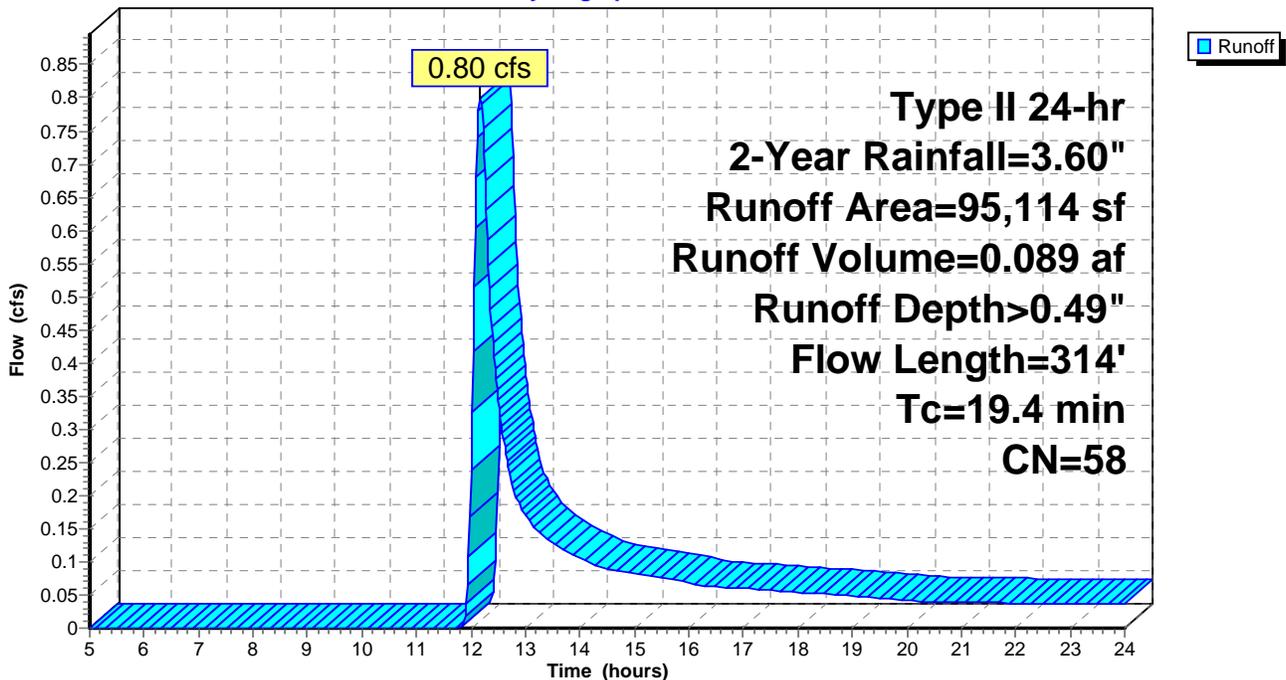
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
45,950	61	>75% Grass cover, Good, HSG B
49,164	55	Woods, Good, HSG B
95,114	58	Weighted Average
95,114		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

**Subcatchment 2S: PRE-DEV BASIN 2**

Hydrograph



**STORM STUDY - 1952**

Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Subcatchment 3S: POST-DEV BASIN 1**

Runoff = 20.85 cfs @ 12.07 hrs, Volume= 1.366 af, Depth&gt; 0.96"

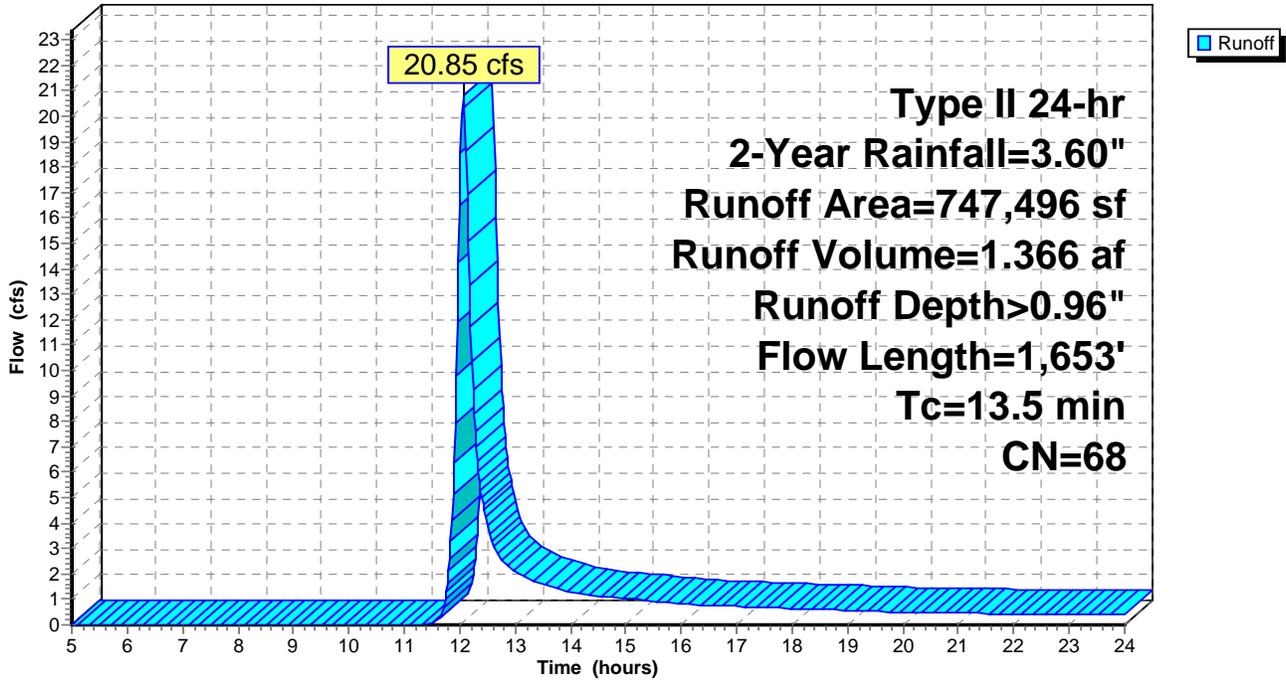
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
192,745	98	Paved parking, HSG B
137,734	61	>75% Grass cover, Good, HSG B
408,717	55	Woods, Good, HSG B
8,300	98	Water Surface, HSG B
747,496	68	Weighted Average
546,451		73.10% Pervious Area
201,045		26.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	48	0.0310	0.18		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.50"
1.7	182	0.0220	1.77	0.33	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.25' Z= 3.0 '/' Top.W=1.50' n= 0.030
2.8	297	0.0710	1.79	0.18	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.10' Z= 10.0 '/' Top.W=2.00' n= 0.030
4.6	1,126	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
13.5	1,653	Total			

**Subcatchment 3S: POST-DEV BASIN 1**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Subcatchment 4S: POST-DEV BASIN 2**

Runoff = 1.03 cfs @ 12.16 hrs, Volume= 0.104 af, Depth> 0.57"

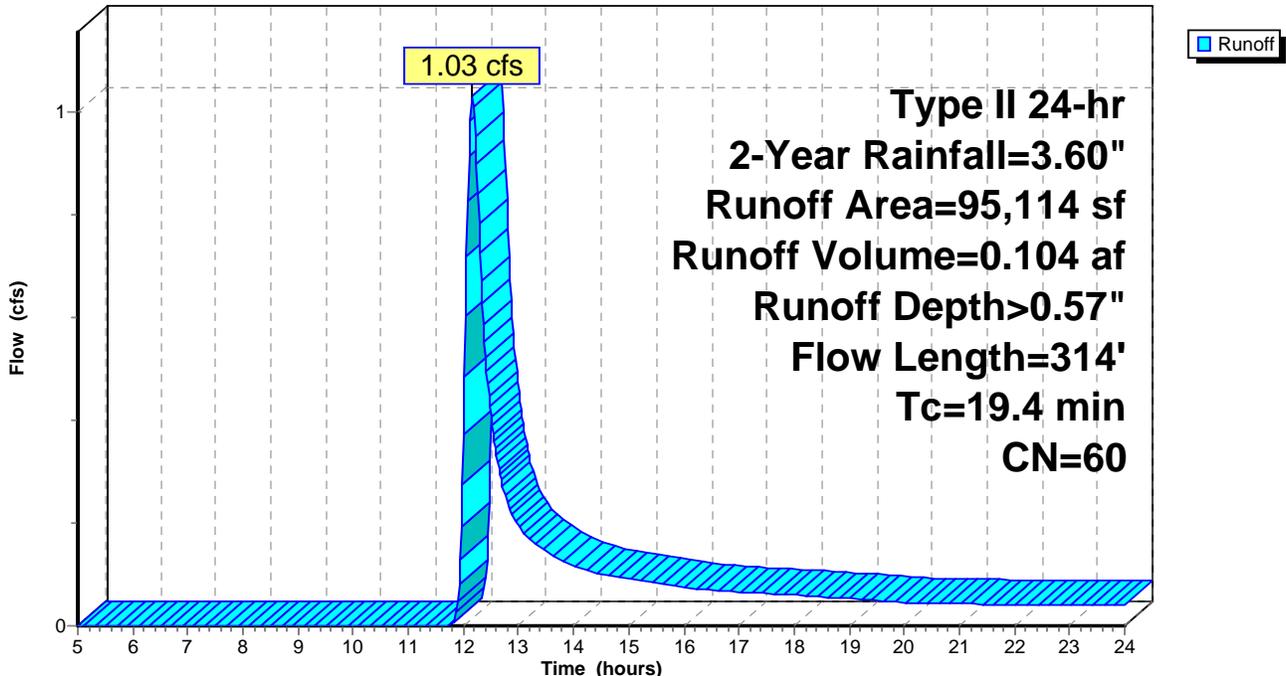
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
4,861	98	Paved parking, HSG B
43,791	61	>75% Grass cover, Good, HSG B
46,462	55	Woods, Good, HSG B
95,114	60	Weighted Average
90,253		94.89% Pervious Area
4,861		5.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

**Subcatchment 4S: POST-DEV BASIN 2**

Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 25-Year Rainfall=6.41"

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**Summary for Subcatchment 1S: PRE-DEV BASIN 1**

Runoff = 31.47 cfs @ 12.13 hrs, Volume= 2.498 af, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 25-Year Rainfall=6.41"

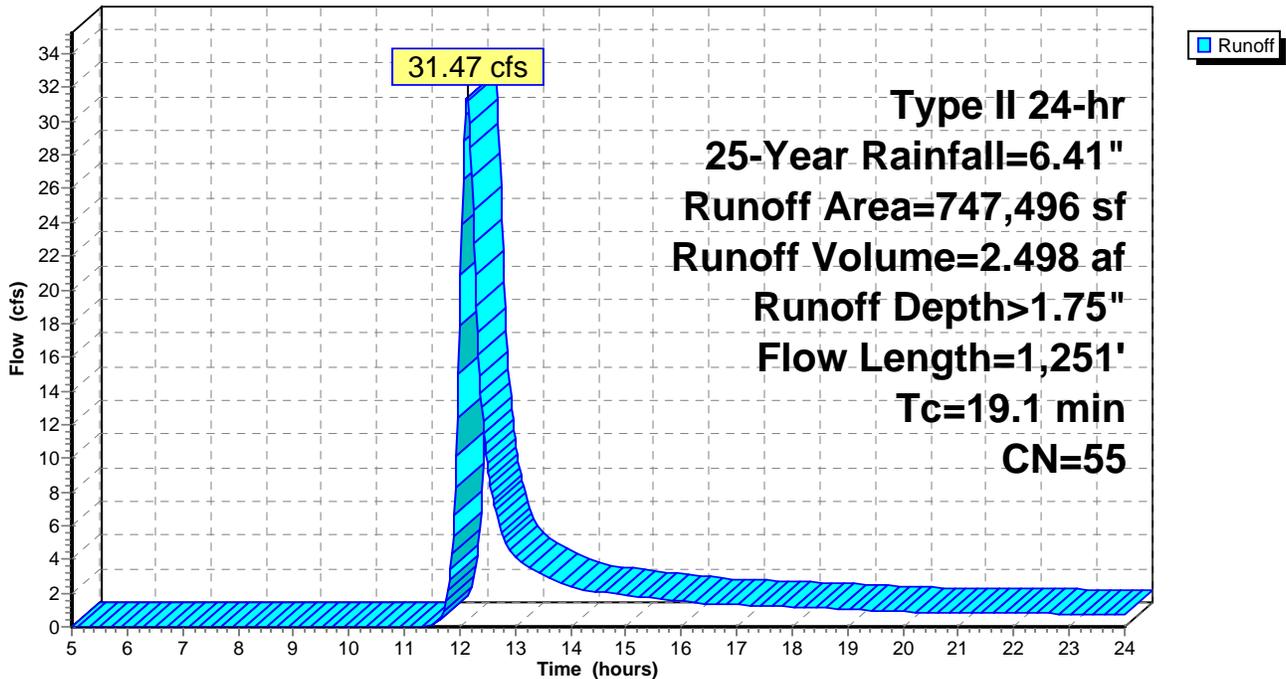
Area (sf)	CN	Description
15,948	61	>75% Grass cover, Good, HSG B
731,548	55	Woods, Good, HSG B
747,496	55	Weighted Average
747,496		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	75	0.0470	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
4.3	385	0.0880	1.48		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.2	791	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
19.1	1,251	Total			

**Subcatchment 1S: PRE-DEV BASIN 1**

Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 25-Year Rainfall=6.41"

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**Summary for Subcatchment 2S: PRE-DEV BASIN 2**

Runoff = 4.71 cfs @ 12.13 hrs, Volume= 0.365 af, Depth> 2.00"

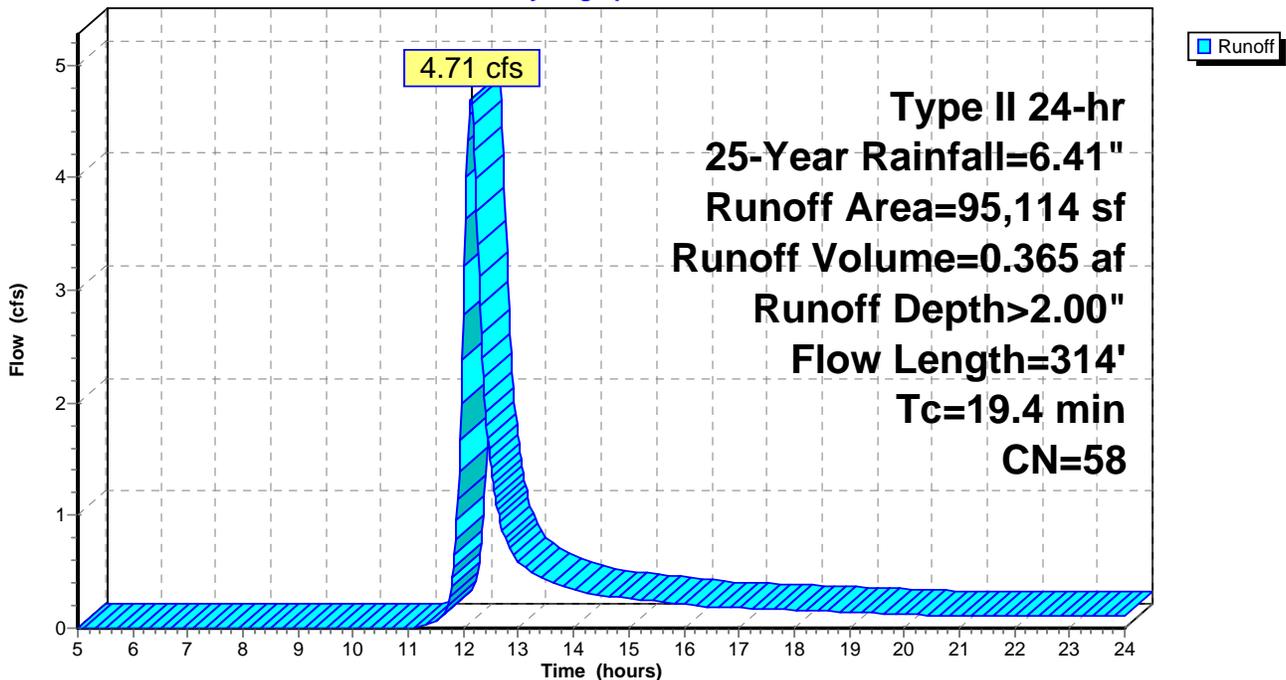
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 25-Year Rainfall=6.41"

Area (sf)	CN	Description
45,950	61	>75% Grass cover, Good, HSG B
49,164	55	Woods, Good, HSG B
95,114	58	Weighted Average
95,114		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

**Subcatchment 2S: PRE-DEV BASIN 2**

Hydrograph



**STORM STUDY - 1952**

Type II 24-hr 25-Year Rainfall=6.41"

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**Summary for Subcatchment 3S: POST-DEV BASIN 1**

Runoff = 68.50 cfs @ 12.06 hrs, Volume= 4.188 af, Depth&gt; 2.93"

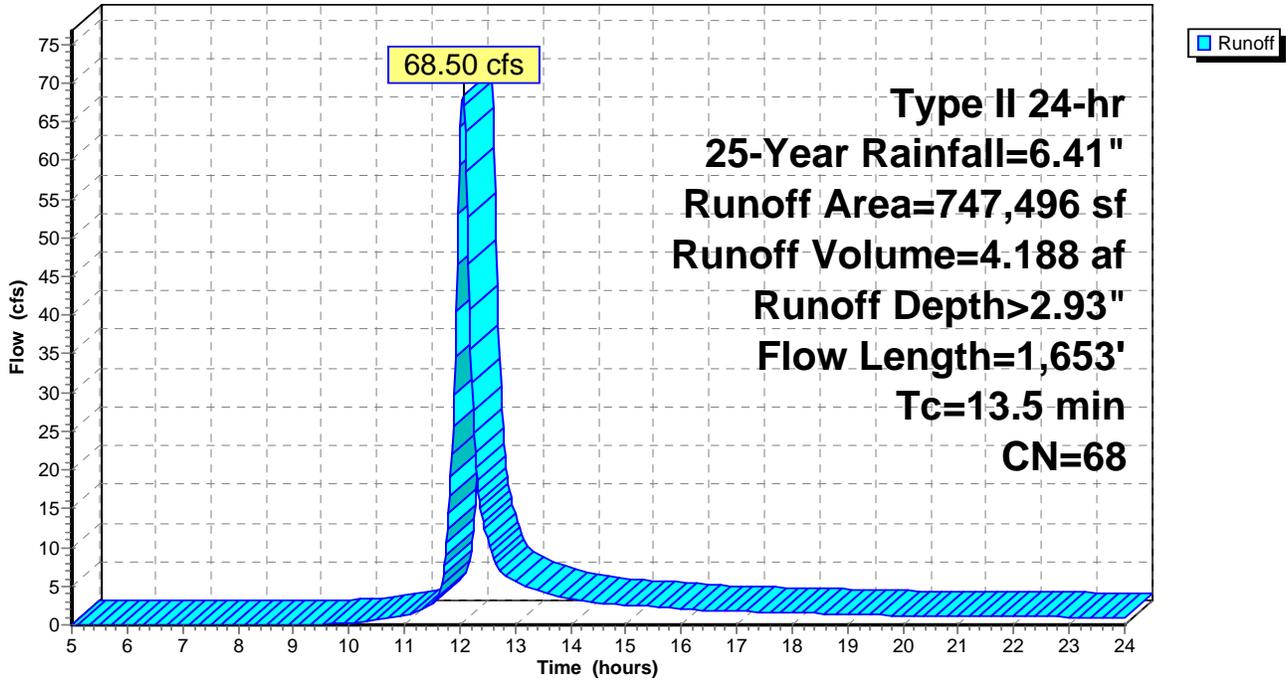
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 25-Year Rainfall=6.41"

Area (sf)	CN	Description
192,745	98	Paved parking, HSG B
137,734	61	>75% Grass cover, Good, HSG B
408,717	55	Woods, Good, HSG B
8,300	98	Water Surface, HSG B
747,496	68	Weighted Average
546,451		73.10% Pervious Area
201,045		26.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	48	0.0310	0.18		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.50"
1.7	182	0.0220	1.77	0.33	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.25' Z= 3.0 '/' Top.W=1.50' n= 0.030
2.8	297	0.0710	1.79	0.18	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.10' Z= 10.0 '/' Top.W=2.00' n= 0.030
4.6	1,126	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
13.5	1,653	Total			

**Subcatchment 3S: POST-DEV BASIN 1**

Hydrograph



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Type II 24-hr 25-Year Rainfall=6.41"

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**Summary for Subcatchment 4S: POST-DEV BASIN 2**

Runoff = 5.20 cfs @ 12.13 hrs, Volume= 0.397 af, Depth> 2.18"

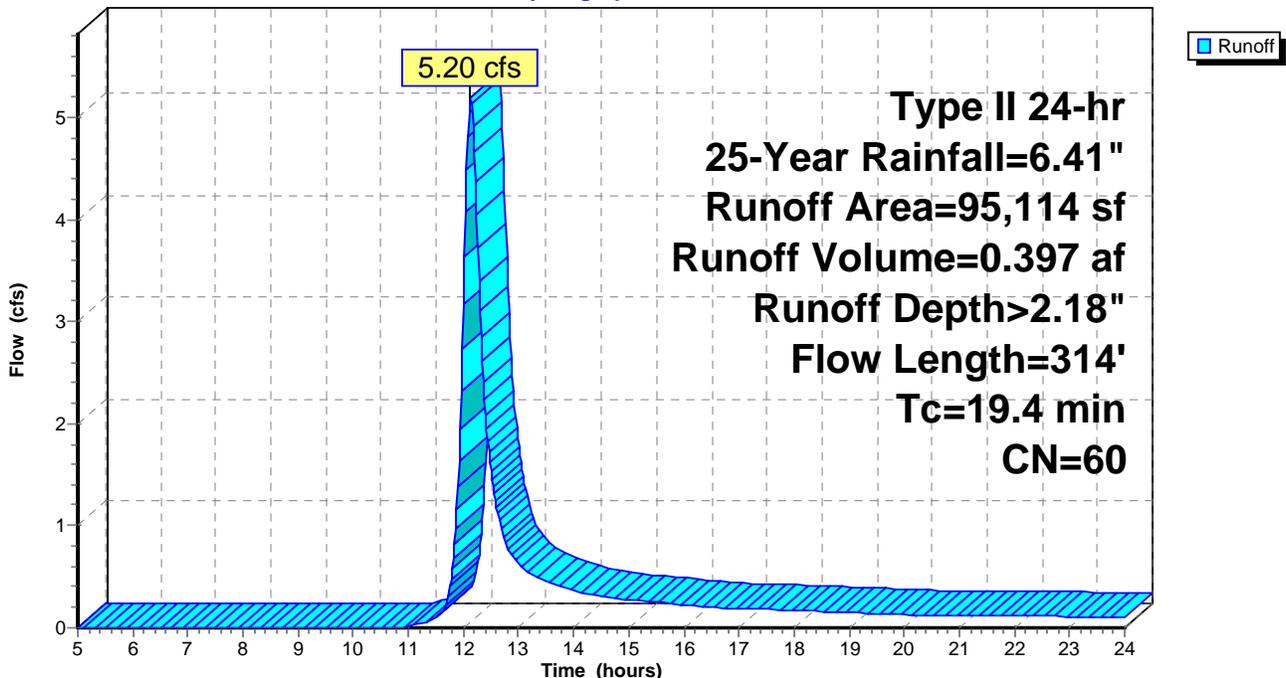
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 25-Year Rainfall=6.41"

Area (sf)	CN	Description
4,861	98	Paved parking, HSG B
43,791	61	>75% Grass cover, Good, HSG B
46,462	55	Woods, Good, HSG B
95,114	60	Weighted Average
90,253		94.89% Pervious Area
4,861		5.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

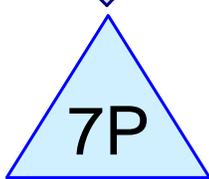
**Subcatchment 4S: POST-DEV BASIN 2**

Hydrograph

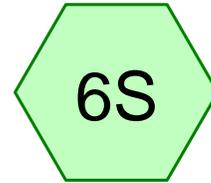
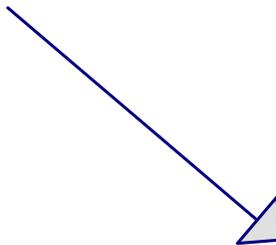




BASIN 1 TO POND



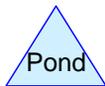
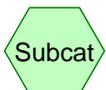
Pond



BASIN 1 BYPASS  
POND



Combined Hydrograph



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Type II 24-hr 1-Year Rainfall=3.00"

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**Summary for Subcatchment 5S: BASIN 1 TO POND**

Runoff = 19.21 cfs @ 11.96 hrs, Volume= 0.872 af, Depth> 1.66"

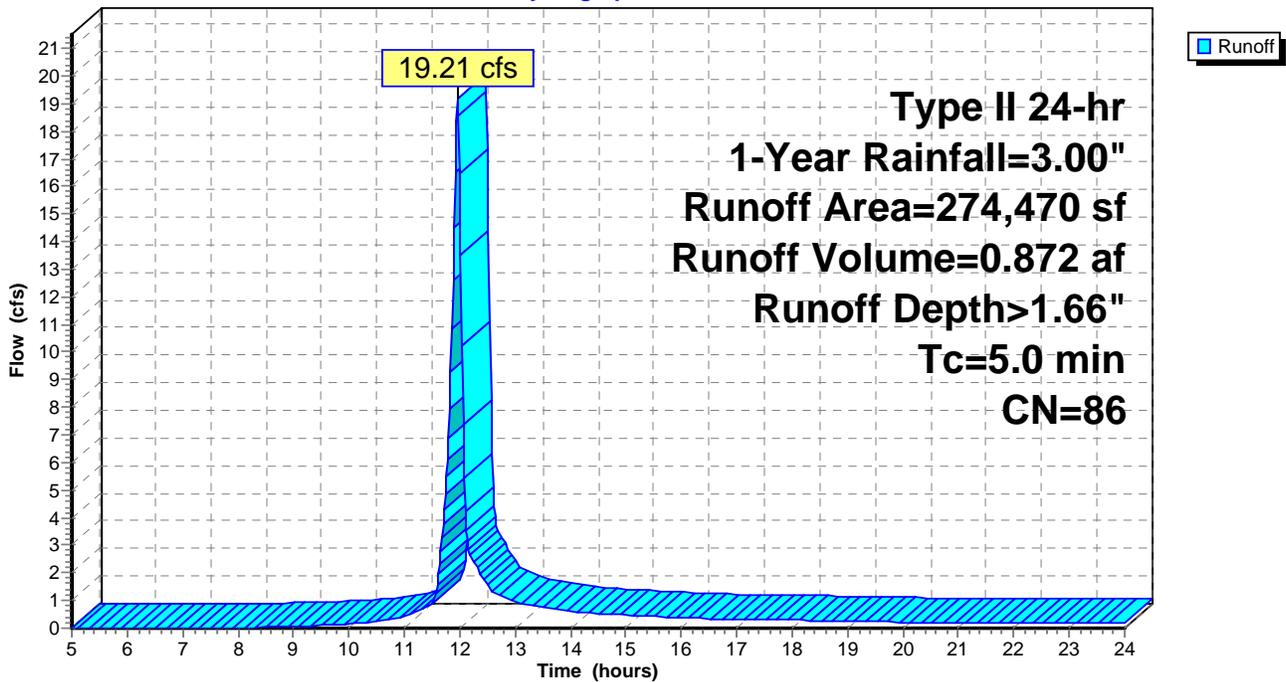
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
180,791	98	Paved parking, HSG B
80,509	61	>75% Grass cover, Good, HSG B
8,300	98	Water Surface, HSG B
4,870	55	Woods, Good, HSG B
274,470	86	Weighted Average
85,379		31.11% Pervious Area
189,091		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum Tc

**Subcatchment 5S: BASIN 1 TO POND**

Hydrograph



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Type II 24-hr 1-Year Rainfall=3.00"

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**Summary for Subcatchment 6S: BASIN 1 BYPASS POND**

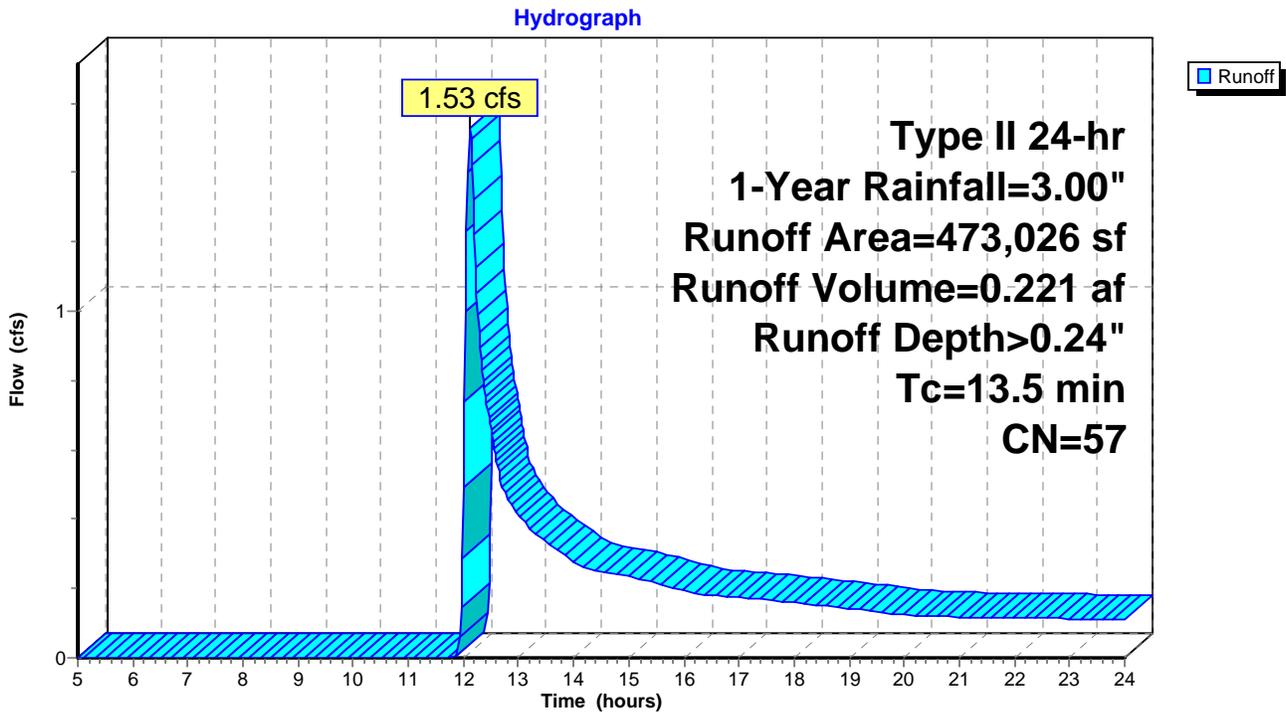
Runoff = 1.53 cfs @ 12.12 hrs, Volume= 0.221 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
 Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
11,954	98	Paved parking, HSG B
57,225	61	>75% Grass cover, Good, HSG B
403,847	55	Woods, Good, HSG B
473,026	57	Weighted Average
461,072		97.47% Pervious Area
11,954		2.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5					Direct Entry,

**Subcatchment 6S: BASIN 1 BYPASS POND**



**STORM STUDY - 1952**

Type II 24-hr 1-Year Rainfall=3.00"

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**Summary for Pond 7P: Pond**

Inflow Area = 6.301 ac, 68.89% Impervious, Inflow Depth > 1.66" for 1-Year event  
 Inflow = 19.21 cfs @ 11.96 hrs, Volume= 0.872 af  
 Outflow = 0.34 cfs @ 16.62 hrs, Volume= 0.345 af, Atten= 98%, Lag= 279.3 min  
 Primary = 0.34 cfs @ 16.62 hrs, Volume= 0.345 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 483.24' @ 16.62 hrs Surf.Area= 13,442 sf Storage= 25,714 cf

Plug-Flow detention time= 368.9 min calculated for 0.344 af (40% of inflow)  
 Center-of-Mass det. time= 246.9 min ( 1,067.5 - 820.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	481.00'	109,504 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
481.00	8,299	0	0
481.50	10,709	4,752	4,752
482.00	11,471	5,545	10,297
483.00	13,049	12,260	22,557
484.00	14,700	13,875	36,432
485.00	16,422	15,561	51,993
486.00	18,215	17,319	69,311
487.00	20,079	19,147	88,458
488.00	22,012	21,046	109,504

Device	Routing	Invert	Outlet Devices
#1	Primary	477.00'	<b>36.0" Round Culvert</b> L= 70.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 477.00' / 476.00' S= 0.0143 1/1' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	485.50'	<b>72.0" x 72.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	481.00'	<b>3.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=0.34 cfs @ 16.62 hrs HW=483.24' (Free Discharge)

- 1=Culvert (Passes 0.34 cfs of 74.09 cfs potential flow)
- 2=Orifice/Grate ( Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.34 cfs @ 7.00 fps)

**STORM STUDY - 1952**

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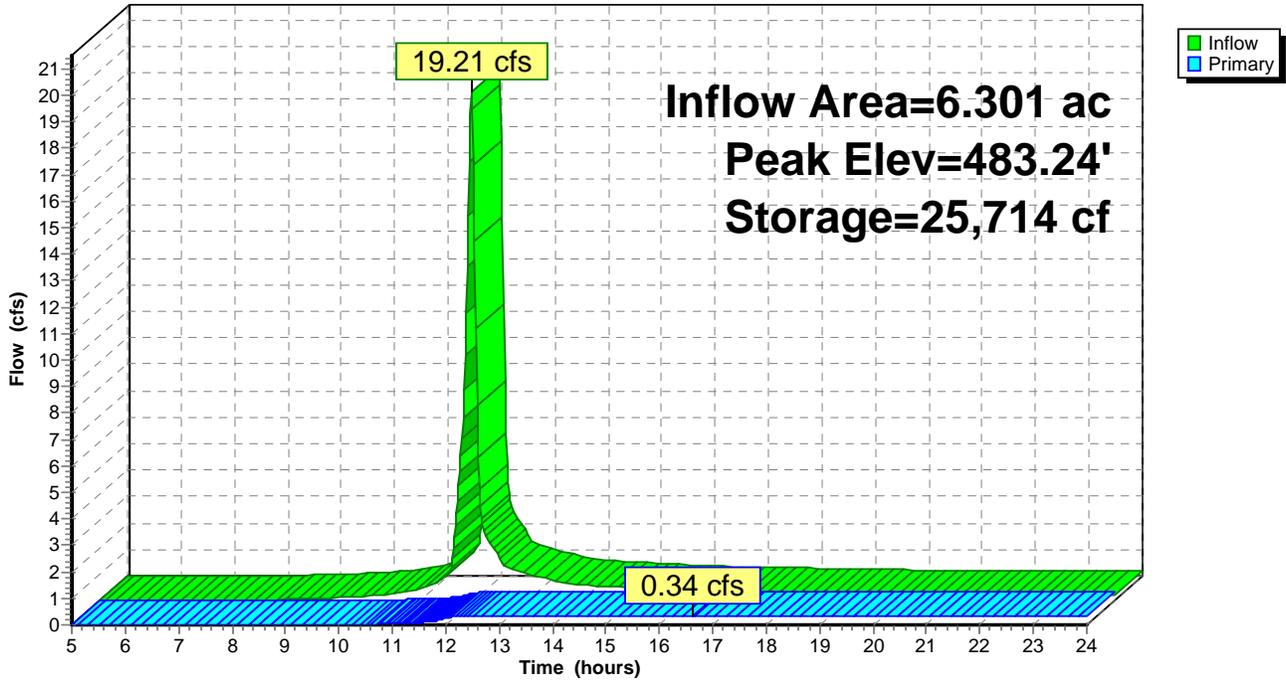
Type II 24-hr 1-Year Rainfall=3.00"

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**Pond 7P: Pond**

Hydrograph

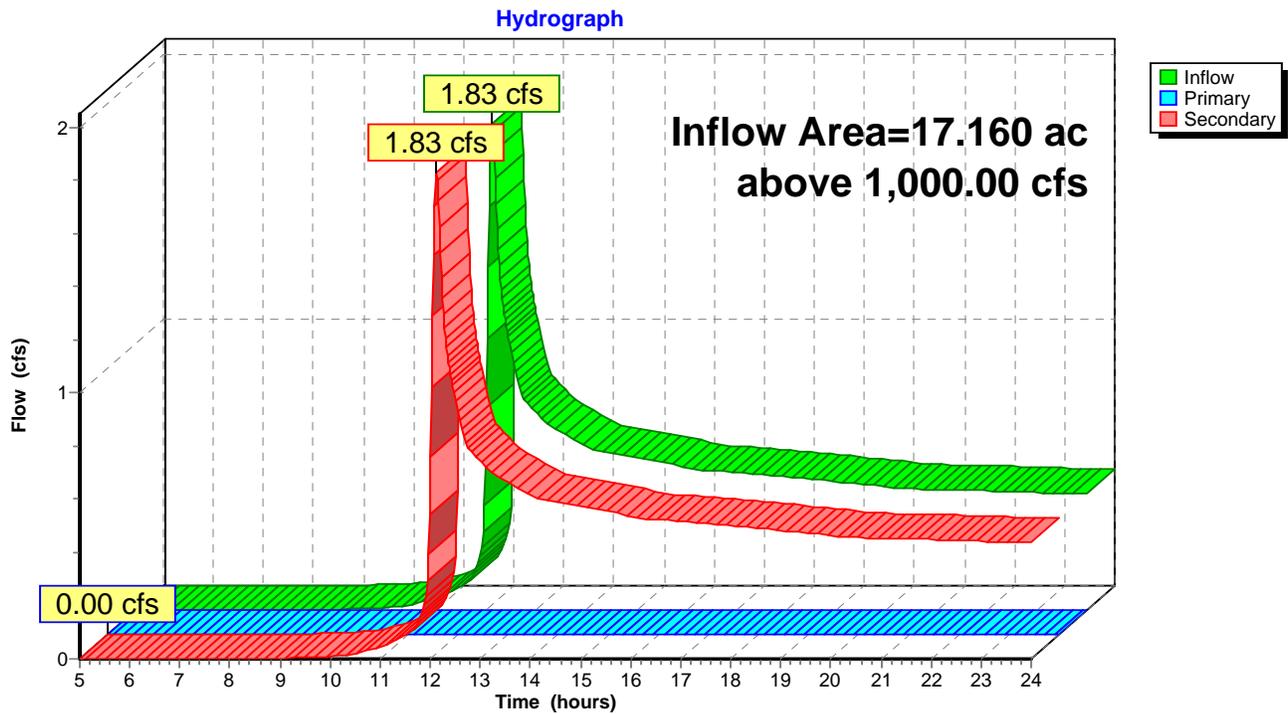


### Summary for Link 8L: Combined Hydrograph

Inflow Area = 17.160 ac, 26.90% Impervious, Inflow Depth > 0.40" for 1-Year event  
Inflow = 1.83 cfs @ 12.12 hrs, Volume= 0.566 af  
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min  
Secondary = 1.83 cfs @ 12.12 hrs, Volume= 0.566 af

Primary outflow = Inflow above 1,000.00 cfs, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs

### Link 8L: Combined Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Subcatchment 5S: BASIN 1 TO POND**

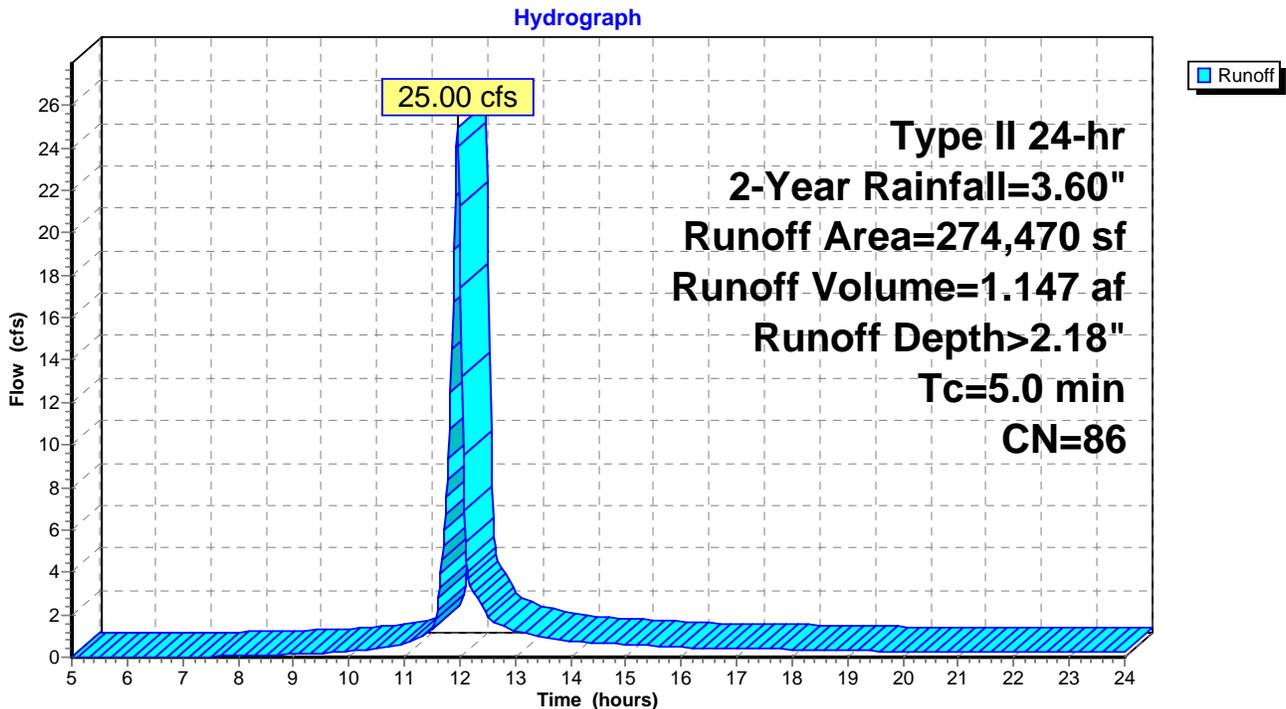
Runoff = 25.00 cfs @ 11.96 hrs, Volume= 1.147 af, Depth> 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
180,791	98	Paved parking, HSG B
80,509	61	>75% Grass cover, Good, HSG B
8,300	98	Water Surface, HSG B
4,870	55	Woods, Good, HSG B
274,470	86	Weighted Average
85,379		31.11% Pervious Area
189,091		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum Tc

**Subcatchment 5S: BASIN 1 TO POND**



**STORM STUDY - 1952**

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Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Subcatchment 6S: BASIN 1 BYPASS POND**

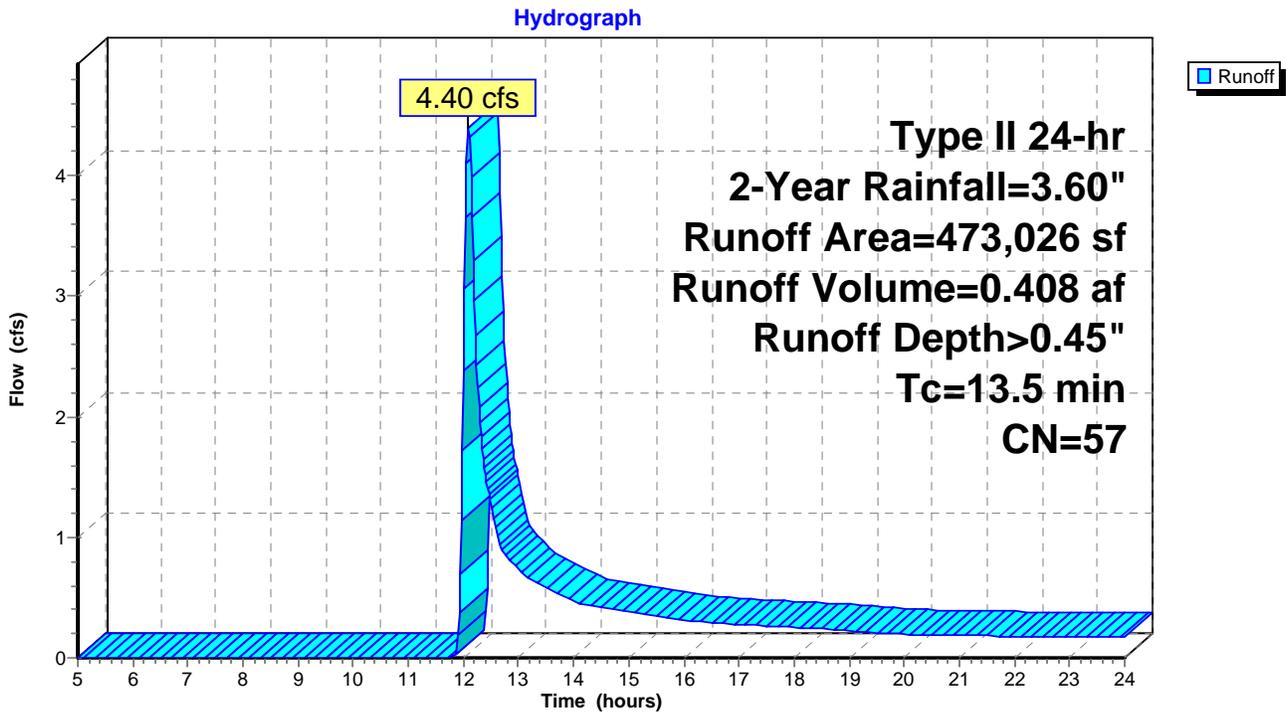
Runoff = 4.40 cfs @ 12.09 hrs, Volume= 0.408 af, Depth> 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
11,954	98	Paved parking, HSG B
57,225	61	>75% Grass cover, Good, HSG B
403,847	55	Woods, Good, HSG B
473,026	57	Weighted Average
461,072		97.47% Pervious Area
11,954		2.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5					Direct Entry,

**Subcatchment 6S: BASIN 1 BYPASS POND**



**STORM STUDY - 1952**

Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Pond 7P: Pond**

Inflow Area = 6.301 ac, 68.89% Impervious, Inflow Depth > 2.18" for 2-Year event  
 Inflow = 25.00 cfs @ 11.96 hrs, Volume= 1.147 af  
 Outflow = 0.39 cfs @ 17.38 hrs, Volume= 0.403 af, Atten= 98%, Lag= 325.3 min  
 Primary = 0.39 cfs @ 17.38 hrs, Volume= 0.403 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 483.91' @ 17.38 hrs Surf.Area= 14,546 sf Storage= 35,067 cf

Plug-Flow detention time= 373.8 min calculated for 0.403 af (35% of inflow)  
 Center-of-Mass det. time= 249.6 min ( 1,062.5 - 812.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	481.00'	109,504 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
481.00	8,299	0	0
481.50	10,709	4,752	4,752
482.00	11,471	5,545	10,297
483.00	13,049	12,260	22,557
484.00	14,700	13,875	36,432
485.00	16,422	15,561	51,993
486.00	18,215	17,319	69,311
487.00	20,079	19,147	88,458
488.00	22,012	21,046	109,504

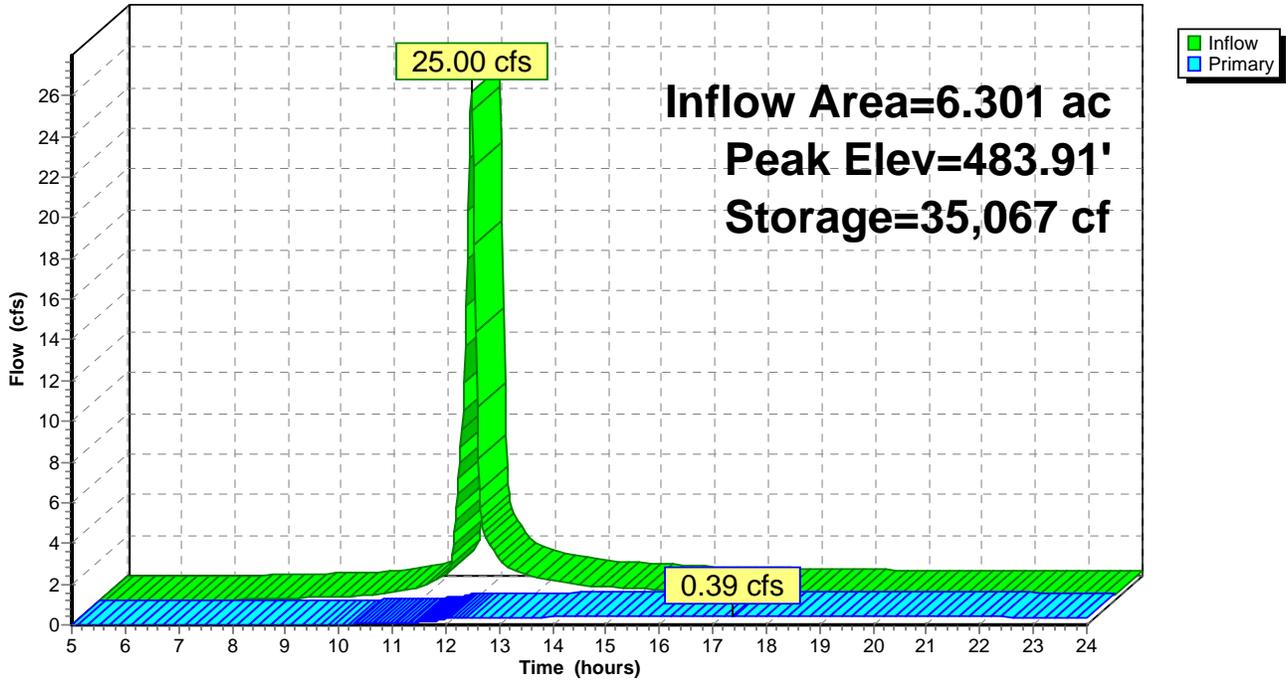
Device	Routing	Invert	Outlet Devices
#1	Primary	477.00'	<b>36.0" Round Culvert</b> L= 70.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 477.00' / 476.00' S= 0.0143 1/1' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	485.50'	<b>72.0" x 72.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	481.00'	<b>3.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=0.39 cfs @ 17.38 hrs HW=483.91' (Free Discharge)

- 1=Culvert (Passes 0.39 cfs of 79.14 cfs potential flow)
- 2=Orifice/Grate ( Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.39 cfs @ 8.03 fps)

**Pond 7P: Pond**

Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 2-Year Rainfall=3.60"

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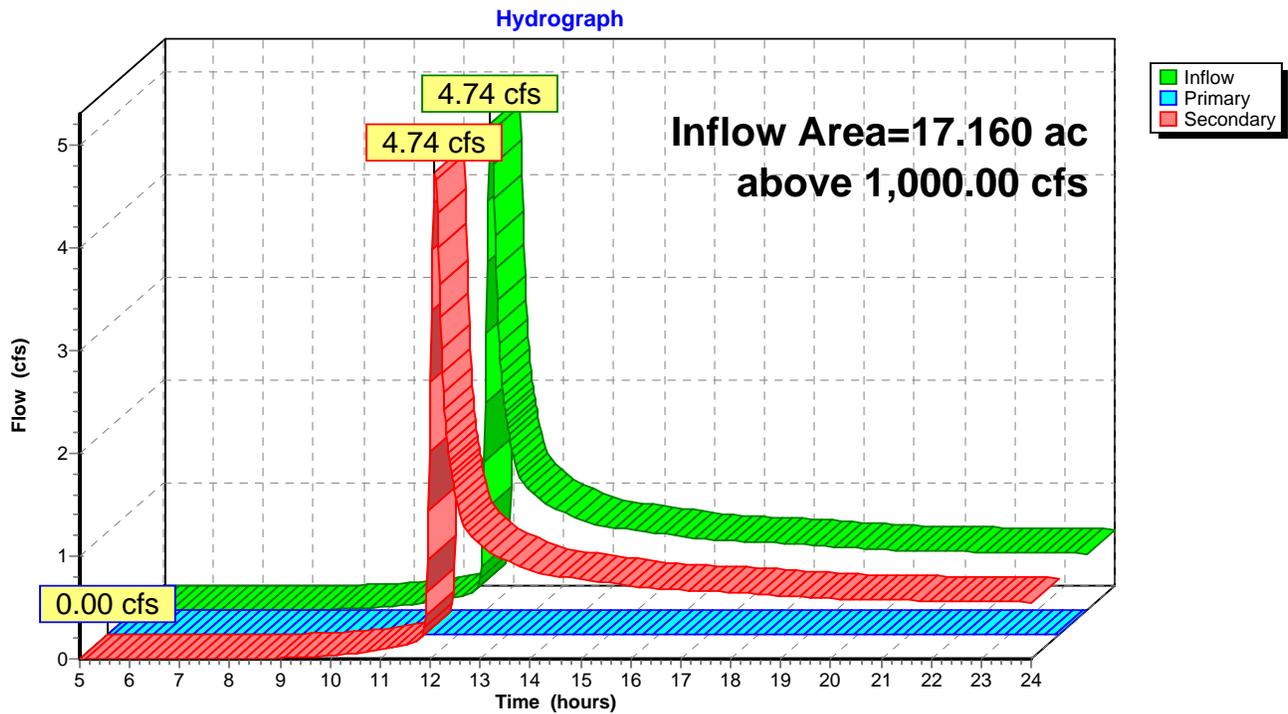
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**Summary for Link 8L: Combined Hydrograph**

Inflow Area = 17.160 ac, 26.90% Impervious, Inflow Depth > 0.57" for 2-Year event  
Inflow = 4.74 cfs @ 12.09 hrs, Volume= 0.811 af  
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min  
Secondary = 4.74 cfs @ 12.09 hrs, Volume= 0.811 af

Primary outflow = Inflow above 1,000.00 cfs, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs

**Link 8L: Combined Hydrograph**



**STORM STUDY - 1952**

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Type II 24-hr 25-Year Rainfall=6.41"

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**Summary for Subcatchment 5S: BASIN 1 TO POND**

Runoff = 52.49 cfs @ 11.96 hrs, Volume= 2.517 af, Depth> 4.79"

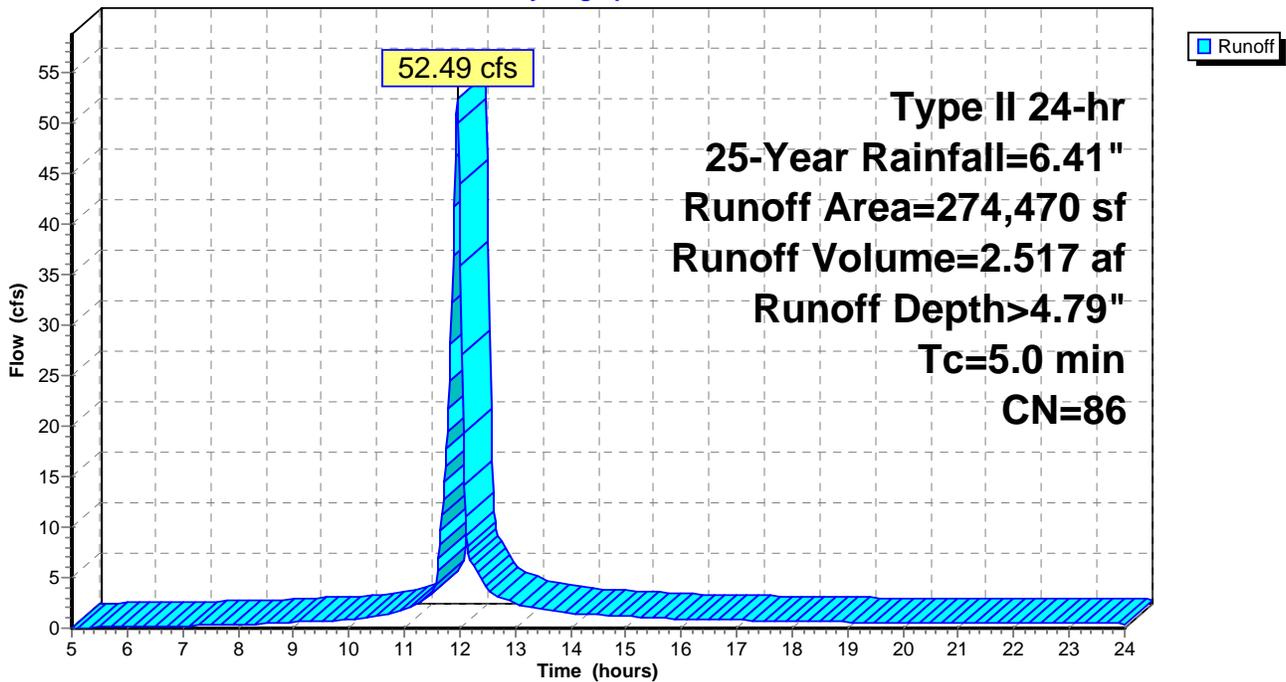
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 25-Year Rainfall=6.41"

Area (sf)	CN	Description
180,791	98	Paved parking, HSG B
80,509	61	>75% Grass cover, Good, HSG B
8,300	98	Water Surface, HSG B
4,870	55	Woods, Good, HSG B
274,470	86	Weighted Average
85,379		31.11% Pervious Area
189,091		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum Tc

**Subcatchment 5S: BASIN 1 TO POND**

Hydrograph



**STORM STUDY - 1952**

Prepared by Coulter Jewell Thames, PA

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Type II 24-hr 25-Year Rainfall=6.41"

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**Summary for Subcatchment 6S: BASIN 1 BYPASS POND**

Runoff = 27.21 cfs @ 12.07 hrs, Volume= 1.739 af, Depth> 1.92"

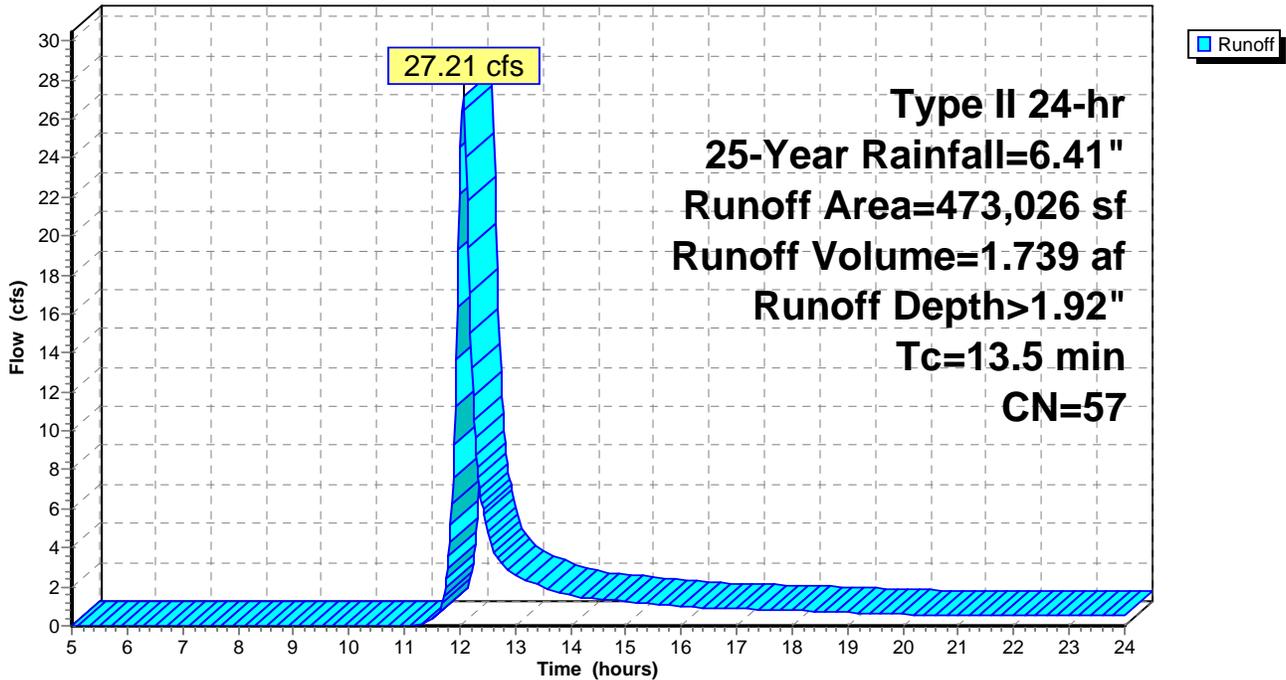
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 25-Year Rainfall=6.41"

Area (sf)	CN	Description
11,954	98	Paved parking, HSG B
57,225	61	>75% Grass cover, Good, HSG B
403,847	55	Woods, Good, HSG B
473,026	57	Weighted Average
461,072		97.47% Pervious Area
11,954		2.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5					Direct Entry,

**Subcatchment 6S: BASIN 1 BYPASS POND**

Hydrograph



**STORM STUDY - 1952**

Type II 24-hr 25-Year Rainfall=6.41"

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**Summary for Pond 7P: Pond**

Inflow Area = 6.301 ac, 68.89% Impervious, Inflow Depth > 4.79" for 25-Year event  
 Inflow = 52.49 cfs @ 11.96 hrs, Volume= 2.517 af  
 Outflow = 5.35 cfs @ 12.34 hrs, Volume= 1.138 af, Atten= 90%, Lag= 22.7 min  
 Primary = 5.35 cfs @ 12.34 hrs, Volume= 1.138 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 485.65' @ 12.34 hrs Surf.Area= 17,595 sf Storage= 63,119 cf

Plug-Flow detention time= 253.9 min calculated for 1.138 af (45% of inflow)  
 Center-of-Mass det. time= 137.4 min ( 928.3 - 790.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	481.00'	109,504 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
481.00	8,299	0	0
481.50	10,709	4,752	4,752
482.00	11,471	5,545	10,297
483.00	13,049	12,260	22,557
484.00	14,700	13,875	36,432
485.00	16,422	15,561	51,993
486.00	18,215	17,319	69,311
487.00	20,079	19,147	88,458
488.00	22,012	21,046	109,504

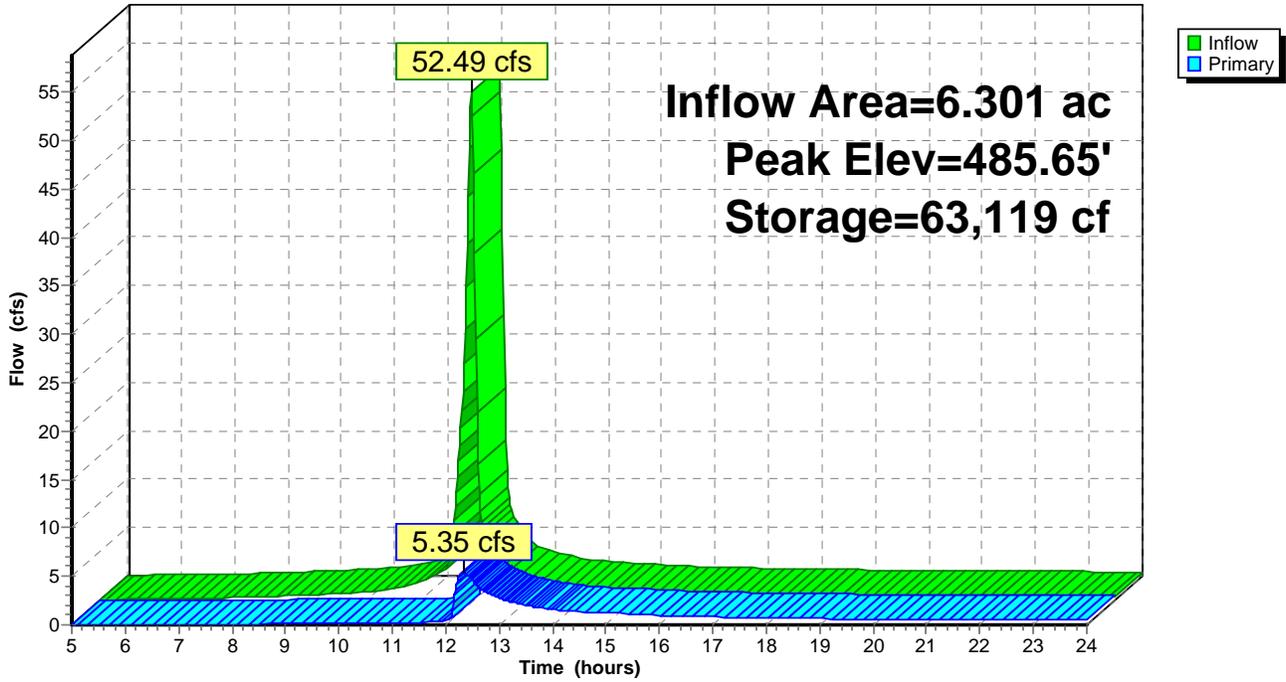
Device	Routing	Invert	Outlet Devices
#1	Primary	477.00'	<b>36.0" Round Culvert</b> L= 70.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 477.00' / 476.00' S= 0.0143 1/ S= 0.0143 1/ Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	485.50'	<b>72.0" x 72.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	481.00'	<b>3.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=5.25 cfs @ 12.34 hrs HW=485.65' (Free Discharge)

- 1=Culvert (Passes 5.25 cfs of 91.03 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 4.75 cfs @ 1.28 fps)
- 3=Orifice/Grate (Orifice Controls 0.50 cfs @ 10.25 fps)

**Pond 7P: Pond**

Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 25-Year Rainfall=6.41"

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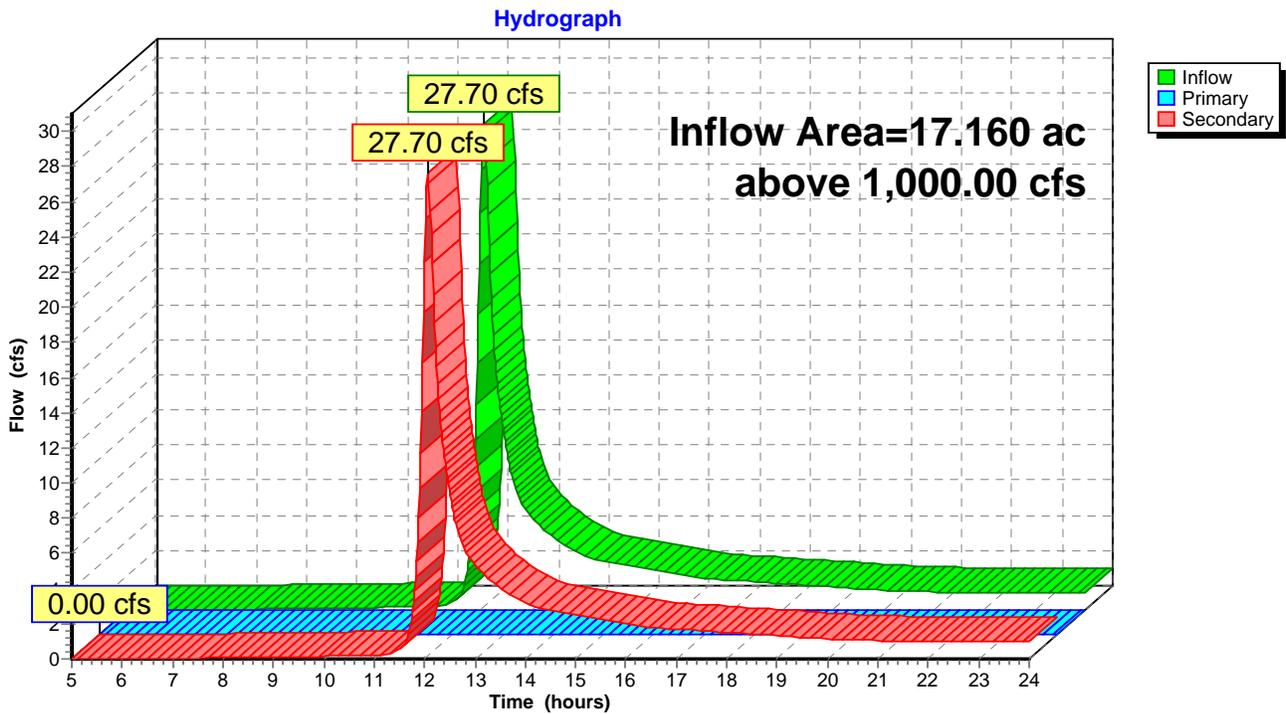
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**Summary for Link 8L: Combined Hydrograph**

Inflow Area = 17.160 ac, 26.90% Impervious, Inflow Depth > 2.01" for 25-Year event  
Inflow = 27.70 cfs @ 12.07 hrs, Volume= 2.877 af  
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min  
Secondary = 27.70 cfs @ 12.07 hrs, Volume= 2.877 af

Primary outflow = Inflow above 1,000.00 cfs, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs

**Link 8L: Combined Hydrograph**



**STORMWATER VOLUME  
CALCULATIONS (2-YR STORM)**

2-YEAR VOLUME SUMMARY

		2-YEAR VOLUME							
		PRE-DEVELOPMENT		POST-DEVELOPMENT					
BASIN 1	23435	CF	59503	CF					
BASIN 2	3877	CF	4530	CF					
		27312	CF	64033	CF	36721	CF	INCREASE	
						WET DETENTION POND	35067	CF	
							35067	CF	PROVIDED
							1654	CF	REMAINING

**STORM STUDY - 1952**

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Type II 24-hr 2-Year Rainfall=3.60"

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Page 1

**Summary for Subcatchment 1S: PRE-DEV BASIN 1**

Runoff = 3.94 cfs @ 12.18 hrs, Volume= 0.538 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

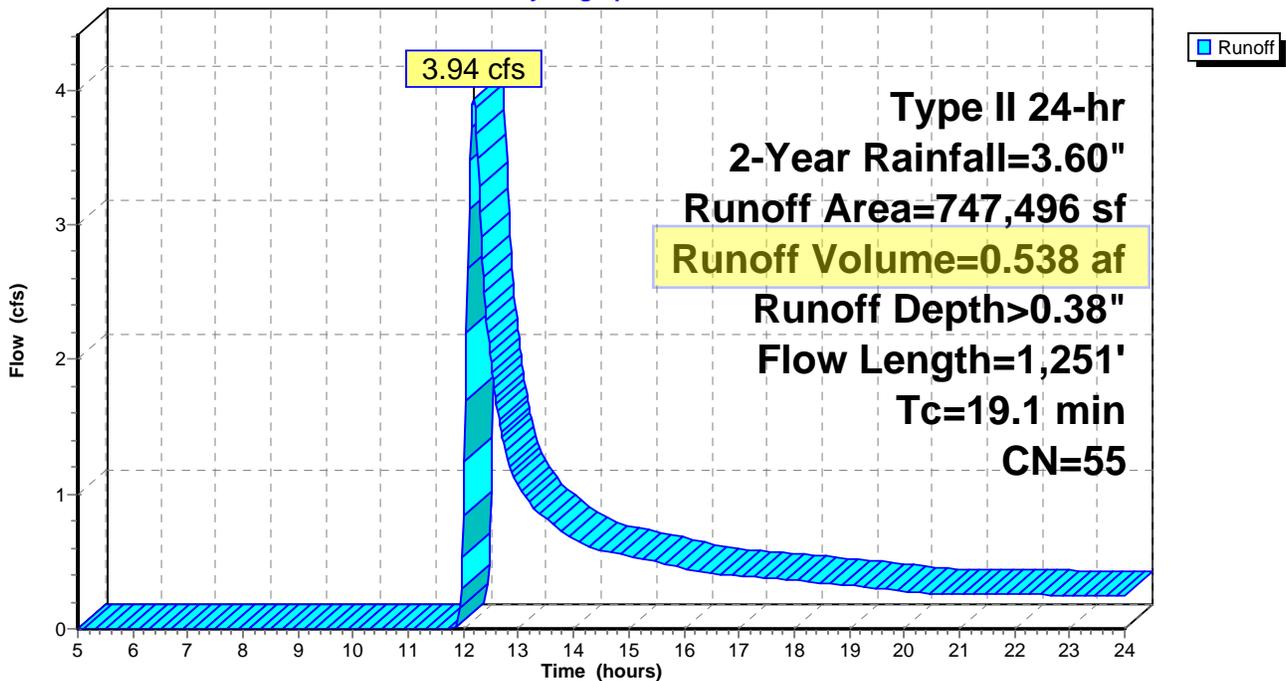
Area (sf)	CN	Description
15,948	61	>75% Grass cover, Good, HSG B
731,548	55	Woods, Good, HSG B
747,496	55	Weighted Average
747,496		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	75	0.0470	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
4.3	385	0.0880	1.48		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.2	791	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
19.1	1,251	Total			

**Subcatchment 1S: PRE-DEV BASIN 1**

Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 2-Year Rainfall=3.60"

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Page 2

**Summary for Subcatchment 2S: PRE-DEV BASIN 2**

Runoff = 0.80 cfs @ 12.17 hrs, Volume= 0.089 af, Depth> 0.49"

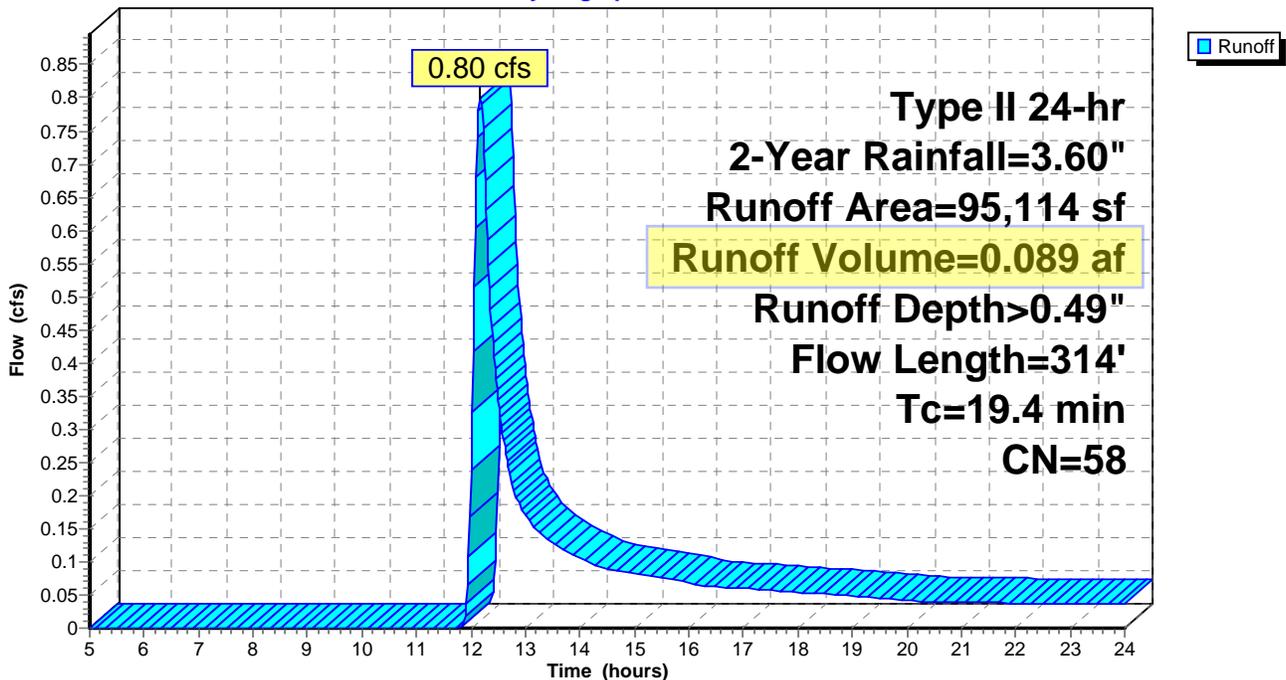
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
45,950	61	>75% Grass cover, Good, HSG B
49,164	55	Woods, Good, HSG B
95,114	58	Weighted Average
95,114		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

**Subcatchment 2S: PRE-DEV BASIN 2**

Hydrograph



**STORM STUDY - 1952**

Type II 24-hr 2-Year Rainfall=3.60"

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**Summary for Subcatchment 3S: POST-DEV BASIN 1**

Runoff = 20.85 cfs @ 12.07 hrs, Volume= 1.366 af, Depth> 0.96"

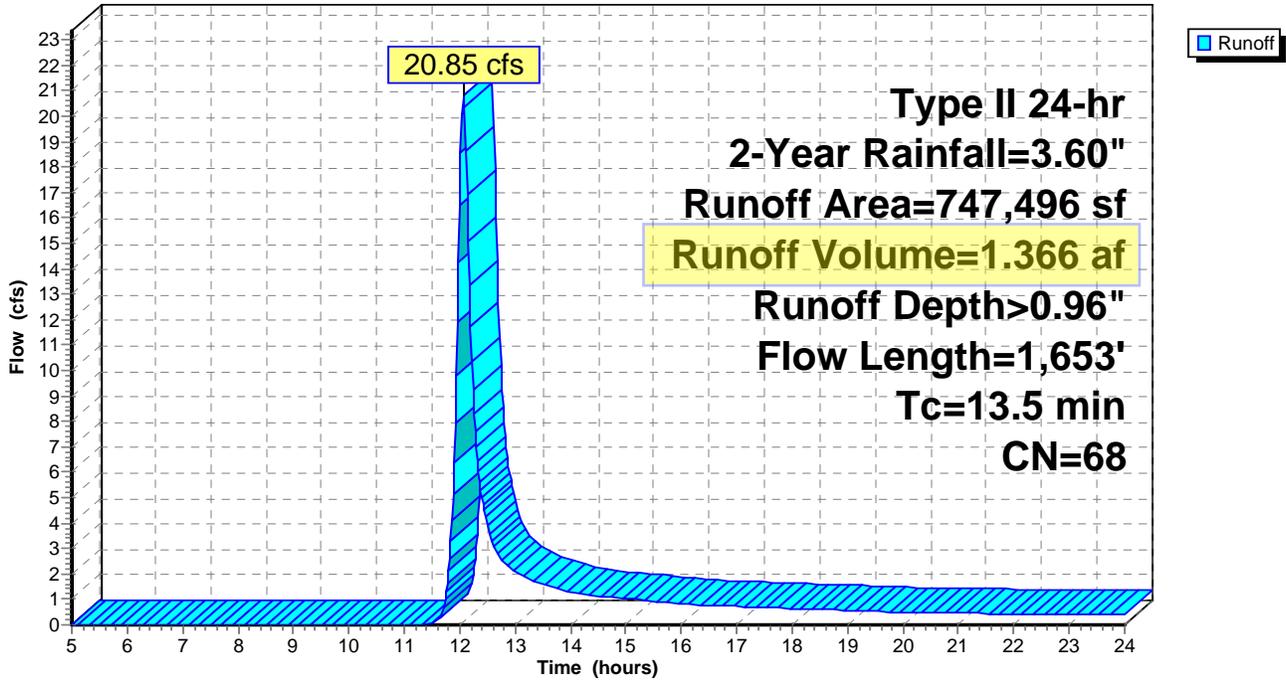
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
192,745	98	Paved parking, HSG B
137,734	61	>75% Grass cover, Good, HSG B
408,717	55	Woods, Good, HSG B
8,300	98	Water Surface, HSG B
747,496	68	Weighted Average
546,451		73.10% Pervious Area
201,045		26.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	48	0.0310	0.18		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.50"
1.7	182	0.0220	1.77	0.33	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.25' Z= 3.0 '/' Top.W=1.50' n= 0.030
2.8	297	0.0710	1.79	0.18	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=0.00' D=0.10' Z= 10.0 '/' Top.W=2.00' n= 0.030
4.6	1,126	0.0190	4.06	15.22	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=0.75' Z= 4.0 '/' Top.W=8.00' n= 0.030
13.5	1,653	Total			

**Subcatchment 3S: POST-DEV BASIN 1**

Hydrograph



**STORM STUDY - 1952**

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Type II 24-hr 2-Year Rainfall=3.60"

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Page 5

**Summary for Subcatchment 4S: POST-DEV BASIN 2**

Runoff = 1.03 cfs @ 12.16 hrs, Volume= 0.104 af, Depth> 0.57"

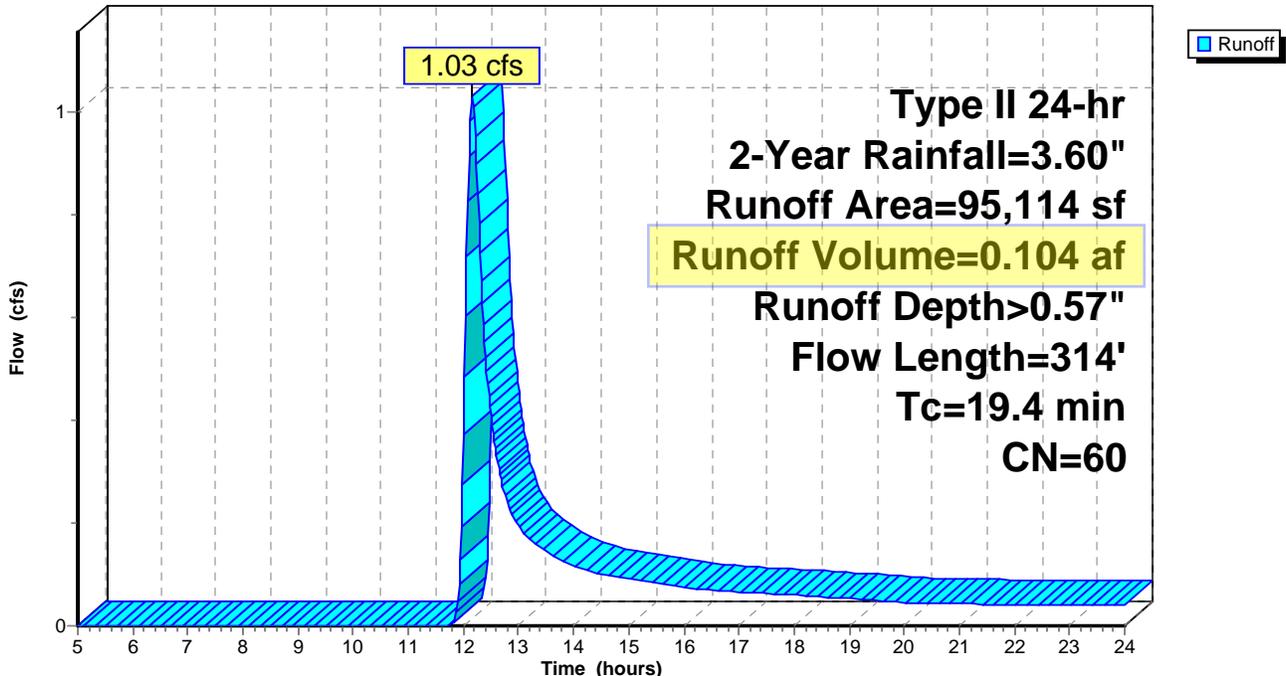
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
Type II 24-hr 2-Year Rainfall=3.60"

Area (sf)	CN	Description
4,861	98	Paved parking, HSG B
43,791	61	>75% Grass cover, Good, HSG B
46,462	55	Woods, Good, HSG B
95,114	60	Weighted Average
90,253		94.89% Pervious Area
4,861		5.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	75	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.50"
0.8	36	0.0200	0.71		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	165	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	38	0.0530	1.15		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
19.4	314	Total			

**Subcatchment 4S: POST-DEV BASIN 2**

Hydrograph



**STORM STUDY - 1952**

Type II 24-hr 2-Year Rainfall=3.60"

Prepared by Coulter Jewell Thames, PA

Printed 7/21/2020

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Page 1

**Summary for Pond 7P: Pond**

Inflow Area = 6.301 ac, 68.89% Impervious, Inflow Depth > 2.18" for 2-Year event  
 Inflow = 25.00 cfs @ 11.96 hrs, Volume= 1.147 af  
 Outflow = 0.39 cfs @ 17.38 hrs, Volume= 0.403 af, Atten= 98%, Lag= 325.3 min  
 Primary = 0.39 cfs @ 17.38 hrs, Volume= 0.403 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 483.91' @ 17.38 hrs Surf.Area= 14,546 sf Storage= 35,067 cf

Plug-Flow detention time= 373.8 min calculated for 0.403 af (35% of inflow)  
 Center-of-Mass det. time= 249.6 min ( 1,062.5 - 812.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	481.00'	109,504 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
481.00	8,299	0	0
481.50	10,709	4,752	4,752
482.00	11,471	5,545	10,297
483.00	13,049	12,260	22,557
484.00	14,700	13,875	36,432
485.00	16,422	15,561	51,993
486.00	18,215	17,319	69,311
487.00	20,079	19,147	88,458
488.00	22,012	21,046	109,504

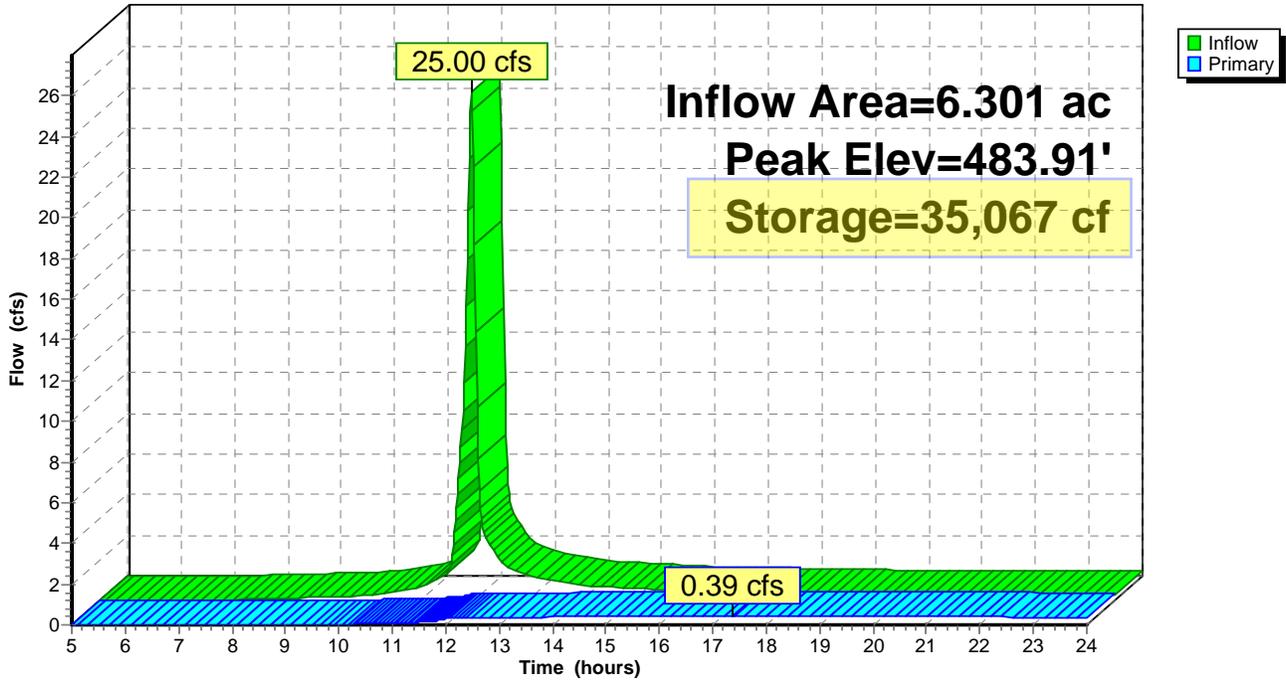
Device	Routing	Invert	Outlet Devices
#1	Primary	477.00'	<b>36.0" Round Culvert</b> L= 70.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 477.00' / 476.00' S= 0.0143 1/1' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	485.50'	<b>72.0" x 72.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	481.00'	<b>3.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=0.39 cfs @ 17.38 hrs HW=483.91' (Free Discharge)

- 1=Culvert (Passes 0.39 cfs of 79.14 cfs potential flow)
- 2=Orifice/Grate ( Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.39 cfs @ 8.03 fps)

**Pond 7P: Pond**

Hydrograph



# **PRELIMINARY POND CALCULATIONS**



Coulter Jewell Thames, PA

Project Name: Putt-Putt Fun Center  
Project Number: 1952

By: \_\_\_\_\_  
Date: \_\_\_\_\_

Revised: \_\_\_\_\_  
Date: \_\_\_\_\_

### Wet Pond Calculations - BASIN 6D

### Runoff Volume: Simple Method

Drainage Area = 6.30 ac  
Impervious Area = 4.15 ac

$$\text{Runoff volume } V = 3630 * R_d * R_v * A$$

$R_d$  = Design storm rainfall depth (1.0 in)

$R_v$  = Runoff coefficient (unitless)

$A$  = Drainage area (ac)

$$\text{Runoff coefficient } R_v = 0.05 + 0.9 * I_a$$

Impervious fraction ( $I_a$ ) = 0.66

$$R_v = 0.6428$$

#### Water Quality Volume Required:

$$V = 14,703 \text{ cf} \quad \text{min 3,630 for wetland}$$

#### Water Quality Volume Provided:

$$V = 14,703 \text{ cf} \quad \text{OK}$$

Total Drainage Area to Pond:	6.30	ac
Impervious Area:	4.15	ac
Impervious Percentage:	65.87%	
Assumed Pond Depth:	3.50	ft

SA/DA Ratio Calculation		Pond Depth (ft)				Assumed Depth
% Impervious	3	4	5	6	3.50	
20%	0.97	0.79	0.70	0.59	0.88	
30%	1.34	1.08	0.97	0.83	1.21	
40%	1.73	1.43	1.25	1.05	1.58	
50%	2.06	1.73	1.50	1.30	1.90	
60%	2.40	2.03	1.71	1.51	2.22	
70%	2.88	2.40	2.07	1.79	2.64	
80%	3.36	2.78	2.38	2.10	3.07	
90%	3.74	3.10	2.60	2.34	3.42	
% Impervious =	65.87%	→			SA/DA =	2.46

Required Permanent Pool SA =	0.155 ac 6764 sf
For a 3:1 length to width ratio:	
Required width	47.5 ft
Required length	142.5 ft
Required Storage Volume (Runoff from 1st 1" of rain)	
Rv =	0.643 in/in
Volume =	14703 cf

Permanent Pool SA Proposed =	8300 sf 0.191 ac OK
WQV Storage Provided =	14703 cf OK

## **SOILS, FLOOD, and USGS MAPS**



EnC HrB GID

TaD

1:990,000 FEET

**SITE**

Orange County Soil Survey  
Map 23

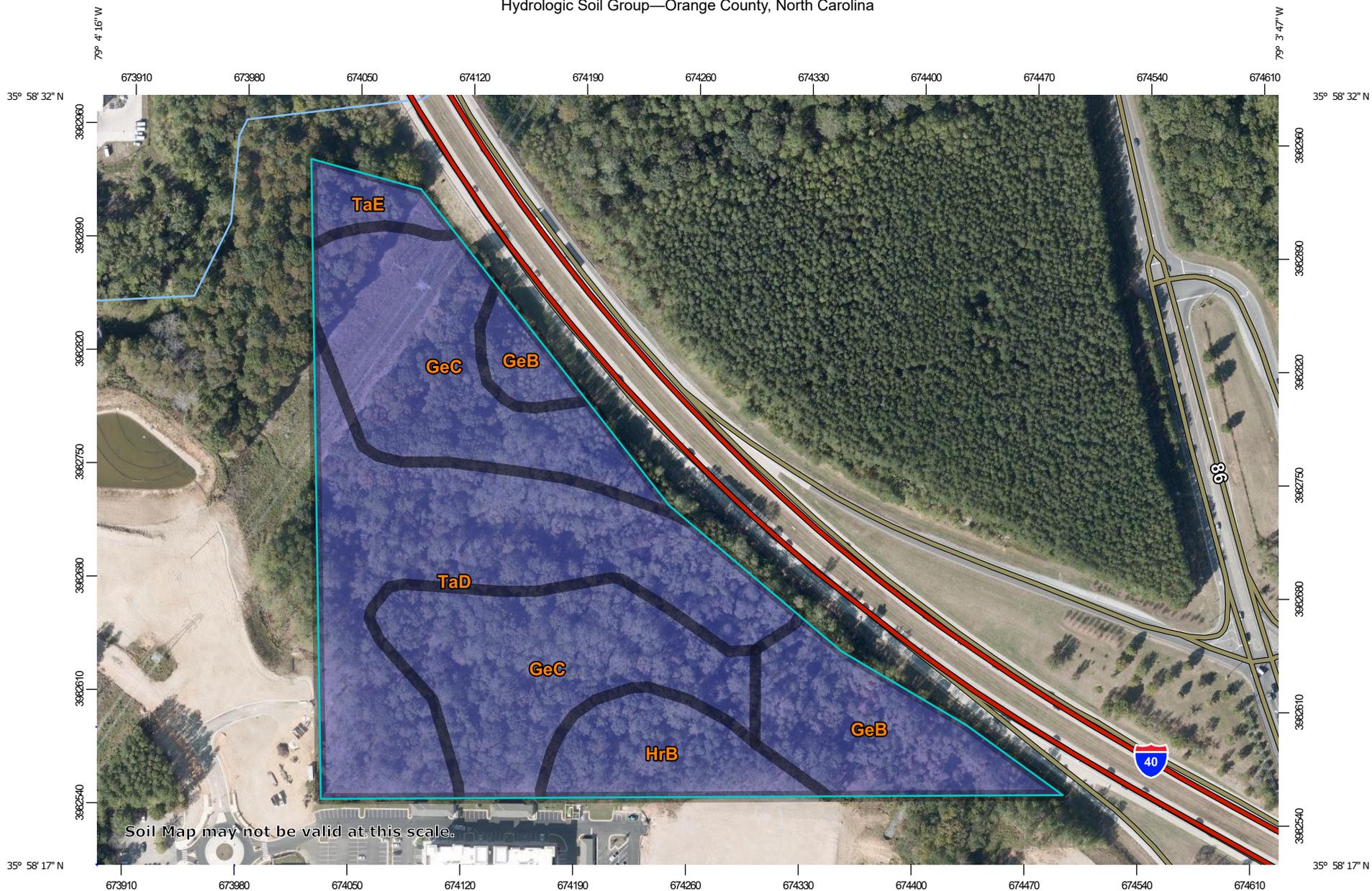
SITE

ORANGE COUNTY, NORTH CAROLINA - SHEET NUMBER 26

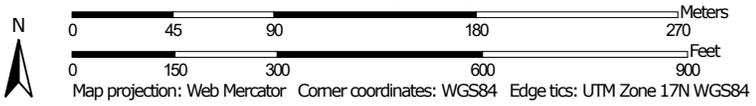
1:950 000 FEET



Hydrologic Soil Group—Orange County, North Carolina



Map Scale: 1:3,350 if printed on A landscape (11" x 8.5") sheet.



## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Lines

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

**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: Orange County, North Carolina  
 Survey Area Data: Version 19, Sep 16, 2019

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

Date(s) aerial images were photographed: Oct 9, 2019—Oct 19, 2019

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
GeB	Georgeville silt loam, 2 to 6 percent slopes	B	3.4	15.4%
GeC	Georgeville silt loam, 6 to 10 percent slopes	B	8.9	40.5%
HrB	Herndon silt loam, 2 to 6 percent slopes	B	2.0	8.9%
TaD	Tarrus silt loam, 8 to 15 percent slopes	B	7.1	32.2%
TaE	Tarrus silt loam, 15 to 25 percent slopes	B	0.7	3.0%
<b>Totals for Area of Interest</b>			<b>22.0</b>	<b>100.0%</b>

## 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.

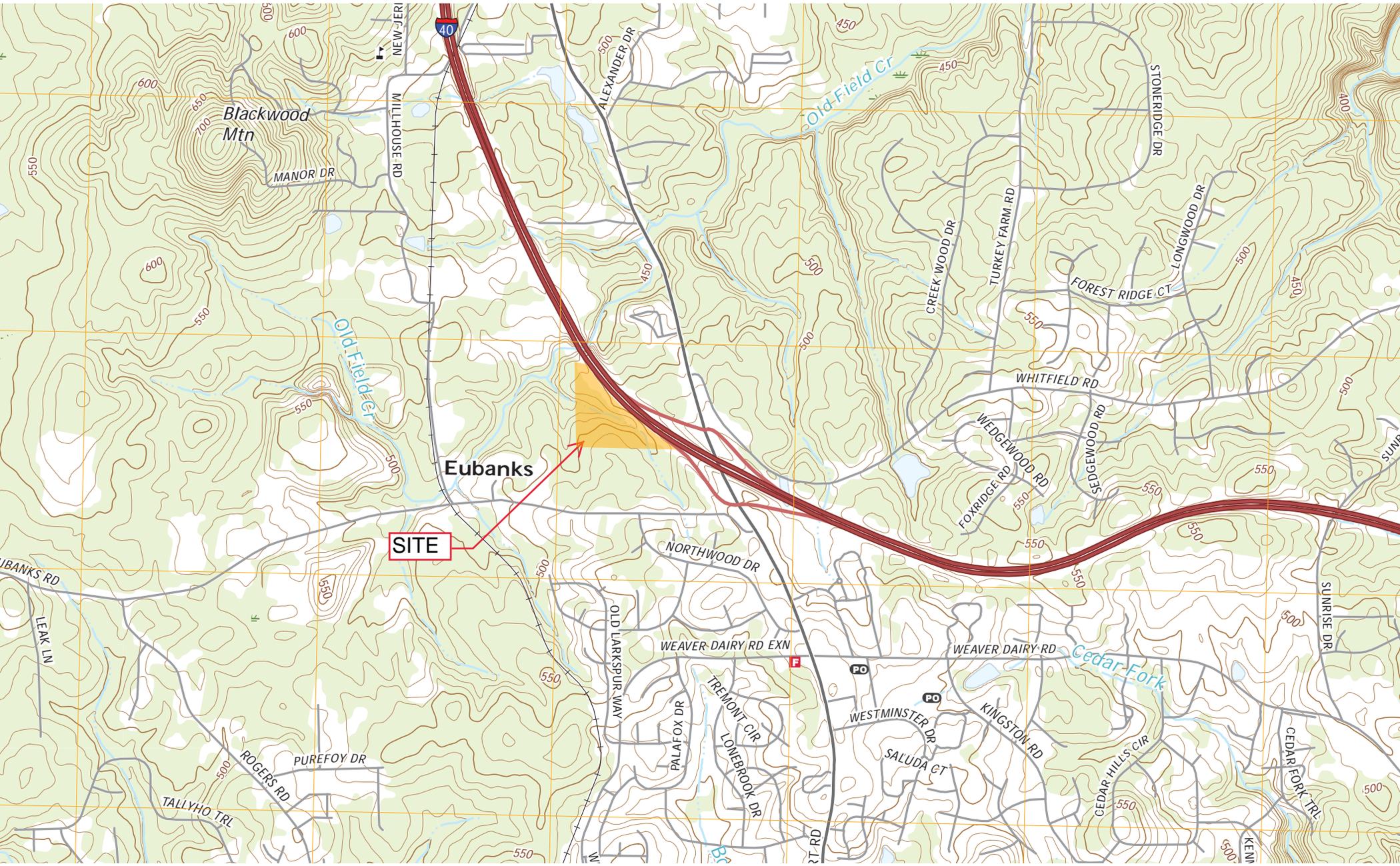
## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

Chapel Hill USGS Quad  
Map



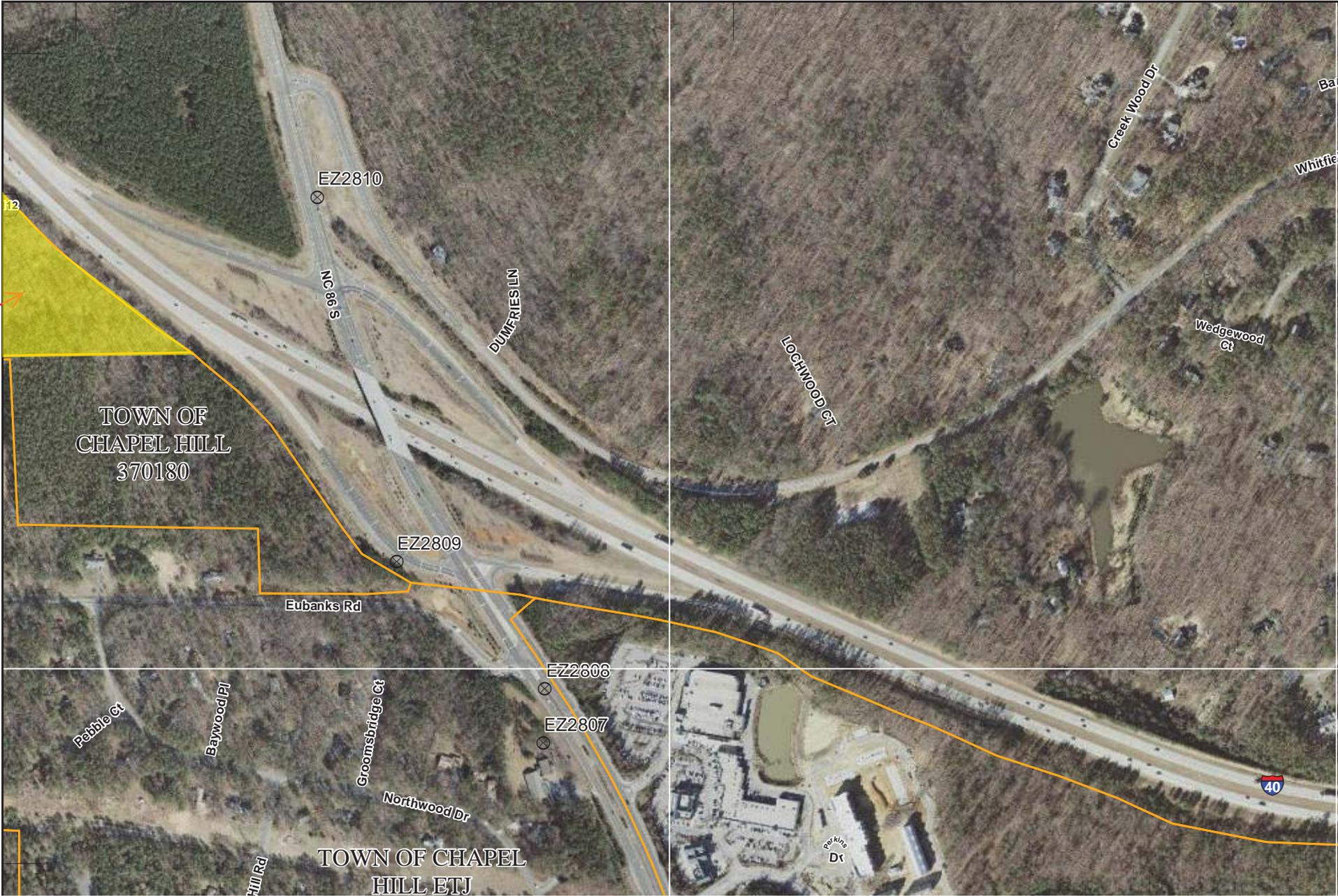
Map Number 3710988000K  
Panel 9880  
11/17/2017

1980000 FEET  
79°4'0"W

79°3'30"W

35°58'30"N

SITE



35°58'0"N

Map Number 3710987000K  
Panel 9870  
11/17/2017

SITE

79°5'0"W

79°4'30"W

198000 FEET

81000

35°58'30"N



TOWN OF  
CHAPEL HILL ETJ  
370180

TOWN OF  
CHAPEL HILL  
370180

ZONE AE

ZONE AE

Eubanks Rd

Millhouse Rd

Rex Rd

Salix St  
Vitex St  
Kousa Trl

Gin kgc Trl

EVERAM CT

YELSMAR  
LN

35°58'0"N

147

134

40

489.5

489.5

469.4

461.5