Ballentine
Associates, P.A.

Storm Water Impact Analysis

For

Fordham Blvd Apartments

1312 N. Fordham Boulevard,
Chapel Hill, North Carolina

(PIN: 9799-24-5697, 9799-24-2361)

Prepared by:

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BA Project # 116026.00

Issue Dates	Description
21 Apr 2017	E-F FDP Submittal #1

Project Overview:

Fordham Boulevard Apartments is a proposed multi-family project in Chapel Hill, NC, located on the west side of Fordham Boulevard off of the NCDOT Service Road. The site is located at the existing Days Inn site between the intersection of Ephesus Church Road and Fordham Blvd, and the intersection of Elliot road and Fordham Blvd. The project will include the demolition of the existing Days Inn and corresponding improvements. The remainder of the site will then be cleared, rough graded and stabilized. The project will include the construction of a large Multi-Family Apartment building, parking facilities and all remaining infrastructure.

Existing Site Description:

The existing site lies on a rectangular parcel that slopes gently from east to west toward Booker Creek. Booker Creek flows from north to south along our western property line to a large arch pipe system under Elliot Road along our southern property line. Our entire site drains to the point where Booker Creek enters the arch pipe system and this is our study point (See DA-3 and DA-4 in appendix A). A total of 35,025 SF (0.804 AC.) of off-site runoff enters the site from the NCDOT R/W (eastern property line) through an existing 15" RCP and discharges towards our western property line. The 15" RCP carries a portion of the NCDOT Service road runoff as well as a portion of the west bound lane of Fordham Blvd and the grass island between.

There is approximately 40,703 SF (0.934 AC) of impervious ground cover within the project property limits, all of which will be demolished. The off-site areas to the east contribute 25,499 SF (0.585 AC) impervious cover, and bring the total existing impervious cover up to 66,202 SF (1.520 AC) for the pre-developed state to the study point.

No streams are located within the property site but a few isolated wetlands exist along the western property line as shown in the Wetland Delineation report by PEI, dated March 9, 2017, which is attached in appendix E. The site lies in the Upper New Hope basin, as depicted in NCDEQ's Jordan Lake Nutrient Strategy Nonpoint Source Delivery Factors Map.

A copy of FIRM panel 3710979900K, Panel 9799 is included in Appendix A, confirms that this site lies within a special flood hazard area. A separate flood study and report has been generated separate from this stormwater impact analysis.

The NRCS Soils Survey mapping included in Appendix A shows that the soils on the site are 67% Urban land, and 33% WwC, White Store-Urban land complex (2 to 8% slopes), which belong to hydrologic soils group "D".

Proposed Project Description:

The proposed site features a new 6-story, approximately 294,593 s.f. building, with a parking garage, a small permeable parking lot with three outdoor parking spaces, an outdoor pool area, sidewalk and an area dedicated for a future TOCH greenway along the western property line. The proposed site has 112,000 sf of proposed impervious cover which is an increase of 71,297 sf of onsite impervious cover. It is important to note that a 2,566 SF allowance has been added into this figure to allow for minor future impervious expansions across the site.

The project will result in a total post-developed impervious cover of 136,988 SF (3.145 AC), which represents a net increase of 70,786 SF (1.625AC.) including offsite improvements, over existing conditions.

3.11.4.3 Stormwater Management Requirements:

This project must meet the town of Chapel Hill's LUMO Sec. 3.11 Ephesus/Fordham Form District current stormwater requirements, which include:

F. Design and Performance Standards.

1. Stormwater treatment shall be designed to achieve average annual 85% total suspended solids (TSS) and must apply to the volume of post-development runoff resulting from the first one-inch of precipitation. Alternative treatment methods to achieve 85% average annual TSS removal may be acceptable. The 85% requirement applies to 85% of the additional suspended solids that are the result of the new development.
2. The Stormwater runoff volume leaving the site post-development shall not exceed the Stormwater runoff volume leaving the site pre-development (existing conditions) for the local 2-year frequency, 24-hour duration storm event for all development. This may be achieved by hydrologic abstraction, recycling and/or reuse, or any other accepted scientific method.
3. The Stormwater runoff rate leaving the site post-development shall not exceed the Stormwater runoff rate leaving the site pre-development (existing conditions for the local 1-year, 2-year, and 25-year 24-hour storm events.
4. Notwithstanding subsection 3.11.4.3.F.1 the minimum impervious area treated for 85% TSS removal shall be 50 percent of the post construction total impervious area.

Proposed Stormwater Management:

The project as proposed includes two Stormwater Control Measures (SCM's) to provide the required water quality treatment. These SCM's include a Storm Filter/Detention System and a Permeable Pavement system. The manner in which these SCM's provide the required Stormwater management is described below:

1. 85% TSS Removal – The two proposed SCM systems will treat a combined 73,404 SF (1.685 AC) of impervious cover, which exceeds the proposed 70,786 SF of net added impervious areas from the development of this project. Refer to Appendix B for SCM sizing calculations and to Appendix A for drainage area mapping showing the subareas described below:
    - Storm Filter: The Storm Filter/Detention System will treat 52,000 SF (1.194 AC) of impervious cover. The Storm Filter is designed according Section D-1 of the 2017 NCDEQ Stormwater Design Manual (revised January 3, 2017).
    - Permeable Pavement: The Permeable Pavement System will treat an impervious area of 20,252 SF (0.465 AC), comprised of a portion of the screened building roof, concrete walks, and the parking surface itself. The Permeable Pavement system is designed

according to Section C-5 of the 2017 NCDEQ Stormwater Design Manual (revised April 6, 2017).

2. 2-Year Storm Volume Management – The site's two proposed SCM's will manage a combined volume of 5,891 cf, with its provided WQV treated. In addition the Underground detention system detains an additional 5,068 cf and releases the volume in 2-5 days. In combination with the provided WQV, the provided SCM's treat and contain a total of 10,959 cf, which exceeds the "2-Year Delta" Volume of 10,747 cf resulting from the development of this site. Each SCM will feature a small orifice designed to draw down the 2-Year Delta Volume over a period of 2-5 days, which satisfies the 2-year storm volume management requirement. The calculations included in Appendix B support this conclusion.
3. Peak Flow Rate Attenuation – The sites SCM's will attenuate the post developed runoff rates to at or below the pre-developed conditions for the 1, 2, 25 and 100-year 24-hour storm events (Even though the 100-year is not required). A summary of the results are below._Calculations supporting this conclusion are provided in Appendix C.
4. N/A

Summary of Results:

The following table compares the pre-developed and post-developed peak flows and the required 2-yr, increased runoff volume "Delta" to be managed from each of the site's subareas:

	1-Year (cfs)			2-Year (cfs)		
	Pre	Post Un-detained	Post Detained	Pre	Post Un-detained	Post Detained
Study Point	11.85	15.46	8.10	15.62	19.25	13.47

	25-Year (cfs)			100-Year (cfs)		
	Pre	Post Un-detained	Post Detained	Pre	Post Un-detained	Post Detained
Study Point	30.77	34.15	30.57	38.85	42.03	37.75

2-Year Vol. (CF)			
Pre	Post	2-yr Volume Required	2-yr Volume Managed
23,874	34,620	10,747	10,959

Conclusion:

This project as proposed, will comply with Chapel Hill's LUMO Sec. 3.11 Ephesus/Fordham Form District current stormwater requirements.

List of Appendices:

- Appendix A - Maps
    - DA-1 Pre-Site Area Map
    - DA-2 Post-Site Area Map
    - DA-3 Pre-Drainage Area Map
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    - DA-5 Inlet Drainage Area Map
    - NRCS Soils Map – Hardbound
    - Web Soils Survey Map
    - Web Soils Survey Map – Hydrologic Soils Group
    - FIRM Panel
    - USGS Topographic Map
- Appendix B – Stormwater Design Calculations
    - Storm Filter Design Calculations
        - Sizing calculation
        - Equivalent drawdown calculation
    - Permeable Pavement Design Calculations
        - Sizing Calculation
        - Drawdown Calculation
    - 2- yr Delta Volume Calculations and Draw Down Calculations
        - Pre Developed 2-yr Volume Calculation
        - Post Developed & 2-yr Delta Volume Calculation
        - 2- yr Delta Volume and Draw Down Calculations
- Appendix C – 1, 2 and 25-yr Stormwater Management Calculations (PondPack)
    - Stormwater Management Schematic Map
    - Table of Contents
    - Master Network Summary
    - Supporting Calculation
- Appendix D – Storm Drainage Calculations (StormCAD)
    - Storm System Schematic
    - NCDOT Flex Table (10-year rainfall event)
    - Profiles showing 10-year HGL
    - NCDOT Flex Table (25-year rainfall event)
    - Profiles showing 25-year HGL
- Appendix E – Environmental Determinations
    - Mar. 6, 2014 Seasonal High Water Table Determination Report
    - March 9, 2017 Wetland Delineation Report
    - Nationwide Permit 18

- # Appendix A - Maps

  - DA-1 Pre-Site Area Map
  - DA-2 Post-Site Area Map
  - DA-3 Pre-Drainage Area Map
  - DA-4 Post-Drainage Area Map
  - DA-5 Inlet Drainage Area Map
  - NRCS Soils Map – Hardbound
  - Web Soils Survey Map
  - Web Soils Survey Map – Hydrologic Soils Group
  - FIRM Panel
  - USGS Topographic Map

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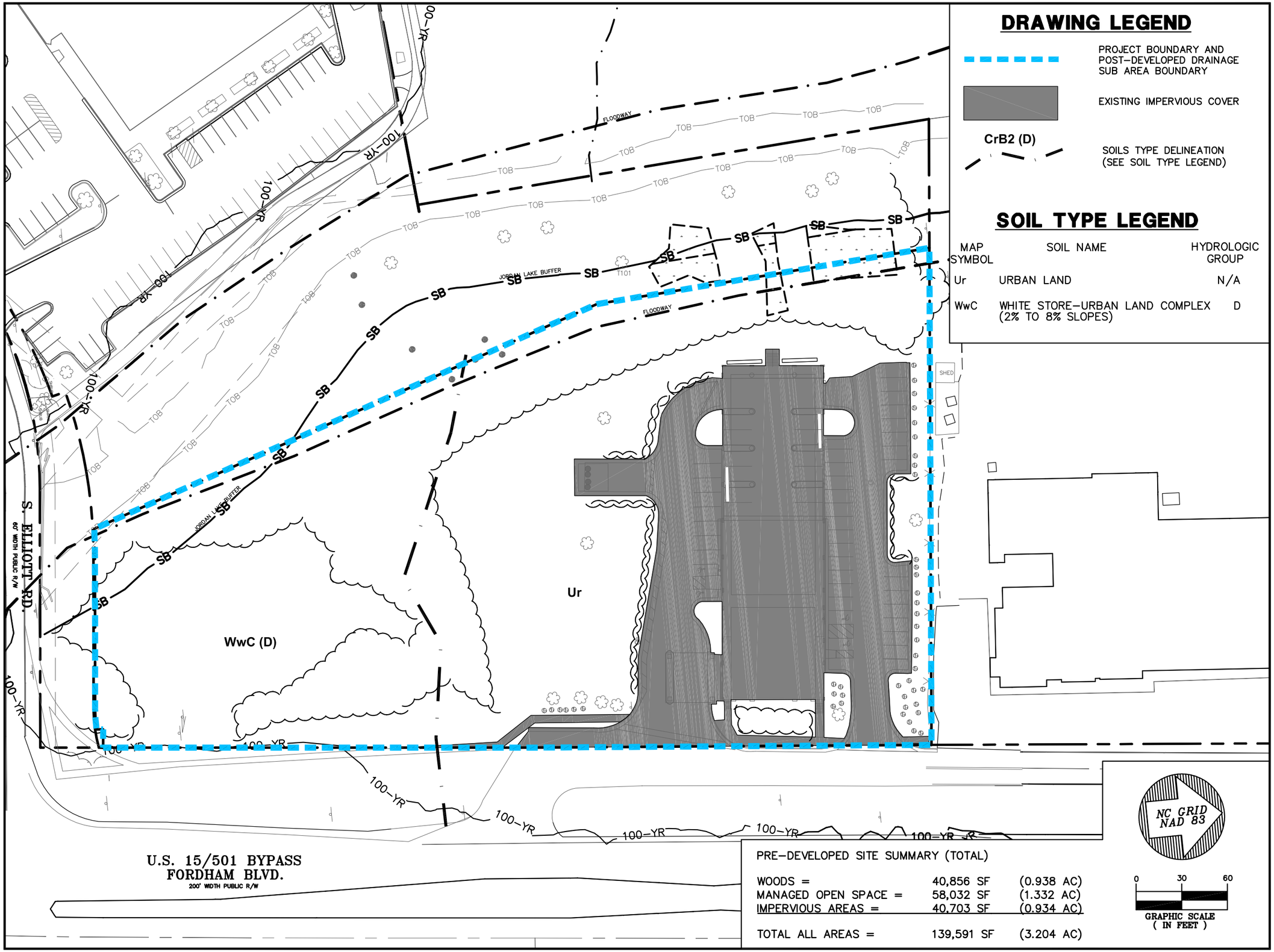

PRE-DEVELOPED SITE SUMMARY (TOTAL)

WOODS =	40,856 SF	(0.938 AC)
MANAGED OPEN SPACE =	58,032 SF	(1.332 AC)
IMPERVIOUS AREAS =	40,703 SF	(0.934 AC)
TOTAL ALL AREAS =	139,591 SF	(3.204 AC)

FORDHAM BLVD. APARTMENTS
PRE-DEVELOPED SITE AREA MAP

CHAPEL HILL, NC

NUM	REVISION	DATE	ISSUED	DATE
			TO TOCH	21 APR 17

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(919) 929 - 0481 (919) 489 - 4789

SCALE:	AS NOTED
DATE:	20 APR 17
JOB NUMBER:	116026.00
DRAWN BY:	D.W.S.
REVIEWED BY:	A.R.S.

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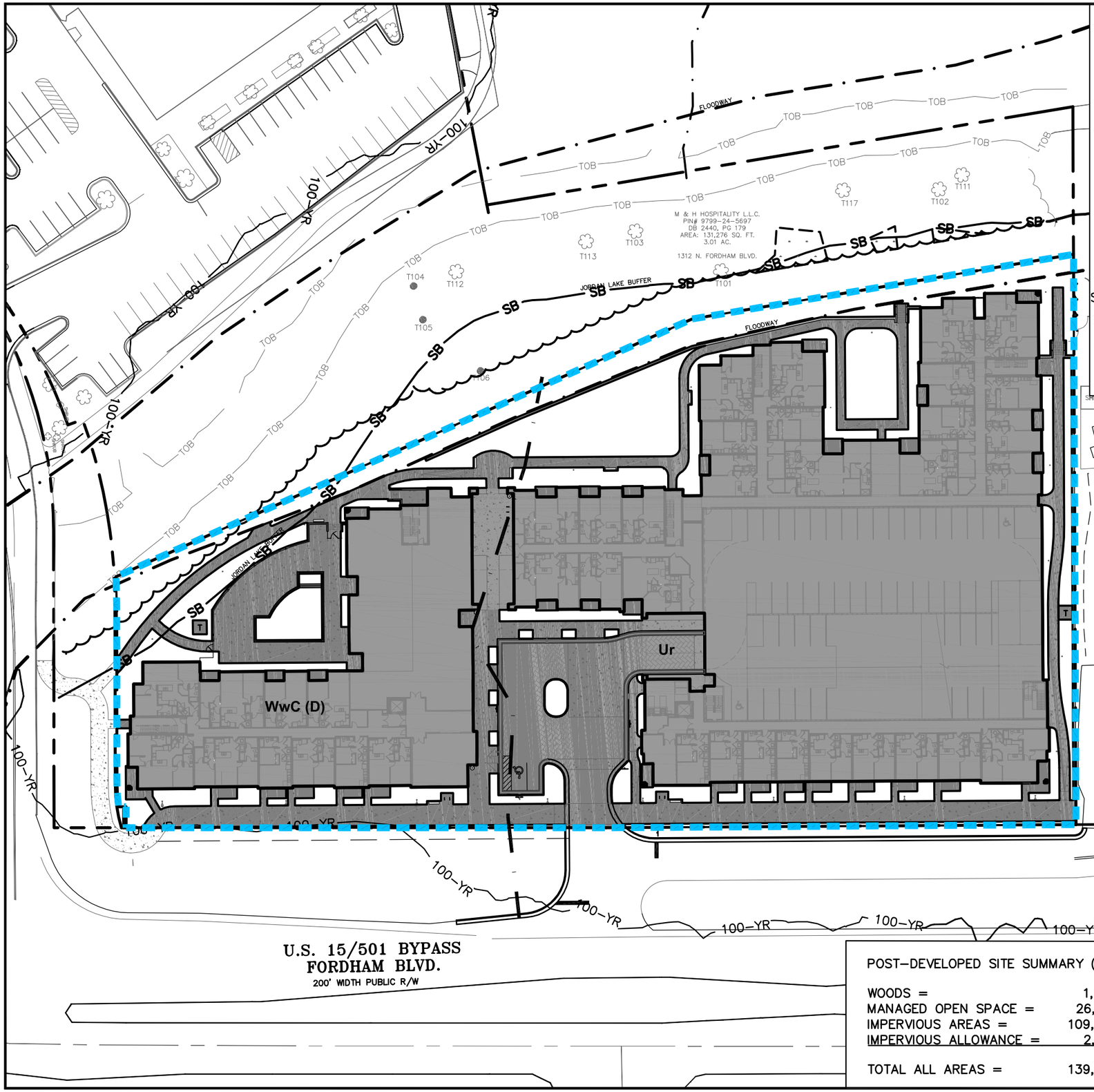

DRAWING LEGEND

PROJECT BOUNDARY AND POST-DEVELOPED DRAINAGE SUB AREA BOUNDARY

PROPOSED IMPERVIOUS COVER

CrB2 (D) — SOILS TYPE DELINEATION (SEE SOIL TYPE LEGEND)

SOIL TYPE LEGEND

MAP SYMBOL	SOIL NAME	HYDROLOGIC GROUP
Ur	URBAN LAND	N/A
WwC	WHITE STORE-URBAN LAND COMPLEX (2% TO 8% SLOPES)	D

POST-DEVELOPED SITE SUMMARY (TOTAL)

WOODS =	1,229 SF	(0.028 AC)
MANAGED OPEN SPACE =	26,362 SF	(0.605 AC)
IMPERVIOUS AREAS =	109,434 SF	(2.512 AC)
IMPERVIOUS ALLOWANCE =	2,566 SF	(0.059 AC)
TOTAL ALL AREAS =	139,591 SF	(3.204 AC)

NC GRID NAD 83

0 30 60
GRAPHIC SCALE (IN FEET)

FORDHAM BLVD. APARTMENTS
POST-DEVELOPED DRAINAGE AREA MAP
CHAPEL HILL, NC

NUM	REVISION	DATE	ISSUED	DATE
			TO TOCH	21 APR 17

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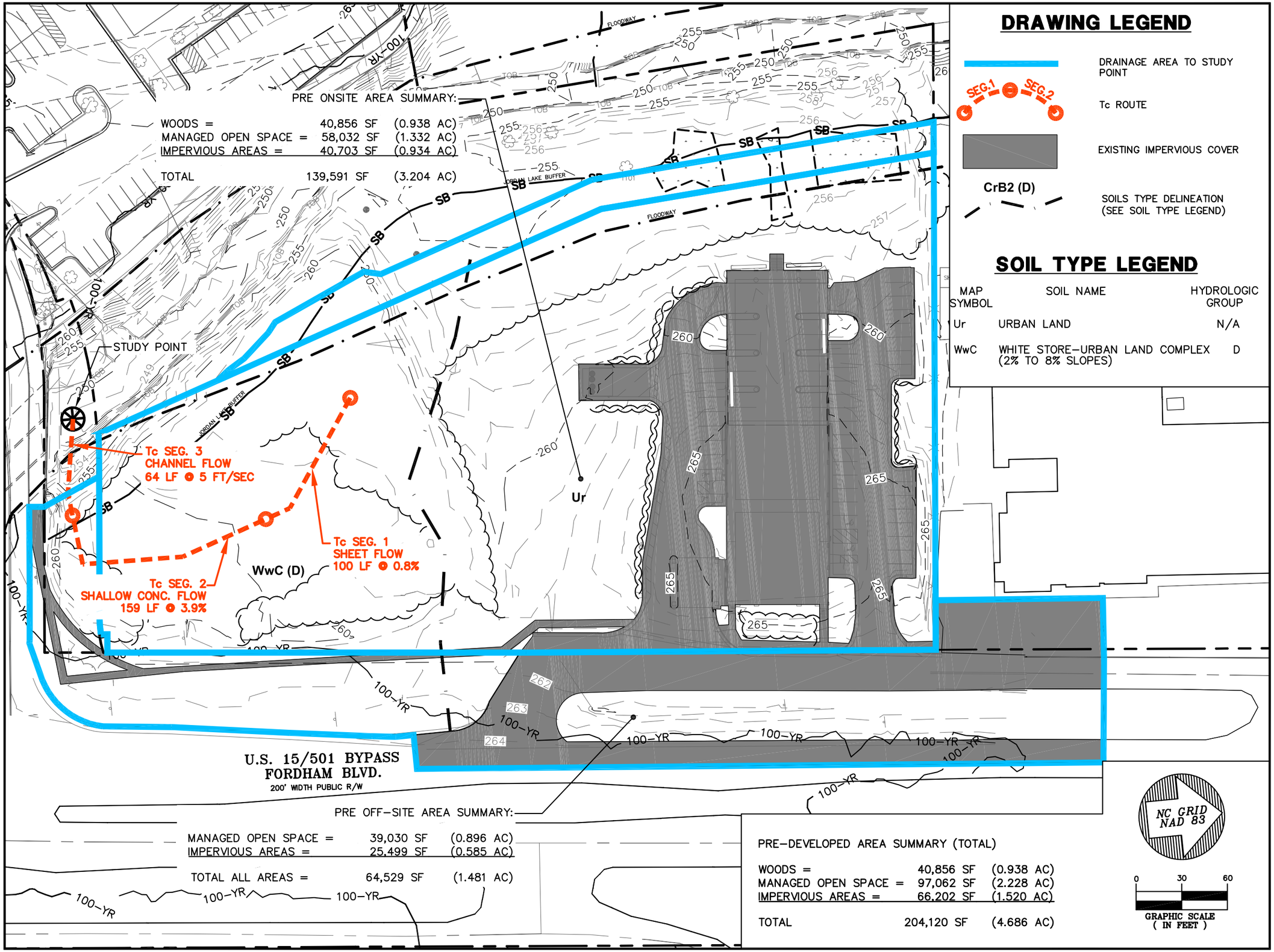

DRAWING LEGEND

- DRAINAGE AREA TO STUDY POINT
- SEG.1 – SEG.2: Tc ROUTE
- EXISTING IMPERVIOUS COVER
- CrB2 (D): SOILS TYPE DELINEATION (SEE SOIL TYPE LEGEND)

SOIL TYPE LEGEND

MAP SYMBOL	SOIL NAME	HYDROLOGIC GROUP
Ur	URBAN LAND	N/A
WwC	WHITE STORE–URBAN LAND COMPLEX (2% TO 8% SLOPES)	D

FORDHAM BLVD. APARTMENTS
PRE-DEVELOPED DRAINAGE AREA MAP
CHAPEL HILL, NC

NUM	REVISION	DATE

ISSUED	DATE
TO TOCH	21 APR 17

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DRAWN BY: D.W.S.
REVIEWED BY: A.R.S.

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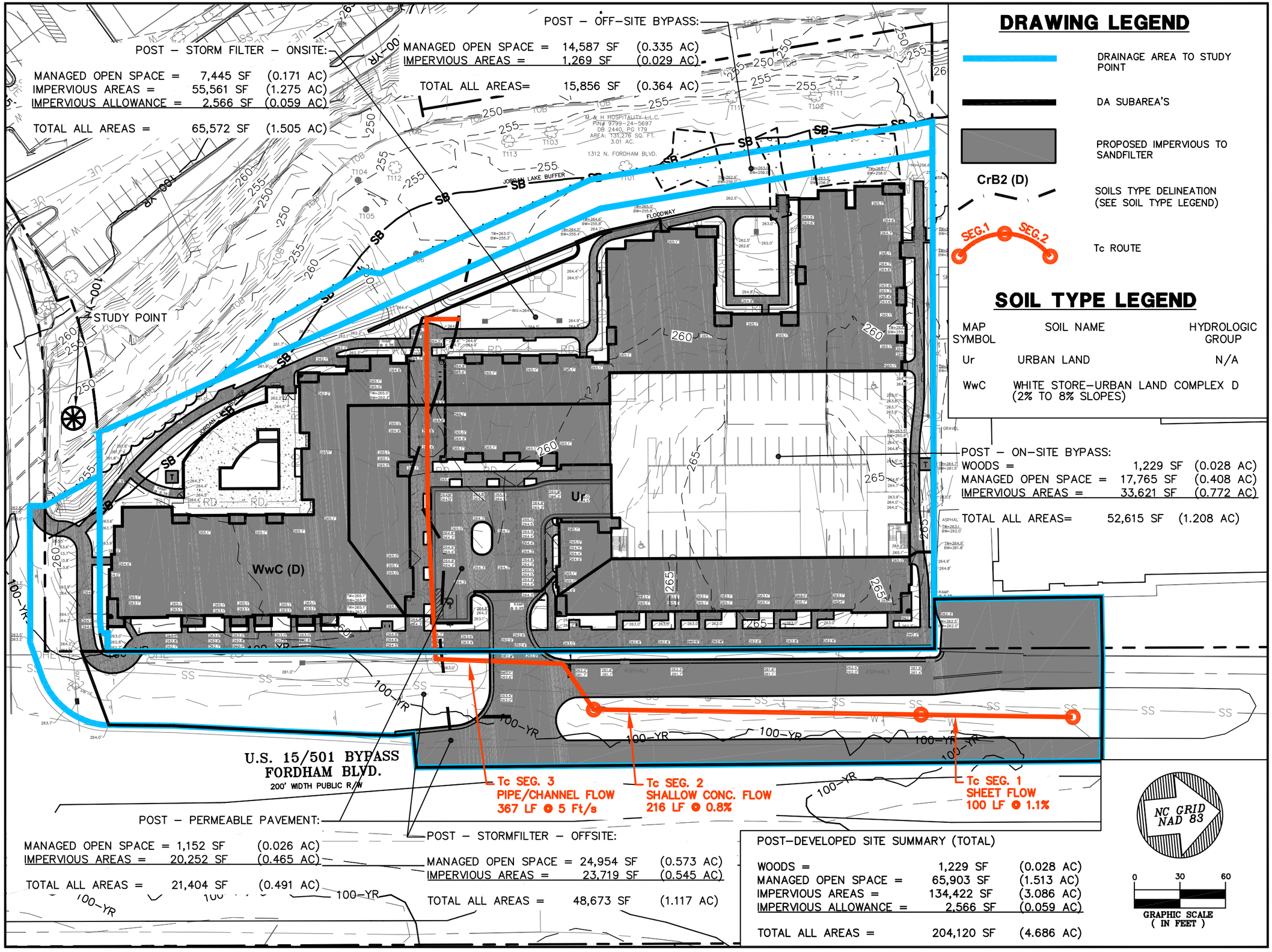

DRAWING LEGEND

- DRAINAGE AREA TO STUDY POINT
- DA SUBAREA'S
- PROPOSED IMPERVIOUS TO SANDFILTER
- CrB2 (D) — SOILS TYPE DELINEATION (SEE SOIL TYPE LEGEND)
- SEG.1 – SEG.2 — Tc ROUTE

SOIL TYPE LEGEND

MAP SYMBOL	SOIL NAME	HYDROLOGIC GROUP
Ur	URBAN LAND	N/A
WwC	WHITE STORE–URBAN LAND COMPLEX (2% TO 8% SLOPES)	D

FORDHAM BLVD. APARTMENTS
POST-DEVELOPED DRAINAGE AREA MAP
CHAPEL HILL, NC

NUM	REVISION	DATE
	ISSUED TO TOCH	21 APR 17

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JOB NUMBER: 116026.00
DRAWN BY: D.W.S.
REVIEWED BY: A.R.S.

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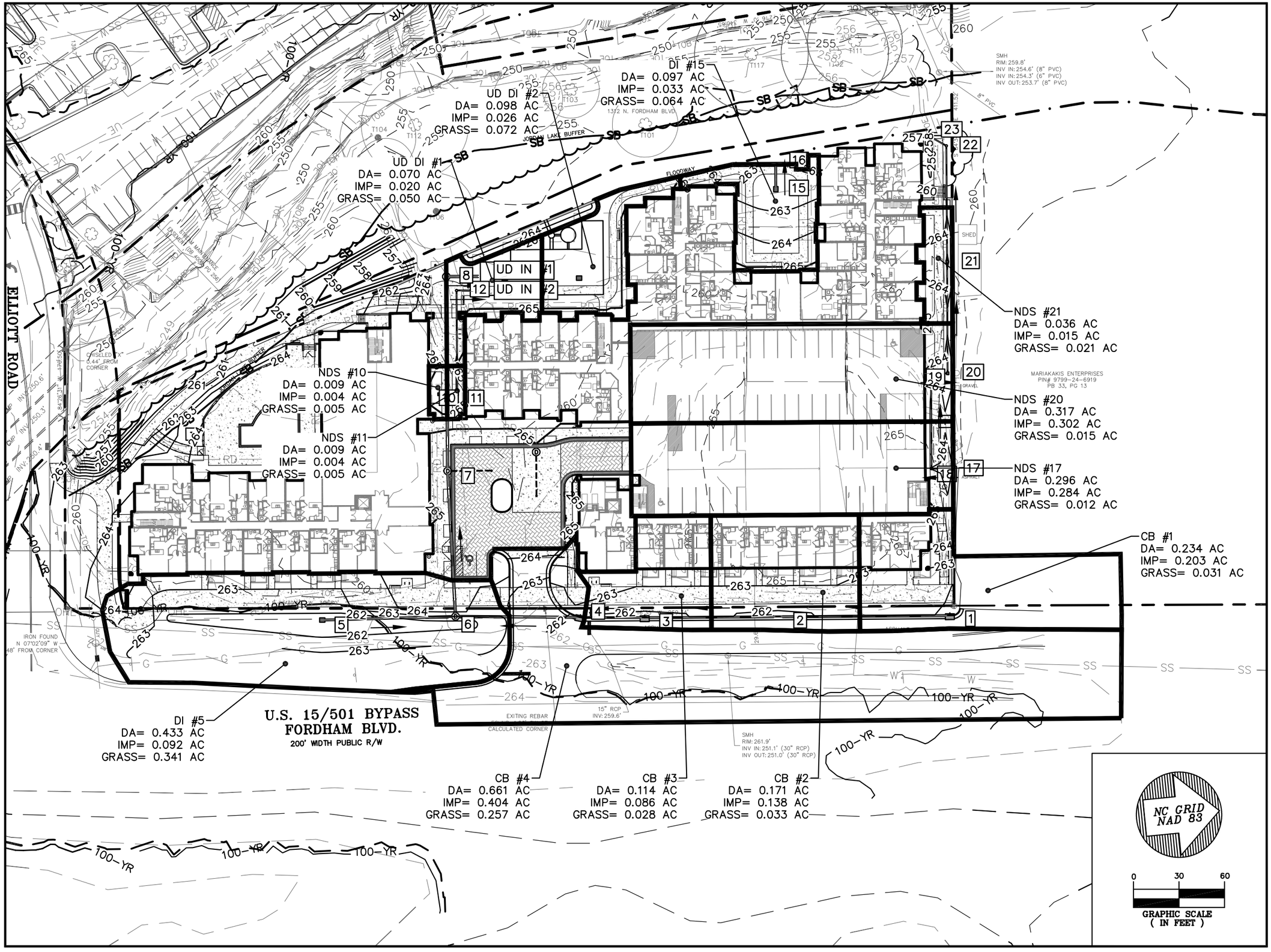

FORDHAM BLVD. APARTMENTS
INLET DRAINAGE AREA MAP

RALEIGH, NC

NUM	REVISION	DATE	ISSUED	DATE
			TO TOCH	21 APR 17

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DRAWN BY:	D.W.S.
REVIEWED BY:	G.J.R.

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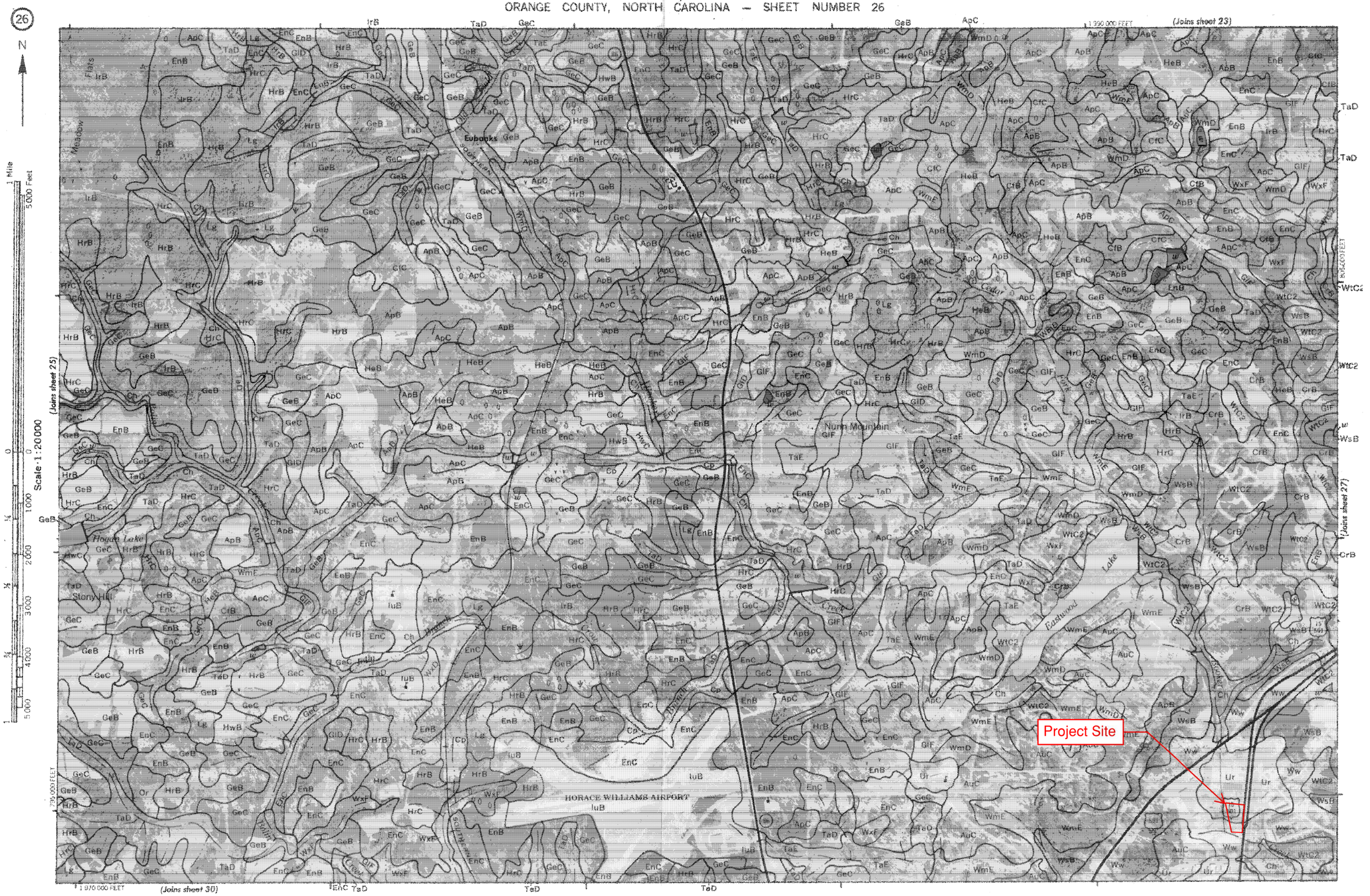
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1 Mile
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1 390 000 FEET
795 000 FEET
1 970 000 FEET
Eubanks
Hogan Lake
Stony Hill
Num Mountain
Eastwood Lake
HORACE WILLIAMS AIRPORT
Project Site

Soil Map—Orange County, North Carolina

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

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 16, Sep 20, 2016

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

Date(s) aerial images were photographed: Apr 27, 2014—May 6, 2014

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.

Map Unit Legend

Orange County, North Carolina (NC135)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ur	Urban land	2.3	67.0%
WwC	White Store-Urban land complex, 2 to 8 percent slopes	1.1	33.0%
Totals for Area of Interest		**3.4**	**100.0%**

Hydrologic Soil Group—Orange County, North Carolina

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

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Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Orange County, North Carolina (NC135)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Ur	Urban land		2.3	67.0%
WwC	White Store-Urban land complex, 2 to 8 percent slopes	D	1.1	33.0%
Totals for Area of Interest			**3.4**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map flood hazard areas at the local level. As a part of this effort, the State of North Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

FLOOD HAZARD INFORMATION

HTTP://FRIS.NC.GOV/FRIS

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with Average Depth Less Than One Foot or With Drainage Areas of Less Than One Square Mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*

OTHER AREAS
- Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Non-accredited Levee, Dike, or Floodwall
- BM5510 North Carolina Geodetic Survey bench mark
- BM5510 National Geodetic Survey bench mark
- BM5510 Contractor Est. NCFMP Survey bench mark

012 18.2

8

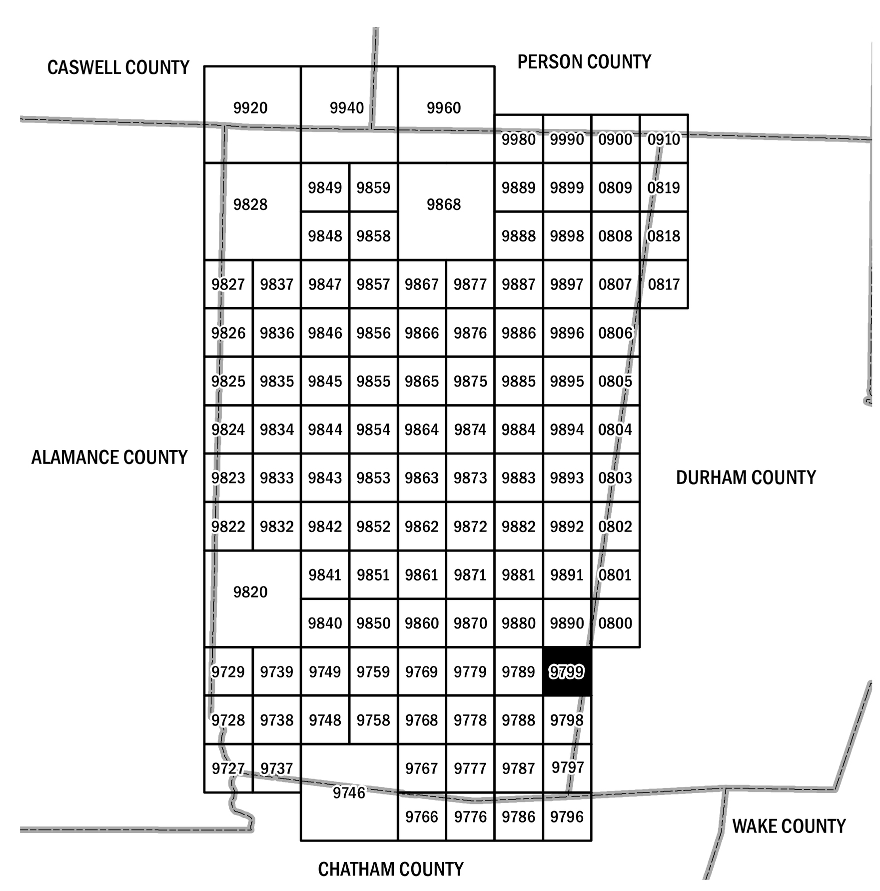
CBRS Area

Otherwise Protected Area

1:6,000

Feet: 0, 250, 500, 1,000

Meters: 0, 75, 150, 300



FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

9799

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
CHAPEL HILL, TOWN OF	370180	9799	K
DURHAM, CITY OF	370086	9799	K

3710979900K

02/02/07

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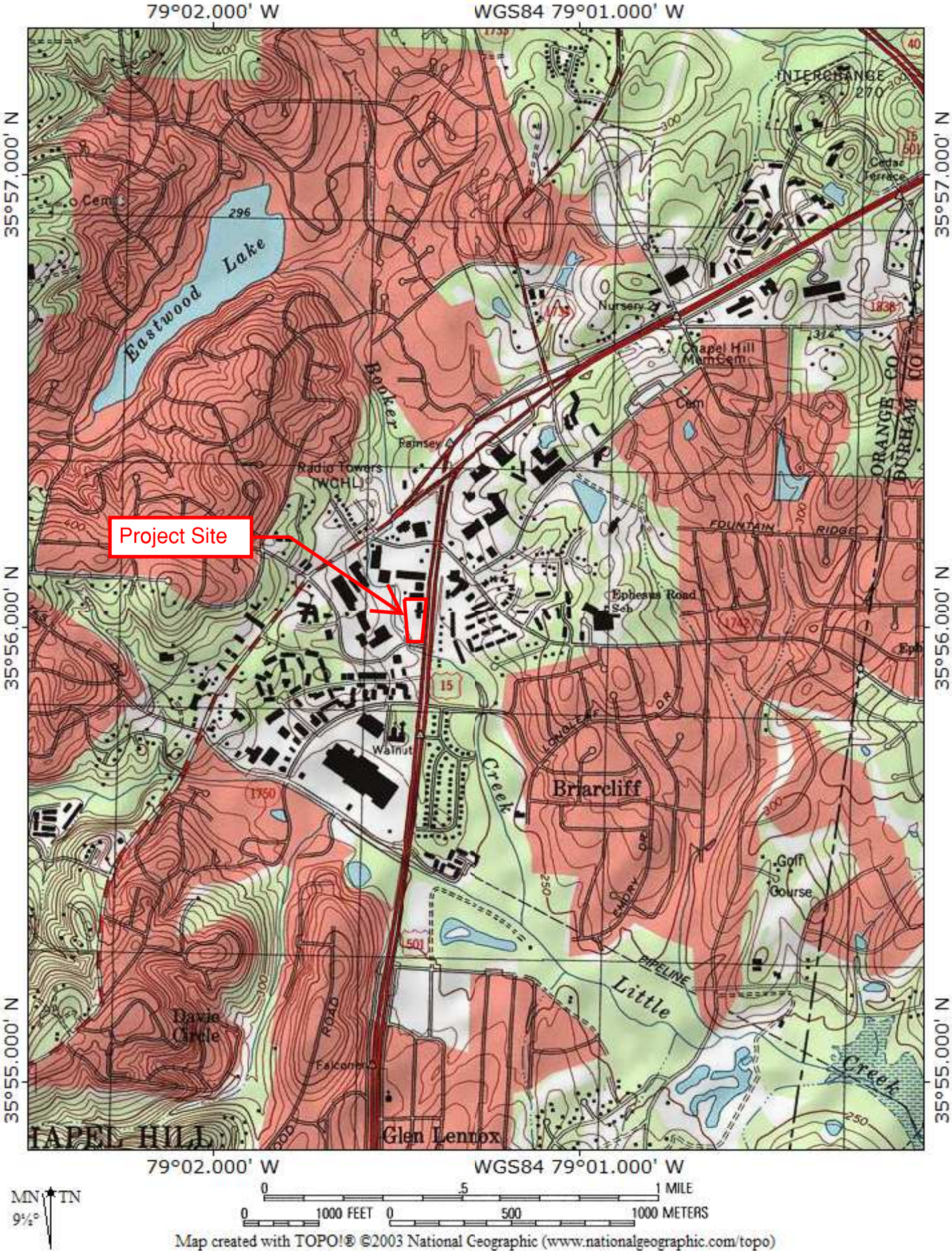


MN TN
9½°

0 .5 1 MILE
0 1000 FEET 0 500 1000 METERS

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

- **Appendix B – Stormwater Design Calculations**
    - Storm Filter Design Calculations
        - Sizing calculation
        - Equivalent drawdown calculation
    - Permeable Pavement Design Calculations
        - Sizing Calculation
        - Drawdown Calculation
    - 2- yr Delta Volume Calculations and Draw Down Calculations
        - Pre Developed 2-yr Volume Calculation
        - Post Developed & 2-yr Delta Volume Calculation
        - 2- yr Delta Volume and Draw Down Calculations

Water Quality Design Volume Calculations (WQV)

PROJECT: Fordham Blvd. Apartments
PROJECT NO.: 116026.00
DATE: 8-Feb-17
LATEST PRINT DATE: 20-Apr-17

Ballentine Associates, P.A.

Storm Filter #1

The following calculations are based on Section 3.3.1 of the July 2007 NCDENR "Stormwater Best Management Practices Manual" (with 6/16/09 revs.)

1) Calculate Ia, the impervious fraction of area draining to BMP:

Drainage Area = 1.19 acres 52000 sf

Impervious Area = 1.19 acres 52000 sf

Ia = 1.00

2) Find the volume of the 1" storm using the "Simple Method" (Shueler 1987):

Rv = 0.05 + 0.9 (Ia)

Rv = runoff coefficient (ratio of runoff to rainfall in inches)
Ia = percent impervious

Rv = 0.05 + 0.9(1.00) = 0.95 in/in

Volume of 1" storm:

volume = Rv x design rainfall x drainage area
= 0.95 x 1" x 1/12 ft/in x 1.19 = 0.095 acre feet
= 4116.7 cubic feet

The following calculations are based on Section 11.3.5 of the July 2007 NCDENR "Stormwater Best Management Practices Manual" (with 9/20/09 revs.)

1) Water Quality Volume (See separate WQV Calcs):

WQV = 4116.7 cubic ft.

WQV_{adj} = 0.75 x WQV = 0.75 x 4116.7 = **3088** cubic ft. (Required)

3167 cubic ft. (Provided)

Storm Filter Equivalent Drawdown Orifice Sizing Calculations

Ballentine Associates, P.A.

PROJECT:	**Fordham Blvd. Apartments**
PROJECT NO.:	**116026.00**
DATE:	**9-Feb-17**
LATEST PRINT DATE:	**20-Apr-17**

BMP: **Storm Filter**

$Q = C_d A \times \sqrt{(2_g H_o)}$, where:

Q =	Discharge (cfs)
C_d =	Coefficient of discharge (0.60 is common for stormwater orifices)
A =	Cross-sectional area of flow at orifice entrance (sq. ft.)
g =	Acceleration from gravity (32.2 ft/sec^2)
H_o =	Driving Head (ft) - measured from centroid of orifice area to water surface
	[Use H_o/3 to reflect that head is falling as drawndown occurs]

Desired drawdown time =	**48**	**hrs. min.**	(48 hrs. min, 120 hrs. max)
Water Quality Volume =	**3088**	**cu. ft.**	(See WQV calcs)
Therefore, required Q =	**0.018**	**cfs (max)**	
Water Quality Depth =	**1.25**	**ft.**	(= H_o)
H_o/3 =	**0.417**	**ft.**	
C_d =	**0.60**		

$$A = \frac{Q}{C_d\sqrt{(2_g H_o)}}$$

Recommended A =	**0.005749**	**s.f.**		
Recomended Orifice Diameter =	**0.085576**	**ft.**		
=	**1.03**	**inches (max)**		
Diameter Chosen =	**1.00**	**inches**	A =	0.005451 s.f.
Actual Average Flow =	**0.017**	**cfs**		
Actual Drawdown Time =	**50.62**	**hrs.**	**OK**	

Check draw down depth provided

Drawn down volume =	**3167**	**cu. ft.**	(See WQV calcs)	
Ho, Total Draw Down Depth =	**1.25**	**ft.**	**Ho/3 =**	**0.417 ft.**
Actual Average Flow =	**0.017**	**cfs**		
Drain Time =	**51.92**	**hrs.**	**OK**	

Permeable Pavement Design Calcs

Permeable Pavement

Ballentine Associates, P.A.

PROJECT:	**Fordham Blvd. Apartments**
PROJECT NO.:	**116026.00**
DATE:	**8-Feb-17**
LATEST PRINT DATE:	**20-Apr-17**

The following calculations are based on Part C-5: Permeable Pavement of the NCDEQ "Stormwater Design Manual (with 01/03/2017 revs.) Robert Patterson, PE from NC DWQ assisted in the design of this spreadsheet.

PERMEABLE PAVEMENT DESIGN DATA:

Total Drainage Area to Permeable Pavement:		21404	sf
Surface Area of Permeable Pavement (SAPP):		4235	sf
Surface Area of Non-Pervious Contributing Built Upon Area (CBUA):		16017	sf
SA of Non-Pervious BUA with storage layer below **&** tied to PP layer		2491	sf
SA of Non-Pervious BUA - Screened Roof		8788	sf
Total Non-Pervious Area to Permeable Pavement (SAPP + CBUA):		20252	sf
Total Unavoidable Pervious Area to Permeable Pavement:		1152	sf
Surface Area of Underground Detention/Infiltration System (SAUD)		6726	sf
P = Design Storm Depth	P =	1	inch
n = Porosity of Stone used (obtained from a local rock quarry)	n =	0.435	
i (Meas)= Measured average in-situ soil infiltration rate (in/hr)	i =	0.001	in/hr
i (Des)= average in-situ soil infiltration rate (in/hr) used for Design	i =	0.001	in/hr
SF = Safety Factor	SF =	0.20	"From NCDEQ Stormwater Design Manual"

Measured in-situ soil infiltration rates		
Bore #	at subgrade (in/hr)	most restrictive (in/hr)
Mean	0.001	0.001
Avg. infiltration rate =		0.001

Use for design= 0.405

CHECK CBUA/SAPP RATIO:

R = Ratio of CBUA to SAPP: R = 0.70 OK, Meets NCDEQ's 1:1 Ratio

CALCULATE D_{WQ} (WATER QUALITY DEPTH):

D_{WQ} = P (1 + R) / n = 4.208 inches *(ref. p 18-19)*

D_{WQ} Depth = **4.21** inches 955 cf required

D_{WQ} Depth provided = **12** inches => 2724 cf provided OK, Depth Provided is greater than WQV Depth

CALCULATE PONDING TIME:

Ponding Time (T) = (P (1 + R))/(24hr/day*SF*I in/hr) *(ref. p 18-17)*

T = **355.09** days Reduce CBUA or place orifice to drain Dwq Depth, see Perm. Pave. Draw Down

VOLUME CREDIT RECEIVED IF LESS THAN 100%:

Volume Credit (What will infiltrate in 5 days, 0 to 1) = P_{max}/P

P_{max} = 24*5*i*SF/(P*(1+R)) = 0.01

*Note: Bottom must be open to surface to receive 85% TSS Removal

Volume infiltrated = 1.41%

Water Quality Volume Drawdown Calculations

PROJECT:	**Fordham Blvd. Apartments**
PROJECT NO.:	**116026.00**
DATE:	**8-Feb-17**
LATEST PRINT DATE:	**20-Apr-17**

Ballentine Associates, P.A.

D_{WQ} Volume Drain Time Calculations for Permeable Pavement 3:

$Q = C_d A \times \sqrt{(2_g H_o)}$, where:

	Discharge (cfs)
Q =	Coefficient of discharge (0.60 is common for stormwater orifices)
C_d =	Cross-sectional area of flow at orifice entrance (sq. ft.)
A =	Acceleration from gravity (32.2 ft/sec^2)
g =	Driving Head (ft) - measured from centroid of orifice area to water surface
H_o =	[Use H_o/3 to reflect that head is falling as drawdown occurs]

Desired Drain Time =	48	**hrs.**	48 - 120 hrs, required.	
D_{WQ} Volume Provided =	**2724.0**	**cu. ft.**	**Area of Permeable Pavement (SAPP):**	**6726** sf
Therefore, Desired Q =	**0.016**	**cfs**	**Void Ratio:**	0.405
Required D_{WQ}, Water Quality Depth =	**1**	**ft.**	**Water Quality Volume Depth (D_{WQ}):**	**12.00** in

H_o/3 =	**0.333**	**ft.**
C_d =	**0.60**	
A =	$\frac{Q}{C_d\sqrt{(2_g H_o)}}$	
A (Recommended) =	**0.005671**	**s.f.**
Recommended D =	**0.084993**	**ft.**

Recommended Orifice Diameter =	**1.020**	**inches**			
Diameter Chosen =	**1.000**	**inches**	A =	0.005451389 s.f.	**Calculated orifice area**
Actual Average Flow =	**0.015**	**cfs**			
Actual Drawdown Time =	**49.93**	**hrs.**	O.K., Required WQV Volume drains in 2-5 days		

Check Water Quality Depth Provided — **Provided Water Quality Volume Depth (D_{WQ}):** **12.00** in

Drawn down volume =	**2724.0**	**cu. ft.**		
H_o, Total Draw Down Depth =	**1.00**	**ft.**	**H_o/3 =**	**0.333** **ft.**
Actual Average Flow =	**0.015**	**cfs**		
Drain Time =	**49.93**	**hrs.**	O.K., Provided WQV Volume drains in 2-5 days	

2-Year Delta Volume Calculations

PROJECT: Fordham Blvd. Apartments
PROJECT NO.: 116026.00
DATE: 9-Feb-17
LATEST PRINT DATE:

Ballentine Associates, P.A.

Pre-Development Volume:

1) Find the volume of the pre-developed 2-yr storm:

$$Q = \frac{(P - 0.2S)^2}{(P+0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

Where:
Q = run off, in inches
P = Rainfall, in inches (P = 3.6 inches for 2-yr storm)
S = potential max. retention after rainfall begins, inches
CN = SCS Curve Number for water shed area

CN for Existing Site

Area (AC)	Area (SF)
3.20	139,591

Pre-Developed Site, CN = 84.371

S = 1.852 inches
Q = 2.052 inches

Volume of 2-yr storm = 23,874 CF (Impervious portion)

Total Drainage Area Existing Site = 3.20 AC

Total Vol. 2-yr, Pre-dev. storm = 23,874 CF

CN Area Collection - Pre-Site (Catchment)

Description	CN	Area (ft²)	Percent Connected Impervious Area (%)	Percent Unconnected Impervious Area (%)
Woods - good - Soil D	77.000	40,856.0	0.0	0.0
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	58,032.0	0.0	0.0
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	40,703.0	0.0	0.0

TOTAL AREA = 139,591 SF
CN = 84.371

2-Year Delta Volume Calculations

PROJECT: **Fordham Blvd. Apartments**
PROJECT NO.: **116026.00**
DATE: **9-Feb-17**
LATEST PRINT DATE: **20-Apr-17**

Ballentine Associates, P.A.

Post-Development Volume & Delta

2) Find the volume of the post-developed 2-yr storm:

$$Q = \frac{(P - 0.2S)^2}{(P+0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

Where:
Q = run off, in inches
P = Rainfall, in inches (P = 3.6 inches for 2-yr storm)
S = potential max. retention after rainfall begins, inches
CN = SCS Curve Number for water shed area

CN for Proposed Site Development

		Area (AC)	Area (SF)
Post-Developed Site, CN =	94.416	3.20	139,591

S = 0.591 inches
Q = 2.976 inches

Volume of 2-yr storm = 34,620 CF (Impervious portion)

Total Site Area = 3.20 AC

Total Vol. 2-yr, post-dev. storm = 34,620 CF

3) The 2-yr Delta:

(Post)		(Pre)		
34,620	-	23,874	=	**10,747 CF**

CN Area Collection - Post Site (Catchment)

Description	CN	Area (ft²)	Percent Connected Impervious Area (%)	Percent Unconnected Impervious Area (%)
Woods - good - Soil D	77.000	1,229.0	0.0	0.0
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	26,362.0	0.0	0.0
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	112,000.0	0.0	0.0

TOTAL AREA = 139,591 SF
CN = 94.416

2-year Delta Volume and Draw Down Calculations

PROJECT:	**Fordham Blvd. Apartments**
PROJECT NO.:	**116026.00**
DATE:	**9-Feb-17**
LATEST PRINT DATE:	**20-Apr-17**

Ballentine Associates, P.A.

2-year Delta Volume

2-Year Delta Volume Required:		**10,747**	**cf**	Note: 1" WQV to be drawn down in 6 hrs. Additional 2-Year Delta Volume required generally to be drawn down in 2-5 days, however a 1-inch min. orifice will draw down in just under 11 hrs.
WQV Volume Provided:	Storm Filter	**3,167**	**cf**	
WQV Volume Provided:	Permeable Pavement	**2,724**	**cf**	
Additional 2-Year Volume Required:	UG Detention	**4,856**	**cf**	

2-Year Delta Volume Draw Down Calculations:

$Q = C_d A \times \sqrt{(2_g H_o)}$, where:

	Discharge (cfs)
Q =	Coefficient of discharge (0.60 is common for stormwater orifices)
C_d =	Cross-sectional area of flow at orifice entrance (sq. ft.)
A =	Acceleration from gravity (32.2 ft/sec^2)
g =	Driving Head (ft) - measured from centroid of orifice area to water surface
H_o =	[Use H_o/3 to reflect that head is falling as drawndown occurs]

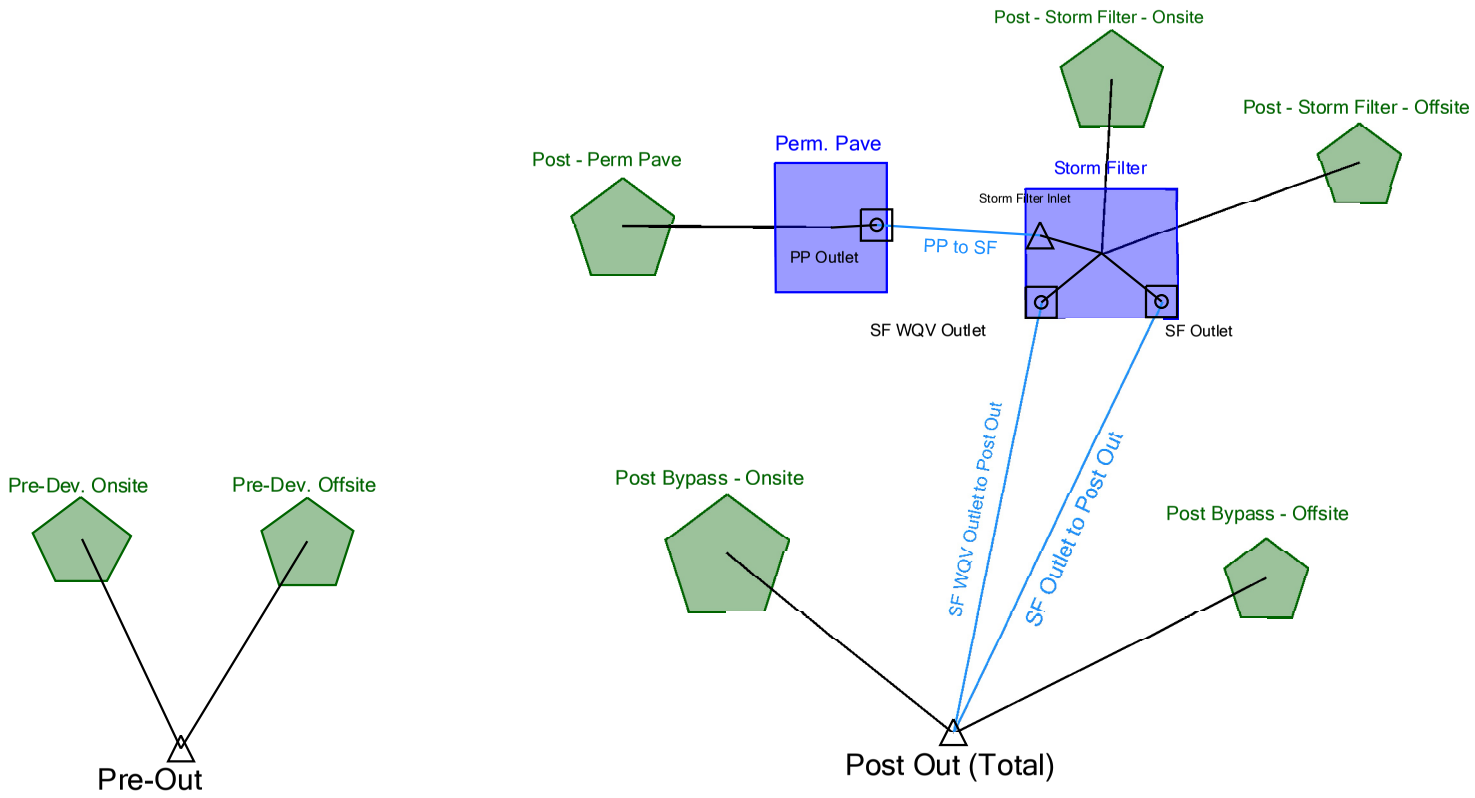
Desired Drain Time =	**48**	**hrs.**	(48 hrs. min, 120 hrs. max)
2-Year Delta Volume =	**4,856**	**cu. ft.**	
Therefore, required Q =	**0.028**	**cfs (max)**	
H_o, Total Draw Down Depth =	**2.000**	**ft.**	
H_o/3 =	**0.667**	**ft.**	
C_d =	**0.60**		
A =	$\frac{Q}{C_d\sqrt{(2_g H_o)}}$		
Recommended A =	**0.007147**	**s.f.**	
Recomended Orifice Diameter =	**0.095420**	**in.**	
=	**1.15**	**inches**	
Diameter Chosen =	**1.000**	**inches**	**A = 0.00545** Calculated Area
Actual Average Flow =	**0.021**	**cfs**	
Drain Time =	**62.93**	**hrs.**	

Check draw down depth provided

Drawn down volume =	**5068**	**cu. ft.**		
Ho, Total Draw Down Depth =	**2.00**	**ft.**	**Ho/3 =**	**0.667 ft.**
Actual Average Flow =	**0.021**	**cfs**		
Drain Time =	**65.69**	**hrs.**		**OK**

- **Appendix C – 1, 2 and 25-yr Stormwater Management Calculations (PondPack)**
    - Stormwater Management Schematic Map
    - Table of Contents
    - Master Network Summary
    - Supporting Calculation

Scenario: Chapel Hill - 1 yrs



Fordham Boulevard Apartments

Project Summary	
Title	Fordham Boulevard Apartments
Engineer	Ashton R. Smith
Company	Ballentine Associates, P.A.
Date	4/21/2017

Notes	BA Project #: 116023.00 Prepared by: Ballentine Associates on 21 Apr 17

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Level Pool Pond Routing Summary, 100 years 113

Fordham Boulevard Apartments

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Pre-Dev. Onsite	Chapel Hill - 1 yrs	1	17,946	715.200	7.78
Pre-Dev. Onsite	Chapel Hill- 2 yrs	2	23,873	715.200	10.34
Pre-Dev. Onsite	Chapel Hill - 25 yrs	25	48,726	715.200	20.68
Pre-Dev. Onsite	Chapel Hill - 100 yrs	100	62,494	715.200	26.22
Post - Perm Pave	Chapel Hill - 1 yrs	1	4,748	715.200	1.87
Post - Perm Pave	Chapel Hill- 2 yrs	2	5,810	715.200	2.26
Post - Perm Pave	Chapel Hill - 25 yrs	25	9,985	715.200	3.79
Post - Perm Pave	Chapel Hill - 100 yrs	100	12,210	715.200	4.60
Post - Storm Filter - Onsite	Chapel Hill - 1 yrs	1	13,921	715.200	5.60
Post - Storm Filter - Onsite	Chapel Hill- 2 yrs	2	17,155	715.200	6.81
Post - Storm Filter - Onsite	Chapel Hill - 25 yrs	25	29,904	715.200	11.52
Post - Storm Filter - Onsite	Chapel Hill - 100 yrs	100	36,709	715.200	14.01
Post Bypass - Onsite	Chapel Hill - 1 yrs	1	9,250	715.200	3.93
Post Bypass - Onsite	Chapel Hill- 2 yrs	2	11,739	715.200	4.93
Post Bypass - Onsite	Chapel Hill - 25 yrs	25	21,732	715.200	8.81
Post Bypass - Onsite	Chapel Hill - 100 yrs	100	27,123	715.200	10.85
Pre-Dev. Offsite	Chapel Hill - 1 yrs	1	9,399	715.200	4.07
Pre-Dev. Offsite	Chapel Hill- 2 yrs	2	12,273	715.200	5.28
Pre-Dev. Offsite	Chapel Hill - 25 yrs	25	24,099	715.200	10.09
Pre-Dev. Offsite	Chapel Hill - 100 yrs	100	30,575	715.200	12.63
Post - Storm Filter - Offsite	Chapel Hill - 1 yrs	1	7,629	715.200	3.29
Post - Storm Filter - Offsite	Chapel Hill- 2 yrs	2	9,853	715.200	4.21
Post - Storm Filter - Offsite	Chapel Hill - 25 yrs	25	18,909	715.200	7.83
Post - Storm Filter - Offsite	Chapel Hill - 100 yrs	100	23,838	715.200	9.74
Post Bypass - Offsite	Chapel Hill - 1 yrs	1	1,773	715.800	0.77
Post Bypass - Offsite	Chapel Hill- 2 yrs	2	2,409	715.200	1.04
Post Bypass - Offsite	Chapel Hill - 25 yrs	25	5,131	715.200	2.20
Post Bypass - Offsite	Chapel Hill - 100 yrs	100	6,661	715.200	2.83

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Pre-Out	Chapel Hill - 1 yrs	1	27,345	715.200	11.85
Pre-Out	Chapel Hill- 2 yrs	2	36,146	715.200	15.62
Pre-Out	Chapel Hill - 25 yrs	25	72,825	715.200	30.77

Fordham Boulevard Apartments

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Pre-Out	Chapel Hill - 100 yrs	100	93,069	715.200	38.85
Post Out (Total)	Chapel Hill - 1 yrs	1	29,982	721.800	8.10
Post Out (Total)	Chapel Hill- 2 yrs	2	39,530	720.600	13.47
Post Out (Total)	Chapel Hill - 25 yrs	25	78,116	715.800	30.57
Post Out (Total)	Chapel Hill - 100 yrs	100	98,978	715.800	37.75

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
Perm. Pave (IN)	Chapel Hill - 1 yrs	1	4,748	715.200	1.87	(N/A)	(N/A)
Perm. Pave (OUT)	Chapel Hill - 1 yrs	1	3,707	725.400	0.51	262.562	2,556
Perm. Pave (IN)	Chapel Hill- 2 yrs	2	5,810	715.200	2.26	(N/A)	(N/A)
Perm. Pave (OUT)	Chapel Hill- 2 yrs	2	4,719	724.800	0.69	262.784	3,005
Perm. Pave (IN)	Chapel Hill - 25 yrs	25	9,985	715.200	3.79	(N/A)	(N/A)
Perm. Pave (OUT)	Chapel Hill - 25 yrs	25	8,842	724.800	1.14	263.658	4,774
Perm. Pave (IN)	Chapel Hill - 100 yrs	100	12,210	715.200	4.60	(N/A)	(N/A)
Perm. Pave (OUT)	Chapel Hill - 100 yrs	100	11,062	725.400	1.30	264.062	5,593
Storm Filter (IN)	Chapel Hill - 1 yrs	1	25,257	715.200	8.91	(N/A)	(N/A)
Storm Filter (OUT)	Chapel Hill - 1 yrs	1	18,958	723.000	5.00	260.223	10,701
Storm Filter (IN)	Chapel Hill- 2 yrs	2	31,726	715.200	11.42	(N/A)	(N/A)
Storm Filter (OUT)	Chapel Hill- 2 yrs	2	25,382	721.200	8.80	260.575	11,592
Storm Filter (IN)	Chapel Hill - 25 yrs	25	57,656	715.200	20.27	(N/A)	(N/A)
Storm Filter (OUT)	Chapel Hill - 25 yrs	25	51,252	716.400	19.73	260.956	12,558
Storm Filter (IN)	Chapel Hill - 100 yrs	100	71,609	715.200	24.80	(N/A)	(N/A)
Storm Filter (OUT)	Chapel Hill - 100 yrs	100	65,195	715.800	24.24	261.077	12,865

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 2 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (3.6 in)

Time-Depth Curve: TypeII 24hr (3.6 in)	
Label	TypeII 24hr (3.6 in)
Start Time	0.000 min
Increment	6.000 min
End Time	1,440.000 min
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.0	0.0	0.0
60.000	0.0	0.0	0.0	0.0	0.1
90.000	0.1	0.1	0.1	0.1	0.1
120.000	0.1	0.1	0.1	0.1	0.1
150.000	0.1	0.1	0.1	0.1	0.1
180.000	0.1	0.1	0.1	0.1	0.1
210.000	0.1	0.2	0.2	0.2	0.2
240.000	0.2	0.2	0.2	0.2	0.2
270.000	0.2	0.2	0.2	0.2	0.2
300.000	0.2	0.2	0.2	0.2	0.3
330.000	0.3	0.3	0.3	0.3	0.3
360.000	0.3	0.3	0.3	0.3	0.3
390.000	0.3	0.3	0.3	0.3	0.3
420.000	0.4	0.4	0.4	0.4	0.4
450.000	0.4	0.4	0.4	0.4	0.4
480.000	0.4	0.4	0.4	0.5	0.5
510.000	0.5	0.5	0.5	0.5	0.5
540.000	0.5	0.5	0.6	0.6	0.6
570.000	0.6	0.6	0.6	0.6	0.6
600.000	0.7	0.7	0.7	0.7	0.7
630.000	0.7	0.8	0.8	0.8	0.8
660.000	0.8	0.9	0.9	0.9	1.0
690.000	1.0	1.1	1.3	1.6	2.0
720.000	2.4	2.5	2.5	2.6	2.6
750.000	2.6	2.7	2.7	2.7	2.8
780.000	2.8	2.8	2.8	2.8	2.9
810.000	2.9	2.9	2.9	2.9	2.9
840.000	3.0	3.0	3.0	3.0	3.0
870.000	3.0	3.0	3.0	3.1	3.1
900.000	3.1	3.1	3.1	3.1	3.1
930.000	3.1	3.1	3.1	3.2	3.2
960.000	3.2	3.2	3.2	3.2	3.2

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 2 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (3.6 in)

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
990.000	3.2	3.2	3.2	3.2	3.2
1,020.000	3.2	3.3	3.3	3.3	3.3
1,050.000	3.3	3.3	3.3	3.3	3.3
1,080.000	3.3	3.3	3.3	3.3	3.3
1,110.000	3.3	3.4	3.4	3.4	3.4
1,140.000	3.4	3.4	3.4	3.4	3.4
1,170.000	3.4	3.4	3.4	3.4	3.4
1,200.000	3.4	3.4	3.4	3.4	3.4
1,230.000	3.5	3.5	3.5	3.5	3.5
1,260.000	3.5	3.5	3.5	3.5	3.5
1,290.000	3.5	3.5	3.5	3.5	3.5
1,320.000	3.5	3.5	3.5	3.5	3.5
1,350.000	3.5	3.5	3.5	3.6	3.6
1,380.000	3.6	3.6	3.6	3.6	3.6
1,410.000	3.6	3.6	3.6	3.6	3.6
1,440.000	3.6	(N/A)	(N/A)	(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 25 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (6.0 in)

Time-Depth Curve: TypeII 24hr (6.0 in)	
Label	TypeII 24hr (6.0 in)
Start Time	0.000 min
Increment	6.000 min
End Time	1,440.000 min
Return Event	25 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.0	0.0	0.1
60.000	0.1	0.1	0.1	0.1	0.1
90.000	0.1	0.1	0.1	0.1	0.1
120.000	0.1	0.1	0.1	0.2	0.2
150.000	0.2	0.2	0.2	0.2	0.2
180.000	0.2	0.2	0.2	0.2	0.2
210.000	0.2	0.3	0.3	0.3	0.3
240.000	0.3	0.3	0.3	0.3	0.3
270.000	0.3	0.3	0.3	0.4	0.4
300.000	0.4	0.4	0.4	0.4	0.4
330.000	0.4	0.4	0.4	0.5	0.5
360.000	0.5	0.5	0.5	0.5	0.5
390.000	0.5	0.5	0.6	0.6	0.6
420.000	0.6	0.6	0.6	0.6	0.6
450.000	0.7	0.7	0.7	0.7	0.7
480.000	0.7	0.7	0.7	0.8	0.8
510.000	0.8	0.8	0.8	0.8	0.9
540.000	0.9	0.9	0.9	0.9	1.0
570.000	1.0	1.0	1.0	1.0	1.1
600.000	1.1	1.1	1.1	1.2	1.2
630.000	1.2	1.2	1.3	1.3	1.4
660.000	1.4	1.4	1.5	1.6	1.6
690.000	1.7	1.8	2.1	2.6	3.4
720.000	3.9	4.1	4.2	4.2	4.3
750.000	4.4	4.4	4.5	4.5	4.6
780.000	4.6	4.6	4.7	4.7	4.7
810.000	4.8	4.8	4.8	4.8	4.9
840.000	4.9	4.9	4.9	4.9	5.0
870.000	5.0	5.0	5.0	5.0	5.1
900.000	5.1	5.1	5.1	5.1	5.1
930.000	5.2	5.2	5.2	5.2	5.2
960.000	5.2	5.2	5.3	5.3	5.3

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 25 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (6.0 in)

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
990.000	5.3	5.3	5.3	5.3	5.4
1,020.000	5.4	5.4	5.4	5.4	5.4
1,050.000	5.4	5.4	5.4	5.5	5.5
1,080.000	5.5	5.5	5.5	5.5	5.5
1,110.000	5.5	5.5	5.6	5.6	5.6
1,140.000	5.6	5.6	5.6	5.6	5.6
1,170.000	5.6	5.6	5.6	5.6	5.7
1,200.000	5.7	5.7	5.7	5.7	5.7
1,230.000	5.7	5.7	5.7	5.7	5.7
1,260.000	5.7	5.7	5.8	5.8	5.8
1,290.000	5.8	5.8	5.8	5.8	5.8
1,320.000	5.8	5.8	5.8	5.8	5.8
1,350.000	5.8	5.9	5.9	5.9	5.9
1,380.000	5.9	5.9	5.9	5.9	5.9
1,410.000	5.9	5.9	5.9	5.9	5.9
1,440.000	6.0	(N/A)	(N/A)	(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 100 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (7.2 in)

Time-Depth Curve: TypeII 24hr (7.2 in)	
Label	TypeII 24hr (7.2 in)
Start Time	0.000 min
Increment	6.000 min
End Time	1,440.000 min
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.1	0.1	0.1
60.000	0.1	0.1	0.1	0.1	0.1
90.000	0.1	0.1	0.1	0.1	0.1
120.000	0.2	0.2	0.2	0.2	0.2
150.000	0.2	0.2	0.2	0.2	0.2
180.000	0.2	0.3	0.3	0.3	0.3
210.000	0.3	0.3	0.3	0.3	0.3
240.000	0.3	0.4	0.4	0.4	0.4
270.000	0.4	0.4	0.4	0.4	0.4
300.000	0.5	0.5	0.5	0.5	0.5
330.000	0.5	0.5	0.5	0.6	0.6
360.000	0.6	0.6	0.6	0.6	0.6
390.000	0.6	0.7	0.7	0.7	0.7
420.000	0.7	0.7	0.7	0.8	0.8
450.000	0.8	0.8	0.8	0.8	0.8
480.000	0.9	0.9	0.9	0.9	0.9
510.000	1.0	1.0	1.0	1.0	1.0
540.000	1.1	1.1	1.1	1.1	1.2
570.000	1.2	1.2	1.2	1.2	1.3
600.000	1.3	1.3	1.4	1.4	1.4
630.000	1.5	1.5	1.5	1.6	1.6
660.000	1.7	1.7	1.8	1.9	2.0
690.000	2.0	2.2	2.6	3.1	4.1
720.000	4.8	4.9	5.0	5.1	5.2
750.000	5.3	5.4	5.4	5.5	5.5
780.000	5.6	5.6	5.6	5.7	5.7
810.000	5.8	5.8	5.8	5.8	5.9
840.000	5.9	5.9	6.0	6.0	6.0
870.000	6.0	6.1	6.1	6.1	6.1
900.000	6.1	6.2	6.2	6.2	6.2
930.000	6.2	6.3	6.3	6.3	6.3
960.000	6.3	6.4	6.4	6.4	6.4

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 100 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (7.2 in)

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
990.000	6.4	6.4	6.4	6.5	6.5
1,020.000	6.5	6.5	6.5	6.5	6.6
1,050.000	6.6	6.6	6.6	6.6	6.6
1,080.000	6.6	6.6	6.7	6.7	6.7
1,110.000	6.7	6.7	6.7	6.7	6.7
1,140.000	6.8	6.8	6.8	6.8	6.8
1,170.000	6.8	6.8	6.8	6.8	6.8
1,200.000	6.9	6.9	6.9	6.9	6.9
1,230.000	6.9	6.9	6.9	6.9	6.9
1,260.000	6.9	7.0	7.0	7.0	7.0
1,290.000	7.0	7.0	7.0	7.0	7.0
1,320.000	7.0	7.0	7.1	7.1	7.1
1,350.000	7.1	7.1	7.1	7.1	7.1
1,380.000	7.1	7.1	7.1	7.1	7.2
1,410.000	7.2	7.2	7.2	7.2	7.2
1,440.000	7.2	(N/A)	(N/A)	(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 1 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (3.0 in)

Time-Depth Curve: TypeII 24hr (3.0 in)	
Label	TypeII 24hr (3.0 in)
Start Time	0.000 min
Increment	6.000 min
End Time	1,440.000 min
Return Event	1 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.0	0.0	0.0
60.000	0.0	0.0	0.0	0.0	0.0
90.000	0.0	0.1	0.1	0.1	0.1
120.000	0.1	0.1	0.1	0.1	0.1
150.000	0.1	0.1	0.1	0.1	0.1
180.000	0.1	0.1	0.1	0.1	0.1
210.000	0.1	0.1	0.1	0.1	0.1
240.000	0.1	0.1	0.2	0.2	0.2
270.000	0.2	0.2	0.2	0.2	0.2
300.000	0.2	0.2	0.2	0.2	0.2
330.000	0.2	0.2	0.2	0.2	0.2
360.000	0.2	0.2	0.3	0.3	0.3
390.000	0.3	0.3	0.3	0.3	0.3
420.000	0.3	0.3	0.3	0.3	0.3
450.000	0.3	0.3	0.3	0.3	0.4
480.000	0.4	0.4	0.4	0.4	0.4
510.000	0.4	0.4	0.4	0.4	0.4
540.000	0.4	0.5	0.5	0.5	0.5
570.000	0.5	0.5	0.5	0.5	0.5
600.000	0.5	0.6	0.6	0.6	0.6
630.000	0.6	0.6	0.6	0.7	0.7
660.000	0.7	0.7	0.8	0.8	0.8
690.000	0.8	0.9	1.1	1.3	1.7
720.000	2.0	2.0	2.1	2.1	2.2
750.000	2.2	2.2	2.3	2.3	2.3
780.000	2.3	2.3	2.4	2.4	2.4
810.000	2.4	2.4	2.4	2.4	2.4
840.000	2.5	2.5	2.5	2.5	2.5
870.000	2.5	2.5	2.5	2.5	2.6
900.000	2.6	2.6	2.6	2.6	2.6
930.000	2.6	2.6	2.6	2.6	2.6
960.000	2.6	2.6	2.7	2.7	2.7

Fordham Boulevard Apartments

Subsection: Time-Depth Curve | Return Event: 1 years
Label: Chapel-Hill | Storm Event: TypeII 24hr (3.0 in)

CUMULATIVE RAINFALL (in)
Output Time Increment = 6.000 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
990.000	2.7	2.7	2.7	2.7	2.7
1,020.000	2.7	2.7	2.7	2.7	2.7
1,050.000	2.7	2.7	2.7	2.8	2.8
1,080.000	2.8	2.8	2.8	2.8	2.8
1,110.000	2.8	2.8	2.8	2.8	2.8
1,140.000	2.8	2.8	2.8	2.8	2.8
1,170.000	2.8	2.8	2.8	2.8	2.9
1,200.000	2.9	2.9	2.9	2.9	2.9
1,230.000	2.9	2.9	2.9	2.9	2.9
1,260.000	2.9	2.9	2.9	2.9	2.9
1,290.000	2.9	2.9	2.9	2.9	2.9
1,320.000	2.9	2.9	2.9	2.9	2.9
1,350.000	2.9	3.0	3.0	3.0	3.0
1,380.000	3.0	3.0	3.0	3.0	3.0
1,410.000	3.0	3.0	3.0	3.0	3.0
1,440.000	3.0	(N/A)	(N/A)	(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post - Perm Pave | Storm Event: TypeII 24hr (3.6 in)

Storm Event	TypeII 24hr (3.6 in)
Return Event	2 years
Duration	2,100.000 min
Depth	3.6 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	21,404.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	2.26 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	2.26 ft³/s

Drainage Area	
SCS CN (Composite)	97.031
Area (User Defined)	21,404.0 ft²
Maximum Retention (Pervious)	0.3 in
Maximum Retention (Pervious, 20 percent)	0.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.3 in
Runoff Volume (Pervious)	5,810 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,810 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post - Perm Pave | Storm Event: TypeII 24hr (3.6 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	6.68 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post - Perm Pave | Storm Event: TypeII 24hr (6.0 in)

Storm Event	TypeII 24hr (6.0 in)
Return Event	25 years
Duration	2,100.000 min
Depth	6.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	21,404.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	3.79 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	3.79 ft³/s

Drainage Area	
SCS CN (Composite)	97.031
Area (User Defined)	21,404.0 ft²
Maximum Retention (Pervious)	0.3 in
Maximum Retention (Pervious, 20 percent)	0.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.6 in
Runoff Volume (Pervious)	9,985 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,985 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post - Perm Pave | Storm Event: TypeII 24hr (6.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	6.68 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post - Perm Pave | Storm Event: TypeII 24hr (7.2 in)

Storm Event	TypeII 24hr (7.2 in)
Return Event	100 years
Duration	2,100.000 min
Depth	7.2 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	21,404.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	4.60 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	4.60 ft³/s

Drainage Area	
SCS CN (Composite)	97.031
Area (User Defined)	21,404.0 ft²
Maximum Retention (Pervious)	0.3 in
Maximum Retention (Pervious, 20 percent)	0.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.8 in
Runoff Volume (Pervious)	12,210 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	12,210 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post - Perm Pave | Storm Event: TypeII 24hr (7.2 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	6.68 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (3.0 in)

Storm Event	TypeII 24hr (3.0 in)
Return Event	1 years
Duration	2,100.000 min
Depth	3.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	48,673.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	3.29 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	3.29 ft³/s

Drainage Area	
SCS CN (Composite)	88.772
Area (User Defined)	48,673.0 ft²
Maximum Retention (Pervious)	1.3 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.9 in
Runoff Volume (Pervious)	7,629 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	7,629 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (3.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	15.19 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (3.6 in)

Storm Event	TypeII 24hr (3.6 in)
Return Event	2 years
Duration	2,100.000 min
Depth	3.6 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	48,673.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	4.22 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	4.21 ft³/s

Drainage Area	
SCS CN (Composite)	88.772
Area (User Defined)	48,673.0 ft²
Maximum Retention (Pervious)	1.3 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.4 in
Runoff Volume (Pervious)	9,853 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,853 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (3.6 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	15.19 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (6.0 in)

Storm Event	TypeII 24hr (6.0 in)
Return Event	25 years
Duration	2,100.000 min
Depth	6.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	48,673.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	7.84 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	7.83 ft³/s

Drainage Area	
SCS CN (Composite)	88.772
Area (User Defined)	48,673.0 ft²
Maximum Retention (Pervious)	1.3 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.7 in
Runoff Volume (Pervious)	18,909 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	18,909 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (6.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	15.19 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (7.2 in)

Storm Event	TypeII 24hr (7.2 in)
Return Event	100 years
Duration	2,100.000 min
Depth	7.2 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	48,673.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	9.74 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	9.74 ft³/s

Drainage Area	
SCS CN (Composite)	88.772
Area (User Defined)	48,673.0 ft²
Maximum Retention (Pervious)	1.3 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.9 in
Runoff Volume (Pervious)	23,838 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	23,838 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post - Storm Filter - Offsite | Storm Event: TypeII 24hr (7.2 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	15.19 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (3.0 in)

Storm Event	TypeII 24hr (3.0 in)
Return Event	1 years
Duration	2,100.000 min
Depth	3.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	65,572.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	5.60 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	5.60 ft³/s

Drainage Area	
SCS CN (Composite)	95.956
Area (User Defined)	65,572.0 ft²
Maximum Retention (Pervious)	0.4 in
Maximum Retention (Pervious, 20 percent)	0.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.5 in
Runoff Volume (Pervious)	13,921 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	13,921 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (3.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.47 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (3.6 in)

Storm Event	TypeII 24hr (3.6 in)
Return Event	2 years
Duration	2,100.000 min
Depth	3.6 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	65,572.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	6.82 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	6.81 ft³/s

Drainage Area	
SCS CN (Composite)	95.956
Area (User Defined)	65,572.0 ft²
Maximum Retention (Pervious)	0.4 in
Maximum Retention (Pervious, 20 percent)	0.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.1 in
Runoff Volume (Pervious)	17,155 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	17,155 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (3.6 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.47 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (6.0 in)

Storm Event	TypeII 24hr (6.0 in)
Return Event	25 years
Duration	2,100.000 min
Depth	6.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	65,572.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	11.52 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	11.52 ft³/s

Drainage Area	
SCS CN (Composite)	95.956
Area (User Defined)	65,572.0 ft²
Maximum Retention (Pervious)	0.4 in
Maximum Retention (Pervious, 20 percent)	0.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.5 in
Runoff Volume (Pervious)	29,904 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	29,904 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (6.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.47 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (7.2 in)

Storm Event	TypeII 24hr (7.2 in)
Return Event	100 years
Duration	2,100.000 min
Depth	7.2 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	65,572.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	14.01 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	14.01 ft³/s

Drainage Area	
SCS CN (Composite)	95.956
Area (User Defined)	65,572.0 ft²
Maximum Retention (Pervious)	0.4 in
Maximum Retention (Pervious, 20 percent)	0.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.7 in
Runoff Volume (Pervious)	36,709 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	36,709 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post - Storm Filter - Onsite | Storm Event: TypeII 24hr (7.2 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.47 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (3.0 in)

Storm Event	TypeII 24hr (3.0 in)
Return Event	1 years
Duration	2,100.000 min
Depth	3.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	15,856.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	0.77 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.800 min
Flow (Peak Interpolated Output)	0.77 ft³/s

Drainage Area	
SCS CN (Composite)	81.441
Area (User Defined)	15,856.0 ft²
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.3 in
Runoff Volume (Pervious)	1,773 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,773 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (3.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.95 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (3.6 in)

Storm Event	TypeII 24hr (3.6 in)
Return Event	2 years
Duration	2,100.000 min
Depth	3.6 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	15,856.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	1.05 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	1.04 ft³/s

Drainage Area	
SCS CN (Composite)	81.441
Area (User Defined)	15,856.0 ft²
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.8 in
Runoff Volume (Pervious)	2,409 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,409 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (3.6 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.95 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (6.0 in)

Storm Event	TypeII 24hr (6.0 in)
Return Event	25 years
Duration	2,100.000 min
Depth	6.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	15,856.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	2.21 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	2.20 ft³/s

Drainage Area	
SCS CN (Composite)	81.441
Area (User Defined)	15,856.0 ft²
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.9 in
Runoff Volume (Pervious)	5,131 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,131 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (6.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.95 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (7.2 in)

Storm Event	TypeII 24hr (7.2 in)
Return Event	100 years
Duration	2,100.000 min
Depth	7.2 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	15,856.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	2.83 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	2.83 ft³/s

Drainage Area	
SCS CN (Composite)	81.441
Area (User Defined)	15,856.0 ft²
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	6,661 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6,661 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post Bypass - Offsite | Storm Event: TypeII 24hr (7.2 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.95 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (3.0 in)

Storm Event	TypeII 24hr (3.0 in)
Return Event	1 years
Duration	2,100.000 min
Depth	3.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	52,615.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	3.93 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	3.93 ft³/s

Drainage Area	
SCS CN (Composite)	91.432
Area (User Defined)	52,615.0 ft²
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	9,250 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,250 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (3.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	16.42 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (3.6 in)

Storm Event	TypeII 24hr (3.6 in)
Return Event	2 years
Duration	2,100.000 min
Depth	3.6 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	52,615.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	4.93 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	4.93 ft³/s

Drainage Area	
SCS CN (Composite)	91.432
Area (User Defined)	52,615.0 ft²
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.7 in
Runoff Volume (Pervious)	11,739 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	11,739 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (3.6 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	16.42 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (6.0 in)

Storm Event	TypeII 24hr (6.0 in)
Return Event	25 years
Duration	2,100.000 min
Depth	6.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	52,615.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	8.81 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	8.81 ft³/s

Drainage Area	
SCS CN (Composite)	91.432
Area (User Defined)	52,615.0 ft²
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	21,732 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	21,732 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (6.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	16.42 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (7.2 in)

Storm Event	TypeII 24hr (7.2 in)
Return Event	100 years
Duration	2,100.000 min
Depth	7.2 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	52,615.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	10.85 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	10.85 ft³/s

Drainage Area	
SCS CN (Composite)	91.432
Area (User Defined)	52,615.0 ft²
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.2 in
Runoff Volume (Pervious)	27,123 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	27,123 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Post Bypass - Onsite | Storm Event: TypeII 24hr (7.2 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	16.42 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (3.0 in)

Storm Event	TypeII 24hr (3.0 in)
Return Event	1 years
Duration	2,100.000 min
Depth	3.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	64,529.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	4.08 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	4.07 ft³/s

Drainage Area	
SCS CN (Composite)	87.113
Area (User Defined)	64,529.0 ft²
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	9,399 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,399 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (3.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.14 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (3.6 in)

Storm Event	TypeII 24hr (3.6 in)
Return Event	2 years
Duration	2,100.000 min
Depth	3.6 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	64,529.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	5.29 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	5.28 ft³/s

Drainage Area	
SCS CN (Composite)	87.113
Area (User Defined)	64,529.0 ft²
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.3 in
Runoff Volume (Pervious)	12,273 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	12,273 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (3.6 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.14 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (6.0 in)

Storm Event	TypeII 24hr (6.0 in)
Return Event	25 years
Duration	2,100.000 min
Depth	6.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	64,529.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	10.10 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	10.09 ft³/s

Drainage Area	
SCS CN (Composite)	87.113
Area (User Defined)	64,529.0 ft²
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.5 in
Runoff Volume (Pervious)	24,099 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	24,099 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (6.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.14 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (7.2 in)

Storm Event	TypeII 24hr (7.2 in)
Return Event	100 years
Duration	2,100.000 min
Depth	7.2 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	64,529.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	12.64 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	12.63 ft³/s

Drainage Area	
SCS CN (Composite)	87.113
Area (User Defined)	64,529.0 ft²
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.7 in
Runoff Volume (Pervious)	30,575 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	30,575 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Pre-Dev. Offsite | Storm Event: TypeII 24hr (7.2 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	20.14 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (3.0 in)

Storm Event	TypeII 24hr (3.0 in)
Return Event	1 years
Duration	2,100.000 min
Depth	3.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	139,591.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	7.80 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	7.78 ft³/s

Drainage Area	
SCS CN (Composite)	84.371
Area (User Defined)	139,591.0 ft²
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	17,946 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	17,946 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (3.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	43.57 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (3.6 in)

Storm Event	TypeII 24hr (3.6 in)
Return Event	2 years
Duration	2,100.000 min
Depth	3.6 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	139,591.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	10.37 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	10.34 ft³/s

Drainage Area	
SCS CN (Composite)	84.371
Area (User Defined)	139,591.0 ft²
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	23,873 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	23,873 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (3.6 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	43.57 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (6.0 in)

Storm Event	TypeII 24hr (6.0 in)
Return Event	25 years
Duration	2,100.000 min
Depth	6.0 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	139,591.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	20.71 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	20.68 ft³/s

Drainage Area	
SCS CN (Composite)	84.371
Area (User Defined)	139,591.0 ft²
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.2 in
Runoff Volume (Pervious)	48,726 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	48,726 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (6.0 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	43.57 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (7.2 in)

Storm Event	TypeII 24hr (7.2 in)
Return Event	100 years
Duration	2,100.000 min
Depth	7.2 in
Time of Concentration (Composite)	5.000 min
Area (User Defined)	139,591.0 ft²

Computational Time Increment	0.667 min
Time to Peak (Computed)	715.333 min
Flow (Peak, Computed)	26.24 ft³/s
Output Increment	0.600 min
Time to Flow (Peak Interpolated Output)	715.200 min
Flow (Peak Interpolated Output)	26.22 ft³/s

Drainage Area	
SCS CN (Composite)	84.371
Area (User Defined)	139,591.0 ft²
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.4 in
Runoff Volume (Pervious)	62,494 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	62,494 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	5.000 min
Computational Time Increment	0.667 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Fordham Boulevard Apartments

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Pre-Dev. Onsite | Storm Event: TypeII 24hr (7.2 in)

SCS Unit Hydrograph Parameters	
Unit peak, qp	43.57 ft^3/s
Unit peak time, Tp	3.333 min
Unit receding limb, Tr	13.333 min
Total unit time, Tb	16.667 min

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 1 years

Label: Perm. Pave | Storm Event: TypeII 24hr (3.0 in)

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	Volume (ft³)	Volume (Total) (ft³)
261.300	0.0	5,000.0	0.0	0	0
264.300	0.0	5,000.0	15,000.0	15,000	6,075

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 2 years

Label: Perm. Pave | Storm Event: TypeII 24hr (3.6 in)

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	Volume (ft³)	Volume (Total) (ft³)
261.300	0.0	5,000.0	0.0	0	0
264.300	0.0	5,000.0	15,000.0	15,000	6,075

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 25 years

Label: Perm. Pave | Storm Event: TypeII 24hr (6.0 in)

Elevation (ft)	Planimeter (ft^2)	Area (ft^2)	A1+A2+sqr (A1*A2) (ft^2)	Volume (ft^3)	Volume (Total) (ft^3)
261.300	0.0	5,000.0	0.0	0	0
264.300	0.0	5,000.0	15,000.0	15,000	6,075

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 100 years

Label: Perm. Pave | Storm Event: TypeII 24hr (7.2 in)

Elevation (ft)	Planimeter (ft^2)	Area (ft^2)	A1+A2+sqr (A1*A2) (ft^2)	Volume (ft^3)	Volume (Total) (ft^3)
261.300	0.0	5,000.0	0.0	0	0
264.300	0.0	5,000.0	15,000.0	15,000	6,075

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 1 years

Label: Storm Filter | Storm Event: TypeII 24hr (3.0 in)

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	Volume (ft³)	Volume (Total) (ft³)
256.000	0.0	2,534.0	0.0	0	0
262.000	0.0	2,534.0	7,602.0	15,204	15,204
262.010	0.0	12.6	2,725.0	9	15,213
264.000	0.0	12.6	37.7	25	15,238

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 2 years

Label: Storm Filter | Storm Event: TypeII 24hr (3.6 in)

Elevation (ft)	Planimeter (ft^2)	Area (ft^2)	A1+A2+sqr (A1*A2) (ft^2)	Volume (ft^3)	Volume (Total) (ft^3)
256.000	0.0	2,534.0	0.0	0	0
262.000	0.0	2,534.0	7,602.0	15,204	15,204
262.010	0.0	12.6	2,725.0	9	15,213
264.000	0.0	12.6	37.7	25	15,238

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 25 years

Label: Storm Filter | Storm Event: TypeII 24hr (6.0 in)

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	Volume (ft³)	Volume (Total) (ft³)
256.000	0.0	2,534.0	0.0	0	0
262.000	0.0	2,534.0	7,602.0	15,204	15,204
262.010	0.0	12.6	2,725.0	9	15,213
264.000	0.0	12.6	37.7	25	15,238

Fordham Boulevard Apartments

Subsection: Elevation-Area Volume Curve | Return Event: 100 years

Label: Storm Filter | Storm Event: TypeII 24hr (7.2 in)

Elevation (ft)	Planimeter (ft^2)	Area (ft^2)	A1+A2+sqr (A1*A2) (ft^2)	Volume (ft^3)	Volume (Total) (ft^3)
256.000	0.0	2,534.0	0.0	0	0
262.000	0.0	2,534.0	7,602.0	15,204	15,204
262.010	0.0	12.6	2,725.0	9	15,213
264.000	0.0	12.6	37.7	25	15,238

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: PP Outlet | Storm Event: TypeII 24hr (3.0 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	261.300 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	262.300	264.300
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	261.300	264.300
Culvert-Circular	Culvert - 1	Forward	TW	256.700	264.300
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: PP Outlet | Storm Event: TypeII 24hr (3.0 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.00 in
Length	150.00 ft
Length (Computed Barrel)	150.00 ft
Slope (Computed)	0.005 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.093
T2 ratio (HW/D)	1.195
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.339 ft	T1 Flow	7.58 ft^3/s
T2 Elevation	258.492 ft	T2 Flow	8.66 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: PP Outlet | Storm Event: TypeII 24hr (3.0 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	261.300 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Riser - 1 Structure Type: Stand Pipe	
Number of Openings	1
Elevation	262.300 ft
Diameter	6.00 in
Orifice Area	0.2 ft²
Orifice Coefficient	0.600
Weir Length	1.57 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: PP Outlet | Storm Event: TypeII 24hr (3.6 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	261.300 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	262.300	264.300
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	261.300	264.300
Culvert-Circular	Culvert - 1	Forward	TW	256.700	264.300
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: PP Outlet | Storm Event: TypeII 24hr (3.6 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.00 in
Length	150.00 ft
Length (Computed Barrel)	150.00 ft
Slope (Computed)	0.005 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.093
T2 ratio (HW/D)	1.195
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.339 ft	T1 Flow	7.58 ft^3/s
T2 Elevation	258.492 ft	T2 Flow	8.66 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: PP Outlet | Storm Event: TypeII 24hr (3.6 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	261.300 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Riser - 1 Structure Type: Stand Pipe	
Number of Openings	1
Elevation	262.300 ft
Diameter	6.00 in
Orifice Area	0.2 ft²
Orifice Coefficient	0.600
Weir Length	1.57 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: PP Outlet | Storm Event: TypeII 24hr (6.0 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	261.300 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	262.300	264.300
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	261.300	264.300
Culvert-Circular	Culvert - 1	Forward	TW	256.700	264.300
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: PP Outlet | Storm Event: TypeII 24hr (6.0 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.00 in
Length	150.00 ft
Length (Computed Barrel)	150.00 ft
Slope (Computed)	0.005 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.093
T2 ratio (HW/D)	1.195
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.339 ft	T1 Flow	7.58 ft³/s
T2 Elevation	258.492 ft	T2 Flow	8.66 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: PP Outlet | Storm Event: TypeII 24hr (6.0 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	261.300 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Riser - 1 Structure Type: Stand Pipe	
Number of Openings	1
Elevation	262.300 ft
Diameter	6.00 in
Orifice Area	0.2 ft²
Orifice Coefficient	0.600
Weir Length	1.57 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: PP Outlet | Storm Event: TypeII 24hr (7.2 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	261.300 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	262.300	264.300
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	261.300	264.300
Culvert-Circular	Culvert - 1	Forward	TW	256.700	264.300
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: PP Outlet | Storm Event: TypeII 24hr (7.2 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.00 in
Length	150.00 ft
Length (Computed Barrel)	150.00 ft
Slope (Computed)	0.005 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.093
T2 ratio (HW/D)	1.195
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.339 ft	T1 Flow	7.58 ft³/s
T2 Elevation	258.492 ft	T2 Flow	8.66 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: PP Outlet | Storm Event: TypeII 24hr (7.2 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	261.300 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Riser - 1 Structure Type: Stand Pipe	
Number of Openings	1
Elevation	262.300 ft
Diameter	6.00 in
Orifice Area	0.2 ft²
Orifice Coefficient	0.600
Weir Length	1.57 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: SF Outlet | Storm Event: TypeII 24hr (3.0 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	257.250	264.000
Rectangular Weir	Weir - 1	Forward	Culvert - 1	259.350	264.000
Rectangular Weir	Weir - 2	Forward	Culvert - 1	260.500	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: SF Outlet | Storm Event: TypeII 24hr (3.0 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.00 in
Length	10.00 ft
Length (Computed Barrel)	10.01 ft
Slope (Computed)	0.050 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.070
T2 ratio (HW/D)	1.172
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.141 ft	T1 Flow	15.55 ft³/s
T2 Elevation	258.344 ft	T2 Flow	17.77 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: SF Outlet | Storm Event: TypeII 24hr (3.0 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	257.250 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	259.350 ft
Weir Length	2.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	260.500 ft
Weir Length	8.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: SF Outlet | Storm Event: TypeII 24hr (3.6 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	257.250	264.000
Rectangular Weir	Weir - 1	Forward	Culvert - 1	259.350	264.000
Rectangular Weir	Weir - 2	Forward	Culvert - 1	260.500	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: SF Outlet | Storm Event: TypeII 24hr (3.6 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.00 in
Length	10.00 ft
Length (Computed Barrel)	10.01 ft
Slope (Computed)	0.050 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.070
T2 ratio (HW/D)	1.172
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.141 ft	T1 Flow	15.55 ft^3/s
T2 Elevation	258.344 ft	T2 Flow	17.77 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: SF Outlet | Storm Event: TypeII 24hr (3.6 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	257.250 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	259.350 ft
Weir Length	2.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	260.500 ft
Weir Length	8.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: SF Outlet | Storm Event: TypeII 24hr (6.0 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	257.250	264.000
Rectangular Weir	Weir - 1	Forward	Culvert - 1	259.350	264.000
Rectangular Weir	Weir - 2	Forward	Culvert - 1	260.500	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: SF Outlet | Storm Event: TypeII 24hr (6.0 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.00 in
Length	10.00 ft
Length (Computed Barrel)	10.01 ft
Slope (Computed)	0.050 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.070
T2 ratio (HW/D)	1.172
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.141 ft	T1 Flow	15.55 ft³/s
T2 Elevation	258.344 ft	T2 Flow	17.77 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: SF Outlet | Storm Event: TypeII 24hr (6.0 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	257.250 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	259.350 ft
Weir Length	2.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	260.500 ft
Weir Length	8.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: SF Outlet | Storm Event: TypeII 24hr (7.2 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	257.250	264.000
Rectangular Weir	Weir - 1	Forward	Culvert - 1	259.350	264.000
Rectangular Weir	Weir - 2	Forward	Culvert - 1	260.500	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: SF Outlet | Storm Event: TypeII 24hr (7.2 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.00 in
Length	10.00 ft
Length (Computed Barrel)	10.01 ft
Slope (Computed)	0.050 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.070
T2 ratio (HW/D)	1.172
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	258.141 ft	T1 Flow	15.55 ft³/s
T2 Elevation	258.344 ft	T2 Flow	17.77 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: SF Outlet | Storm Event: TypeII 24hr (7.2 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	257.250 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	259.350 ft
Weir Length	2.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	260.500 ft
Weir Length	8.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (3.0 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	256.000	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (3.0 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	6.00 in
Length	20.00 ft
Length (Computed Barrel)	20.01 ft
Slope (Computed)	0.025 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.079
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.082
T2 ratio (HW/D)	1.185
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	256.541 ft	T1 Flow	0.49 ft³/s
T2 Elevation	256.592 ft	T2 Flow	0.56 ft³/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 1 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (3.0 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	256.000 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (3.6 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	256.000	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (3.6 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	6.00 in
Length	20.00 ft
Length (Computed Barrel)	20.01 ft
Slope (Computed)	0.025 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.079
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.082
T2 ratio (HW/D)	1.185
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	256.541 ft	T1 Flow	0.49 ft^3/s
T2 Elevation	256.592 ft	T2 Flow	0.56 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 2 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (3.6 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	256.000 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (6.0 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	256.000	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (6.0 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	6.00 in
Length	20.00 ft
Length (Computed Barrel)	20.01 ft
Slope (Computed)	0.025 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.079
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.082
T2 ratio (HW/D)	1.185
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	256.541 ft	T1 Flow	0.49 ft^3/s
T2 Elevation	256.592 ft	T2 Flow	0.56 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 25 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (6.0 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	256.000 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (7.2 in)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	256.000 ft
Increment (Headwater)	0.100 ft
Maximum (Headwater)	264.000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	256.000	264.000
Culvert-Circular	Culvert - 1	Forward	TW	256.000	264.000
Tailwater Settings	Tailwater			(N/A)	(N/A)

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (7.2 in)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	6.00 in
Length	20.00 ft
Length (Computed Barrel)	20.01 ft
Slope (Computed)	0.025 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.079
Kr	0.200
Convergence Tolerance	0.001 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.082
T2 ratio (HW/D)	1.185
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	256.541 ft	T1 Flow	0.49 ft^3/s
T2 Elevation	256.592 ft	T2 Flow	0.56 ft^3/s

Fordham Boulevard Apartments

Subsection: Outlet Input Data | Return Event: 100 years
Label: SF WQV Outlet | Storm Event: TypeII 24hr (7.2 in)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	256.000 ft
Orifice Diameter	1.00 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Fordham Boulevard Apartments

Subsection: Level Pool Pond Routing Summary | Return Event: 1 years
Label: Storm Filter (IN) | Storm Event: TypeII 24hr (3.0 in)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	256.000 ft
Volume (Initial)	0 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.600 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	8.91 ft³/s	Time to Peak (Flow, In)	715.200 min
Flow (Peak Outlet)	5.00 ft³/s	Time to Peak (Flow, Outlet)	723.000 min

Elevation (Water Surface, Peak)	260.223 ft
Volume (Peak)	10,701 ft³

Mass Balance (ft³)	
Volume (Initial)	0 ft³
Volume (Total Inflow)	25,257 ft³
Volume (Total Infiltration)	0 ft³
Volume (Total Outlet Outflow)	18,958 ft³
Volume (Retained)	6,296 ft³
Volume (Unrouted)	-2 ft³
Error (Mass Balance)	0.0 %

Fordham Boulevard Apartments

Subsection: Level Pool Pond Routing Summary | Return Event: 2 years
Label: Storm Filter (IN) | Storm Event: TypeII 24hr (3.6 in)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	256.000 ft
Volume (Initial)	0 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.600 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	11.42 ft³/s	Time to Peak (Flow, In)	715.200 min
Flow (Peak Outlet)	8.80 ft³/s	Time to Peak (Flow, Outlet)	721.200 min

Elevation (Water Surface, Peak)	260.575 ft
Volume (Peak)	11,592 ft³

Mass Balance (ft³)	
Volume (Initial)	0 ft³
Volume (Total Inflow)	31,726 ft³
Volume (Total Infiltration)	0 ft³
Volume (Total Outlet Outflow)	25,382 ft³
Volume (Retained)	6,342 ft³
Volume (Unrouted)	-2 ft³
Error (Mass Balance)	0.0 %

Fordham Boulevard Apartments

Subsection: Level Pool Pond Routing Summary | Return Event: 25 years
Label: Storm Filter (IN) | Storm Event: TypeII 24hr (6.0 in)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	256.000 ft
Volume (Initial)	0 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.600 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	20.27 ft³/s	Time to Peak (Flow, In)	715.200 min
Flow (Peak Outlet)	19.73 ft³/s	Time to Peak (Flow, Outlet)	716.400 min

Elevation (Water Surface, Peak)	260.956 ft
Volume (Peak)	12,558 ft³

Mass Balance (ft³)	
Volume (Initial)	0 ft³
Volume (Total Inflow)	57,656 ft³
Volume (Total Infiltration)	0 ft³
Volume (Total Outlet Outflow)	51,252 ft³
Volume (Retained)	6,401 ft³
Volume (Unrouted)	-2 ft³
Error (Mass Balance)	0.0 %

Fordham Boulevard Apartments

Subsection: Level Pool Pond Routing Summary | Return Event: 100 years
Label: Storm Filter (IN) | Storm Event: TypeII 24hr (7.2 in)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	256.000 ft
Volume (Initial)	0 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.600 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	24.80 ft³/s	Time to Peak (Flow, In)	715.200 min
Flow (Peak Outlet)	24.24 ft³/s	Time to Peak (Flow, Outlet)	715.800 min

Elevation (Water Surface, Peak)	261.077 ft
Volume (Peak)	12,865 ft³

Mass Balance (ft³)	
Volume (Initial)	0 ft³
Volume (Total Inflow)	71,609 ft³
Volume (Total Infiltration)	0 ft³
Volume (Total Outlet Outflow)	65,195 ft³
Volume (Retained)	6,412 ft³
Volume (Unrouted)	-2 ft³
Error (Mass Balance)	0.0 %

Fordham Boulevard Apartments

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- **Appendix D – Storm Drainage Calculations (StormCAD)**

  - Storm System Schematic
  - NCDOT Flex Table (10-year rainfall event)
  - Profiles showing 10-year HGL
  - NCDOT Flex Table (25-year rainfall event)
  - Profiles showing 25-year HGL

- **Appendix E – Environmental Determinations**

  - Mar. 6, 2014 Seasonal High Water Table Determination Report
  - March 9, 2017 Wetland Delineation Report
  - Nationwide Permit 18

PILOT ENVIRONMENTAL INC

March 6, 2017

Mr. Dillon Smith
Ballentine Associates, PA
221 Providence Road
Chapel Hill, North Carolina 27514

Reference: Seasonal High Water Table Determination
Approximate 4.6 Acre Tract
Fordham Boulevard Apartments
1312 Fordham Boulevard
Chapel Hill, Orange County, North Carolina
PEI Project 2604

Dear Mr. Smith:

Pilot Environmental, Inc. (PEI) has completed the Seasonal High Water Table (SHWT) Determination at the above referenced site. PEI representative, Mr. Christopher Murray (NC Licensed Soil Scientist No. 1284), conducted the SHWT determination at two boring locations to depths of 5 feet below ground surface (bgs) on March 2, 2017. At Boring Location 1, Mr. Murray determined that a seasonally high water table was observed from 14 inches bgs to cessation of the boring at 60 inches. At Boring Location 2, Mr. Murray determined that a seasonally high water table was observed from 40 inches bgs to cessation of the boring at 60 inches.

This report and results are based on conditions at the site on the day the SHWT determination was performed. This report is provided for the exclusive use of the report's addressee. Use of this report without the written consent of PEI is at the sole risk of the user.

We appreciate the opportunity to provide environmental services on your project. If you have questions concerning this report or need additional information, please contact us at (336) 310-4527.

Sincerely,

Bradley S. Luckey, PWS
Project Manager

Attachments: Report of SHWT Determination

3/2/2017 Project # 757

Pilot Environmental
Attn.: Mr. Brad Luckey
P.O. Box 128
Kernersville, NC 27285

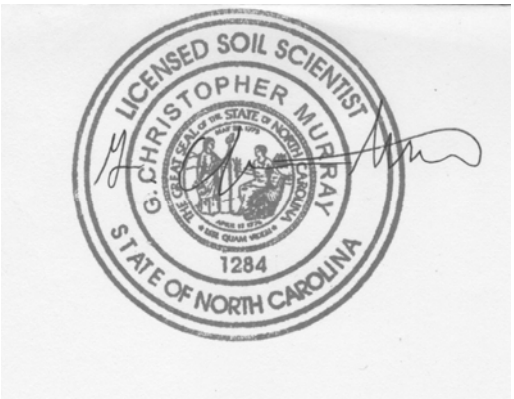
This report details the findings of a test location for the potential use of a storm water device off of Fordham Blvd. in Chapel Hill, NC. Your office gave the location of the proposed device. Soil borings were completed within the proposed device at coordinates specified by you, and the depth to the seasonally high water table was determined by observing soil indicators. G. Christopher Murray, Licensed Soil Scientist #1284, conducted the evaluation.

BORING #1 (35.93335080º, -79.0248955º)
Soil Boring #1 was conducted at the specified coordinates, and advanced to a depth of 60 inches, per your request. A seasonally high water table was observed from 14 inches to cessation of the boring at 60 inches.

BORING #2 (35.9333983º, -79.0244824º)
Soil Boring #2 was conducted at the specified coordinates, and advanced to a depth of 60 inches, per your request. A seasonally high water table was observed from 40 inches to cessation of the boring at 60 inches.

Piedmont Environmental Associates, PA is pleased to perform this work for you. If you have any further questions please feel free to call (336) 662-5487.

Sincerely,



G. Christopher Murray
N.C. Licensed Soil Scientist #1284

8004 Linville Road, Ste. C2 Oak Ridge, NC 27310 336-662-5487

PILOT ENVIRONMENTAL INC

March 9, 2017

Mr. Dillon Smith
Ballentine Associates, PA
221 Providence Road
Chapel Hill, North Carolina 27514

Reference: Wetland Delineation
Approximate 4.7 Acre Tract
Fordham Boulevard
Chapel Hill, Orange County, North Carolina
PEI Project 2604

Dear Mr. Smith:

Pilot Environmental, Inc. (PEI) is pleased to submit this report of the wetland delineation for the approximate 4.7 acre tract located west of Fordham Boulevard in Chapel Hill, Orange County, North Carolina.

Background

Wetlands are defined by the United States Army Corps of Engineers (USACE) and the United States Environmental Protection Agency (EPA) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions." In order for an area to be classified as wetland, hydrophytic vegetation, hydric soils, and wetland hydrology indicators must be present.

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredge and fill materials into waters of the United States (lakes, rivers, ponds, streams, etc.), including wetlands. Waters of the United States include the territorial seas, navigable coastal and inland lakes, rivers and streams, intermittent streams, and wetlands. The EPA and the USACE jointly administer the Section 404 program. Section 401 of the Clean Water Act grants each state the authority to approve, condition, or deny any Federal permits that could result in a discharge to State waters.

Jurisdictional features include wetlands, open waters, ponds, lakes and perennial/intermittent streams. Jurisdictional features are regulated by the USACE and North Carolina Department of Environmental Quality -Division of Water Resources (NCDEQ-DWR). Permits are required prior to impacting any jurisdictional feature. The type of permit required is specific to the type,

location and amount of impacts. Stormwater management plans and/or mitigation for proposed impacts could be a requirement of the permit approval process.

The findings and conclusions in this report are our opinions based on field conditions encountered at the time of the site visit. Changes including, but not limited to, regulations, weather, timber/vegetation removal and usage/development of the site or nearby properties can alter the findings and opinions presented in this report. We recommend that this report only be used for preliminary planning purposes. Agency verifications, followed by a survey of jurisdictional features are required to determine the exact extent and locations of jurisdictional features and are valid for a period of up to five years following issuance of a USACE Jurisdictional Determination (JD) and/or NCDEQ-DWR Site Determination Letter.

Scope of Services

PEI was contracted to perform a wetland delineation for the approximate 4.7 acre tract located west of Fordham Boulevard in Chapel Hill, Orange County, North Carolina. The site consists of the parcels identified by the Orange County Geographical Information System (GIS) as Parcel Identification Numbers (PINs) 9799242361 and 9799245697. The scope of services included a delineation of jurisdictional features (streams, wetlands and other surface waters) on the site. The site boundary was not surveyed at the time of our field delineation.

Literature Review

We reviewed the U.S. Geological Survey (USGS) Topographic Map, the U.S. Department of Agriculture (USDA) Soil Survey of Orange County, the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Map and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM).

- The USGS Topographic Map (Drawing 1) identifies Booker Creek along the western site boundary. Other surface waters or wetlands are not shown on the site.

- The USDA Web Soil Survey of Orange County (Drawing 2) identifies the following mapping units on the site: Urban Land (Ur) and White Store-Urban Land Complex (WwC). The soil mapping units are not identified on the Orange County Hydric Soils List.

  PEI also reviewed the last published USDA Soil Survey of Orange County (Drawing 2A). The published soil survey depicts Booker Creek along the western site boundary and an intermittent stream along the southern site boundary. Other surface waters or wetlands are not shown on the site.

- The USFWS NWI Map (Drawing 3) depicts a riverine stream along the western portion of the site. Other surface waters or wetlands are not shown on the site.

- PEI reviewed the FEMA FIRM (Drawing 4) for the site. The FEMA FIRM identifies the site as being located within Zone AE, the 100 year floodplain. Additionally, the western portion of the site is located within a special designated FEMA floodway.

Field Delineation

PEI conducted the site visit on March 6, 2017. The northern portion of the site is developed with a Days Inn Motel and associated parking and landscaped areas. The remainder of the site consist of undeveloped wooded land. Ponds are not located on the site.

Booker Creek is located on the western portion of the site. Booker Creek is a perennial stream. PEI marked the eastern side of Booker Creek in the field with blue and white striped surveyor tape. The western side of Booker Creek is well defined and should be located by surveyors as necessary.

Wetlands are located in pockets on the northwestern portion of the site. The wetlands located on the site are separated from uplands by distinct breaks in topography, vegetation and/or soils. USACE Wetland Determination Data Forms, supporting our opinions, are included as attachments. The wetland boundaries were marked in the field with red and white striped surveyor tape.

Drawing 5 shows the approximate locations of the site and jurisdictional features. The locations and designations of jurisdictional features as shown on Drawing 5 are subject to change during agency verification.

Watershed Classification

According to the NCDEQ-DWR, the site is located in the Cape Fear River Basin. Booker Creek is located on the western portion of the site. The NCDEQ-DWR has classified Booker Creek on the site as WS-IV; Nutrient Sensitive Waters (NSW).

Additionally, the site is located in the Jordan Lake Watershed. State Regulated Riparian Buffers, fifty foot from the top of stream bank, are required adjacent to streams as depicted on the most recent versions of the USGS Topographic Map (Drawing 1) and the Published USDA Soil Survey (Drawing 2A). Booker Creek, along the western site boundary, is subject to the Jordan Lake Riparian Buffer Regulations. An intermittent stream is shown on the last published USDA Soil Survey (Drawing 2A), along the southern site boundary. However, it is our opinion that the stream is not present in the field. A Lake Jordan Buffer Determination, conducted by the NCDEQ-DWR or local delegated NCDEQ-DWR municipality would be required to determine the site's subjectivity to the Lake Jordan Riparian Buffer regulations. We recommend consultation with the local zoning authority to determine if other surface water setbacks or buffers are required.

Agency Verification

The site has not been verified by the USACE or the NCDEQ-DWR. We understand that our flags will be surveyed to determine the exact extent and location of jurisdictional features and applicable surface water buffers. The delineation, including locations and designations of features, is subject to change during agency verification. Additionally, A Lake Jordan Buffer Determination, conducted by the NCDEQ-DWR or local delegated NCDEQ-DWR municipality would be required to determine the site's subjectivity to the Lake Jordan Riparian Buffer regulations.

Closing

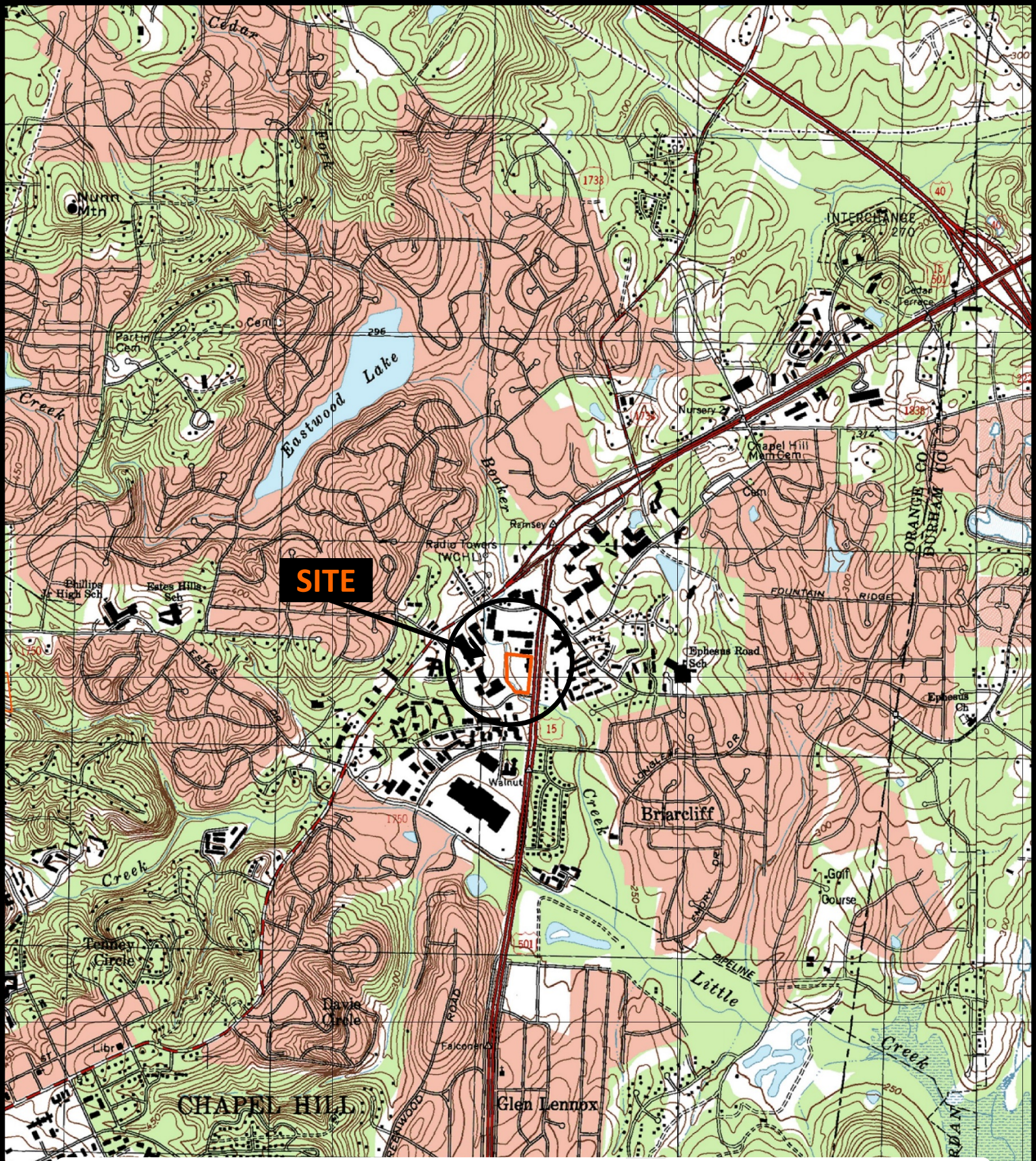
We appreciate the opportunity to provide our services to you. Please contact us at (336) 708-4997 if you have questions or require additional information.

Sincerely,

Bradley S. Luckey, PWS
Project Manager

David S. Brame, PWS
Project Manager

Attachments: Drawing 1 – USGS Topographic Map
Drawing 2 – Web Soil Map
Drawing 2A – Published Soil Map
Drawing 3 – NWI Map
Drawing 4 – FEMA FIRM
Drawing 5 – Wetland Map
Wetland Determination Data Forms



Drawing 1

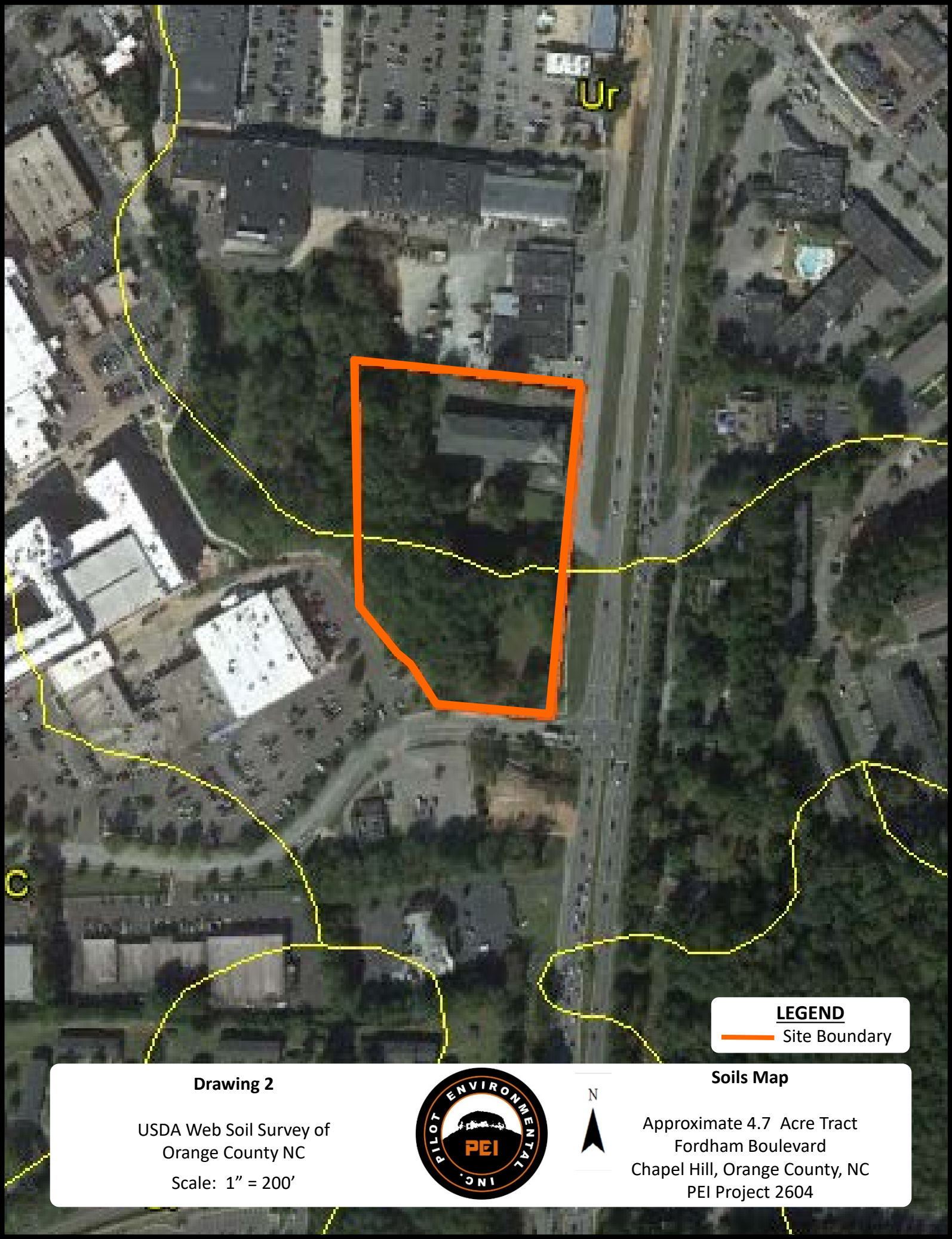
USGS Topographic Map
Chapel Hill, NC Quadrangle

Scale: 1" = 2,000'

N

USGS Topographic Map

Approximate 4.7 Acre Tract
Fordham Boulevard
Chapel Hill, Orange County, NC
PEI Project 2604



Drawing 2

USDA Web Soil Survey of
Orange County NC

Scale: 1" = 200'

Soils Map

Approximate 4.7 Acre Tract
Fordham Boulevard
Chapel Hill, Orange County, NC
PEI Project 2604

Drawing 2A

USDA Soil Survey of Orange County, NC
Published 1977, Sheets 26 & 30

Not to Scale

N

USDA Published Soils Map

Approximate 4.7 Acre Tract
Fordham Boulevard
Chapel Hill, Orange County, NC
PEI Project 2604

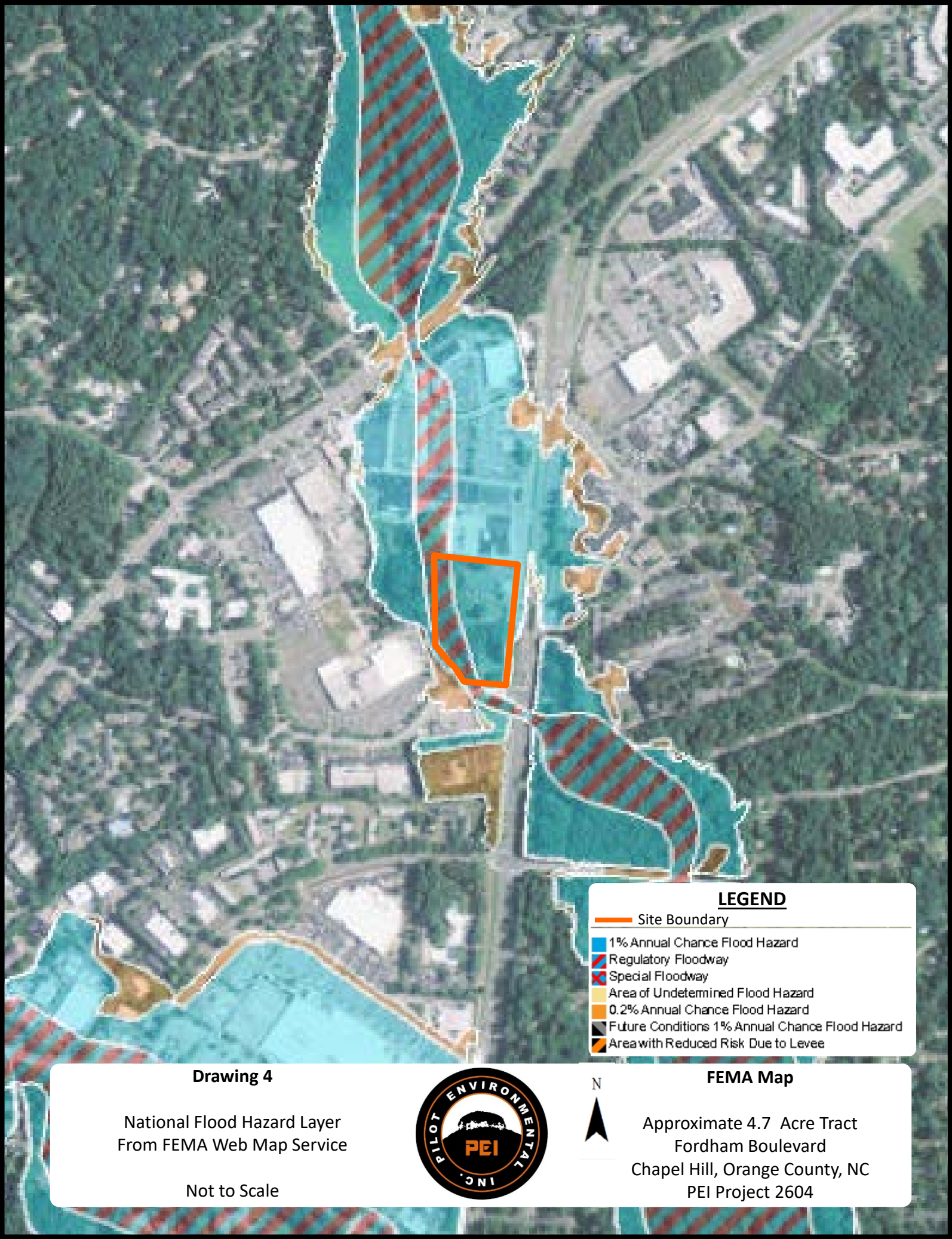
Drawing 3

USFWS National Wetland Inventory Mapper

Not to Scale

NWI Map

Approximate 4.7 Acre Tract
Fordham Boulevard
Chapel Hill, Orange County, NC
PEI Project 2604



Drawing 4

National Flood Hazard Layer
From FEMA Web Map Service

Not to Scale

FEMA Map

Approximate 4.7 Acre Tract
Fordham Boulevard
Chapel Hill, Orange County, NC
PEI Project 2604

LEGEND

- Site Boundary
- Perennial Stream (Booker Creek)
- SA 1-5 Flag Number
- DP-1 Data Point

FLAG NUMBERS/INFO

WETLAND FLAGS =
STREAM FLAGS =
Stream Flags = 17
Wetland Flags = 21
Total Flags = 38

THE LOCATIONS OF FEATURES SHOWN ON THIS MAP ARE PRELIMINARY AND APPROXIMATE. THEY HAVE NOT BEEN VERIFIED BY THE USACE AND/OR THE NCDEQ-DWR. THEY HAVE NOT BEEN SURVEYED OR GEOLOCATED.

Drawing 5

Aerial Imagery from ESRI
and PEI Field Notes
Scale: 1" = 100'
Date: 3.7.17

PILOT ENVIRONMENTAL INC. PEI

N

Wetland Map

Approximate 4.7 Acre Tract
Fordham Boulevard
Chapel Hill, Orange County, NC
PEI Project 2604

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Forham Blvd. City/County: Chapel Hill/Orange Sampling Date: 3.6.17

Applicant/Owner: State: North Carolina Sampling Point: DP-1

Investigator(s): PEI Section, Township, Range:

Landform (hillslope, terrace, etc.) Swale Local relief (concave, convex, none):

Slope (%): 1 Lat: Long: Datum:

Soil Map Unit Name: WwC NWI Classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ____
Water Table Present?	Yes ___	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point DP-1

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20	Y	FAC
2. Lirodendron tulipifera	30	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	50	= Total Cover	

Sapling/Shrub Stratum (Plot size: 30')			
1. Acer rubrum	10	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	10	= Total Cover	

Herb Stratum (Plot size: 30')			
1. Microstegium viminea	20	Y	FAC
2. Lonicera japonica	2		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	42	= Total Cover	

Woody Vine Stratum (Plot size: 30')			
1. Lonicera japonica	2	Y	FAC
2.			
3.			
4.			
5.			
6.			
	2	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		X 2 =	
FAC species		X 3 =	
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is > 50%

___ 3 - Prevalence Test is ≤ 3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 4/2	95	7.5YR 5/8	5	RM	M	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ 2 cm Muck (A10) **(LRR N)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ____ Sandy Gleyed Matrix (s4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7)
- ____ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ____ Thin Dark Suface (S9) **(MLRA 147, 148)**
- ____ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Iron Manganese Masses (F12) **(LRR N, MLRA 136)**
- ____ Umbric Surface (F13) **(MLRA 136, 122)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(MLRA 147)**
- ____ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ____ Red Parent Material (TF2)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of Hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Fordham Blvd. City/County: Chapel Hill/Orange Sampling Date: 3.6.17

Applicant/Owner: State: North Carolina Sampling Point: DP-2

Investigator(s): PEI Section, Township, Range:

Landform (hillslope, terrace, etc.) Swale Local relief (concave, convex, none):

Slope (%): 1 Lat: Long: Datum:

Soil Map Unit Name: WwC NWI Classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ____
Water Table Present?	Yes ___	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point DP-2

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	10		FAC
2. Lirodendron tulipifera	60	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	70	= Total Cover	

Sapling/Shrub Stratum (Plot size: 30')			
1. Acer rubrum	20	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	20	= Total Cover	

Herb Stratum (Plot size: 30')			
1. Microstegium viminea	30	Y	FAC
2. Allium canadensis	5		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	

Woody Vine Stratum (Plot size: 30')			
1. Toxicodendron radicans	2	Y	FAC
2.			
3.			
4.			
5.			
6.			
	2	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		X 2 =	
FAC species		X 3 =	
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is > 50%

___ 3 - Prevalence Test is ≤ 3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 5/6	50					SCL	
	10YR 5/3	50					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ 2 cm Muck (A10) **(LRR N)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ____ Sandy Gleyed Matrix (s4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7)
- ____ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ____ Thin Dark Suface (S9) **(MLRA 147, 148)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Iron Manganese Masses (F12) **(LRR N, MLRA 136)**
- ____ Umbric Surface (F13) **(MLRA 136, 122)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(MLRA 147)**
- ____ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ____ Red Parent Material (TF2)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of Hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER RESOURCES

WATER QUALITY GENERAL CERTIFICATION NO. 4092

GENERAL CERTIFICATION FOR PROJECTS ELIGIBLE FOR US ARMY CORPS OF ENGINEERS

- NATIONWIDE PERMIT NUMBER 18 (MINOR DISCHARGES),
- NATIONWIDE PERMIT NUMBER 29 (RESIDENTIAL DEVELOPMENT),
- NATIONWIDE PERMIT NUMBER 39 (COMMERCIAL AND INSTITUTIONAL DEVELOPMENTS),
- NATIONWIDE PERMIT NUMBER 40 (AGRICULTURAL ACTIVITIES),
- NATIONWIDE PERMIT NUMBER 41 (RESHAPING EXISTING DRAINAGE DITCHES),
- NATIONWIDE PERMIT NUMBER 42 (RECREATIONAL FACILITIES),
- NATIONWIDE PERMIT NUMBER 44 (MINING ACTIVITIES),
- NATIONWIDE PERMIT NUMBER 46 (DISCHARGES IN DITCHES),
- NATIONWIDE PERMIT NUMBER 51 (LAND BASED RENEWABLE ENERGY GENERATION FACILITIES), AND
- NATIONWIDE PERMIT NUMBER 52 (WATER BASED RENEWABLE ENERGY GENERATION PILOT PROJECTS).

Water Quality Certification Number 4092 is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Regulations in 15A NCAC 02H .0500 and 15A NCAC 02B .0200 for the discharge of fill material to surface waters and wetland areas as described in 33 CFR 330 Appendix A (B) (18, 29, 39, 40, 41, 42, 44, 46, 51 and 52) of the US Army Corps of Engineers regulations.

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions hereinafter set forth.

Effective date: March 19, 2017

Signed this day March 3, 2017

By

for S. Jay Zimmerman, P.G.
Director

Activities meeting any one (1) of the following thresholds or circumstances require *written approval* for a 401 Water Quality Certification from the Division of Water Resources (DWR):

a) If any of the conditions of this Certification (listed below) cannot be met; or
b) Any impacts to streams from excavation or dredging; or
c) Total temporary and permanent impacts to streams greater than 150 feet; or
d) Any stream relocation or stream restoration; or
e) Total temporary and permanent impacts to wetlands or open waters equal to or greater than one-tenth (1/10) acre; or
f) Any high density project, as defined in 15A NCAC 02H .1003(2)(a) and by the density thresholds specified in 15A NCAC 02H .1017, which does not have a stormwater management plan reviewed and approved under a state stormwater program[1] or a state-approved local government stormwater program[2]. Projects that have vested rights, exemptions, or grandfathering from state or locally-implemented stormwater programs and projects that satisfy state or locally-implemented stormwater programs through use of community in-lieu programs **require written approval**.; or
g) Any impacts to waters, or to wetlands adjacent to waters, designated as: ORW (including SAV), HQW (including PNA), SA, WS-I, WS-II, Trout, or North Carolina or National Wild and Scenic River; or
h) Any impacts to coastal wetlands [15A NCAC 07H .0205], or Unique Wetlands (UWL) [15A NCAC 02H .0506]; or
i) Any impact associated with a Notice of Violation or an enforcement action for violation(s) of NC Wetland Rules (15A NCAC 02H .0500), NC Isolated Wetland Rules (15A NCAC 02H .1300), NC Surface Water or Wetland Standards (15A NCAC 02B .0200), or State Regulated Riparian Buffer Rules (15A NCAC 02B .0200); or
j) Any impacts to subject water bodies and/or state regulated riparian buffers along subject water bodies in the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman Lake, Jordan Lake or Goose Creek Watersheds (or any other basin or watershed with State Regulated Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) *unless:*
    i) The activities are listed as "EXEMPT" from these rules; or
    ii) A Buffer Authorization Certificate is issued by the NC Division of Coastal Management (DCM); or
    iii) A Buffer Authorization Certificate or a Minor Variance is issued by a delegated or designated local government implementing a state riparian buffer program pursuant to 143-215.23.

Activities included in this General Certification that do not meet one of the thresholds listed above do not require written approval.

[1] e.g. Coastal Counties, HQW, ORW, or state-implemented Phase II NPDES
[2] e.g. Delegated Phase II NPDES, Water Supply Watershed, Nutrient-Sensitive Waters, or Universal Stormwater Management Program

I. ACTIVITY SPECIFIC CONDITIONS:

1. If this Water Quality Certification is used to access residential, commercial or industrial building sites, then all parcels owned by the applicant that are part of the single and complete project authorized by this Certification must be buildable without additional impacts to streams or wetlands. If required in writing by DWR, the applicant shall provide evidence that the parcels are buildable without requiring additional impacts to wetlands, waters, or state regulated riparian buffers. [15A NCAC 02H .0506(b)(4) and (c)(4)]

2. For road construction purposes, this Certification shall only be utilized from natural high ground to natural high ground. [15A NCAC 02H .0506(b)(2) and (c)(2)]

3. Deed notifications or similar mechanisms shall be placed on all lots with retained jurisdictional wetlands, waters, and state regulated riparian buffers within the project boundaries in order to assure compliance with NC Wetland Rules (15A NCAC 02H .0500), NC Isolated Wetland Rules (15A NCAC 02H .1300), and/or State Regulated Riparian Buffer Rules (15A NCAC 02B .0200). These mechanisms shall be put in place at the time of recording of the property or individual parcels, whichever is appropriate. [15A NCAC 02H .0506(b)(4) and (c)(4)]

4. For the North Carolina Department of Transportation, compliance with the NCDOT's individual NPDES permit NCS000250 shall serve to satisfy this condition. For all other projects that disturb one acre or more of land (including a project that disturbs less than one acre of land that is part of a larger common plan of development or sale); have permanent wetland, stream, or open water impacts; and are proposing new built-upon area shall comply with the following requirements: [15A NCAC 02H .0506(b)(5) and (c)(5)]

   a. Stormwater management shall be provided throughout the entire project area in accordance with 15A NCAC 02H .1003. For the purposes of 15A NCAC 02H .1003(2)(a), density thresholds shall be determined in accordance with 15A NCAC 02H .1017.

   b. Projects that have vested rights, exemptions, or grandfathering from state or locally-implemented stormwater programs do not satisfy this condition. Projects that satisfy state or locally-implemented stormwater programs through use of community in-lieu programs do not satisfy this condition.

   c. Projects that require written authorization from DWR shall submit the following with their application for review and approval:

      i. For projects that have a stormwater management plan (SMP) reviewed under a state stormwater program[1] or a state-approved local government stormwater program[2] shall submit plans that show the location and approximate size of all proposed stormwater measures;

[1] e.g. Coastal Counties, HQW, ORW, or state-implemented Phase II NPDES

[2] e.g. Delegated Phase II NPDES, Water Supply Watershed, Nutrient-Sensitive Waters, or Universal Stormwater Management Program

ii. All other low density projects not covered above shall submit a completed low density supplement form with all required items; and

iii. All other high density projects not covered above shall submit a completed SMP, including all appropriate stormwater control measure (SCM) supplemental forms and associated items, that complies with the high density development requirements of 15A NCAC 02H .1003.

d. Projects that do not require written approval from DWR shall obtain approval of the SMP, when required, before any impacts authorized by this Certification occur.

e. SMPs approved by DWR may be phased on a case-by-case basis. SMPs for each future phase must be approved before construction of that phase commences. Approved SMPs may not be modified without prior written authorization from DWR.

II. GENERAL CONDITIONS:

1. When written authorization is required, the plans and specifications for the project are incorporated into the authorization by reference and are an enforceable part of the Certification. Any modifications to the project require notification to DWR and may require an application submittal to DWR with the appropriate fee. [15A NCAC 02H .0501 and .0502]

2. No waste, spoil, solids, or fill of any kind shall occur in wetlands or waters beyond the footprint of the impacts (including temporary impacts) as authorized in the written approval from DWR; or beyond the thresholds established for use of this Certification without written authorization. [15A NCAC 02H .0501 and .0502]

   No removal of vegetation or other impacts of any kind shall occur to state regulated riparian buffers beyond the footprint of impacts approved in a Buffer Authorization or Variance or as listed as an exempt activity in the applicable riparian buffer rules. [15A NCAC 02B .0200]

3. In accordance with 15A NCAC 02H .0506(h), compensatory mitigation may be required for losses of greater than 150 linear feet of streams and/or greater than one (1) acre of wetlands. Impacts to isolated and other non-404 jurisdictional wetlands shall not be combined with 404 jurisdictional wetlands for the purpose of determining when impact thresholds trigger a mitigation requirement. For linear publicly owned and maintained transportation projects that are not determined to be part of a larger common plan of development by the US Army Corps of Engineers, compensatory mitigation may be required for losses of greater than 150 linear feet per stream.

   Compensatory stream and/or wetland mitigation shall be proposed and completed in compliance with G.S. 143-214.11. For applicants proposing to conduct mitigation within a project site, a complete mitigation proposal developed in accordance with the most recent guidance issued by the US Army Corps of Engineers Wilmington District shall be submitted for review and approval with the application for impacts.

4. All activities shall be in compliance with any applicable State Regulated Riparian Buffer Rules in Chapter 2 of Title 15A.

5. When applicable, all construction activities shall be performed and maintained in full compliance with G.S. Chapter 113A Article 4 (Sediment and Pollution Control Act of 1973). Regardless of applicability of the Sediment and Pollution Control Act, all projects shall incorporate appropriate Best Management Practices for the control of sediment and erosion so that no violations of state water quality standards, statutes, or rules occur. [15A NCAC 02H .0506 (b)(3) and (c)(3) and 15A NCAC 02B .0200]

   Design, installation, operation, and maintenance of all sediment and erosion control measures shall be equal to or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*, or for linear transportation projects, the *NCDOT Sediment and Erosion Control Manual*.

   All devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) sites, including contractor-owned or leased borrow pits associated with the project. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

   For borrow pit sites, the erosion and sediment control measures shall be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*. Reclamation measures and implementation shall comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.

   If the project occurs in waters or watersheds classified as Primary Nursery Areas (PNAs), SA, WS-I, WS-II, High Quality Waters (HQW), or Outstanding Resource Waters (ORW), then the sedimentation and erosion control designs shall comply with the requirements set forth in 15A NCAC 04B .0124, *Design Standards in Sensitive Watersheds*.

6. Sediment and erosion control measures shall not be placed in wetlands or waters except within the footprint of temporary or permanent impacts authorized under this Certification. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0501 and .0502]

7. Erosion control matting that incorporates plastic mesh and/or plastic twine shall not be used along streambanks or within wetlands. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02B .0201]

8. An NPDES Construction Stormwater Permit (NCG010000) is required for construction projects that disturb one (1) or more acres of land. The NCG010000 Permit allows stormwater to be discharged during land disturbing construction activities as stipulated in the conditions of the permit. If the project is covered by this permit, full compliance with permit conditions including the erosion & sedimentation control plan, inspections and maintenance, self-monitoring, record keeping and reporting requirements is required. [15A NCAC 02H .0506(b)(5) and (c)(5)]

   The North Carolina Department of Transportation (NCDOT) shall be required to be in full compliance with the conditions related to construction activities within the most recent version of their individual NPDES (NCS000250) stormwater permit. [15A NCAC 02H .0506(b)(5) and (c)(5)]

9. All work in or adjacent to streams shall be conducted so that the flowing stream does not come in contact with the disturbed area. Approved best management practices from the most current version of the *NC Sediment and Erosion Control Manual*, or the *NC DOT Construction and Maintenance Activities Manual*, such as sandbags, rock berms, cofferdams, and other diversion structures shall be used to minimize excavation in flowing water. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506(b)(3) and (c)(3)]

10. If activities must occur during periods of high biological activity (e.g. sea turtle nesting, fish spawning, or bird nesting), then biological monitoring may be required at the request of other state or federal agencies and coordinated with these activities. [15A NCAC 02H .0506(b)(2) and 15A NCAC 04B .0125]

    All moratoriums on construction activities established by the NC Wildlife Resources Commission (WRC), US Fish and Wildlife Service (USFWS), NC Division of Marine Fisheries (DMF), or National Marine Fisheries Service (NMFS) shall be implemented. Exceptions to this condition require written approval by the resource agency responsible for the given moratorium. A copy of the approval from the resource agency shall be forwarded to DWR.

    Work within a designated trout watershed of North Carolina (as identified by the Wilmington District of the US Army Corps of Engineers), or identified state or federal endangered or threatened species habitat, shall be coordinated with the appropriate WRC, USFWS, NMFS, and/or DMF personnel.

11. Culverts shall be designed and installed in such a manner that the original stream profiles are not altered and allow for aquatic life movement during low flows. The dimension, pattern, and profile of the stream above and below a pipe or culvert shall not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed culvert shall be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. [15A NCAC 02H .0506(b)(2) and (c)(2)]

Placement of culverts and other structures in streams shall be below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20% of the culvert diameter for culverts having a diameter less than or equal to 48 inches, to allow low flow passage of water and aquatic life.

If multiple pipes or barrels are required, they shall be designed to mimic the existing stream cross section as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel shall be avoided.

When topographic constraints indicate culvert slopes of greater than 5%, culvert burial is not required, provided that all alternative options for flattening the slope have been investigated and aquatic life movement/connectivity has been provided when possible (e.g. rock ladders, cross vanes, etc.). Notification, including supporting documentation to include a location map of the culvert, culvert profile drawings, and slope calculations, shall be provided to DWR 60 calendar days prior to the installation of the culvert.

When bedrock is present in culvert locations, culvert burial is not required provided that there is sufficient documentation of the presence of bedrock. Notification, including supporting documentation such as, a location map of the culvert, geotechnical reports, photographs, etc. shall be provided to DWR a minimum of 60 calendar days prior to the installation of the culvert. If bedrock is discovered during construction, then DWR shall be notified by phone or email within 24 hours of discovery.

If other site-specific topographic constraints preclude the ability to bury the culverts as described above and/or it can be demonstrated that burying the culvert would result in destabilization of the channel, then exceptions to this condition require application to and written approval from DWR.

Installation of culverts in wetlands shall ensure continuity of water movement and be designed to adequately accommodate high water or flood conditions. When roadways, causeways, or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges shall be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in destabilization of streams or wetlands.

The establishment of native woody vegetation and other soft stream bank stabilization techniques shall be used where practicable instead of rip-rap or other bank hardening methods.

12. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means to the maximum extent practicable (e.g. grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. -Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506(b)(5)]

13. Application of fertilizer to establish planted/seeded vegetation within disturbed riparian areas and/or wetlands shall be conducted at agronomic rates and shall comply with all other Federal, State and Local regulations. Fertilizer application shall be accomplished in a manner that minimizes the risk of contact between the fertilizer and surface waters. [15A NCAC 02B .0200 and 15A NCAC 02B .0231]

14. If concrete is used during construction, then all necessary measures shall be taken to prevent direct contact between uncured or curing concrete and waters of the state. Water that inadvertently contacts uncured concrete shall not be discharged to waters of the state. [15A NCAC 02B .0200]

15. All proposed and approved temporary fill and culverts shall be removed and the impacted area shall be returned to natural conditions within 60 calendar days after the temporary impact is no longer necessary. The impacted areas shall be restored to original grade, including each stream's original cross sectional dimensions, planform pattern, and longitudinal bed profile. For projects that receive written approval, no temporary impacts are allowed beyond those included in the application and authorization. All temporarily impacted sites shall be restored and stabilized with native vegetation. [15A NCAC 02H .0506(b)(2) and (c)(2)]

16. All proposed and approved temporary pipes/culverts/rip-rap pads etc. in streams shall be installed as outlined in the most recent edition of the *North Carolina Sediment and Erosion Control Planning and Design Manual* or the *North Carolina Surface Mining Manual* or the *North Carolina Department of Transportation Best Management Practices for Construction and Maintenance Activities* so as not to restrict stream flow or cause dis-equilibrium during use of this Certification. [15A NCAC 02H .0506(b)(2) and (c)(2)]

17. Any rip-rap required for proper culvert placement, stream stabilization, or restoration of temporarily disturbed areas shall be restricted to the area directly impacted by the approved construction activity. All rip-rap shall be placed such that the original stream elevation and streambank contours are restored and maintained. Placement of rip-rap or other approved materials shall not result in de-stabilization of the stream bed or banks upstream or downstream of the area or in a manner that precludes aquatic life passage. [15A NCAC 02H .0506(b)(2)]

18. Any rip-rap used for stream or shoreline stabilization shall be of a size and density to prevent movement by wave, current action, or stream flows and shall consist of clean rock or masonry material free of debris or toxic pollutants. Rip-rap shall not be installed in the streambed except in specific areas required for velocity control and to ensure structural integrity of bank stabilization measures. [15A NCAC 02H .0506(b)(2)]

19. Applications for rip-rap groins proposed in accordance with 15A NCAC 07H .1401 (NC Division of Coastal Management General Permit for construction of Wooden and Rip-rap Groins in Estuarine and Public Trust Waters) shall meet all the specific conditions for design and construction specified in 15A NCAC 07H .1405.

20. All mechanized equipment operated near surface waters shall be inspected and maintained regularly to prevent contamination of surface waters from fuels, lubricants, hydraulic fluids, or other toxic materials. Construction shall be staged in order to minimize the exposure of equipment to surface waters to the maximum extent practicable. Fueling, lubrication and general equipment maintenance shall not take place within 50 feet of a waterbody or wetlands to prevent contamination by fuels and oils. [15A NCAC 02H .0506(b)(3) and (c)(3) and 15A NCAC 02B .0211 (12)]

21. Heavy equipment working in wetlands shall be placed on mats or other measures shall be taken to minimize soil disturbance. [15A NCAC 02H .0506(b)(3) and (c)(3)]

22. In accordance with 143-215.85(b), the applicant shall report any petroleum spill of 25 gallons or more; any spill regardless of amount that causes a sheen on surface waters; any petroleum spill regardless of amount occurring within 100 feet of surface waters; and any petroleum spill less than 25 gallons that cannot be cleaned up within 24 hours.

23. If an environmental document is required under the State Environmental Policy Act (SEPA), then this General Certification is not valid until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is issued by the State Clearinghouse. If an environmental document is required under the National Environmental Policy Act (NEPA), then this General Certification is not valid until a Categorical Exclusion, the Final Environmental Assessment, or Final Environmental Impact Statement is published by the lead agency [15A NCAC 01C .0107(a)]

24. This General Certification does not relieve the applicant of the responsibility to obtain all other required Federal, State, or Local approvals before proceeding with the project, including those required by, but not limited to Sediment and Erosion Control, Non-Discharge, Water Supply Watershed, and Trout Buffer regulations.

25. The applicant and their authorized agents shall conduct all activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act), and any other appropriate requirements of State and Federal Law. If DWR determines that such standards or laws are not being met, including failure to sustain a designated or achieved use, or that State or Federal law is being violated, or that further conditions are necessary to assure compliance, then DWR may revoke or modify a written authorization associated with this General Water Quality Certification. [15A NCAC 02H .0507(d)]

26. When written authorization is required for use of this Certification, upon completion of all permitted impacts included within the approval and any subsequent modifications, the applicant shall be required to return a certificate of completion (available on the DWR website https://edocs.deq.nc.gov/Forms/Certificate-of-Completion). [15A NCAC 02H .0502(f)]

27. Additional site-specific conditions, including monitoring and/or modeling requirements, may be added to the written approval letter for projects proposed under this Water Quality Certification in order to ensure compliance with all applicable water quality and effluent standards. [15A NCAC 02H .0507(c)]

28. If the property or project is sold or transferred, the new Permittee shall be given a copy of this Certification (and written authorization if applicable) and is responsible for complying with all conditions. [15A NCAC 02H .0501 and .0502]

III. GENERAL CERTIFICATION ADMINISTRATION:

1. In accordance with North Carolina General Statute 143-215.3D(e), written approval for a 401 Water Quality General Certification must include the appropriate fee. An applicant for a CAMA permit under Article 7 of Chapter 113A of the General Statutes for which a Water Quality Certification is required shall only make one payment to satisfy both agencies; the fee shall be as established by the Secretary in accordance with 143-215.3D(e)(7).

2. This Certification neither grants nor affirms any property right, license, or privilege in any waters, or any right of use in any waters. This Certification does not authorize any person to interfere with the riparian rights, littoral rights, or water use rights of any other person and this Certification does not create any prescriptive right or any right of priority regarding any usage of water. This Certification shall not be interposed as a defense in any action respecting the determination of riparian or littoral rights or other rights to water use. No consumptive user is deemed by virtue of this Certification to possess any prescriptive or other right of priority with respect to any other consumptive user regardless of the quantity of the withdrawal or the date on which the withdrawal was initiated or expanded.

3. This Certification grants permission to the Director, an authorized representative of the Director, or DWR staff, upon the presentation of proper credentials, to enter the property during normal business hours. [15A NCAC 02H .0502(e)]

4. This General Certification shall expire on the same day as the expiration date of the corresponding Nationwide Permit and/or Regional General Permit. The conditions in effect on the date of issuance of Certification for a specific project shall remain in effect for the life of the project, regardless of the expiration date of this Certification. This General Certification is rescinded when the US Army Corps of Engineers reauthorizes any of the corresponding Nationwide Permits and/or Regional General Permits or when deemed appropriate by the Director of the Division of Water Resources.

5. Non-compliance with or violation of the conditions herein set forth by a specific project may result in revocation of this General Certification for the project and may also result in criminal and/or civil penalties.

6. The Director of the North Carolina Division of Water Resources may require submission of a formal application for Individual Certification for any project in this category of activity if it is determined that the project is likely to have a significant adverse effect upon water quality, including state or federally listed endangered or threatened aquatic species, or degrade the waters so that existing uses of the water or downstream waters are precluded.

7. Public hearings may be held prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Resources.

History Note: Water Quality Certification (WQC) Number 4092 issued March 3, 2017 replaces WQC 3890 issued March 19, 2012 replaces WQC Number 3821 issued April 6, 2010; WQC Number 3631 issued March 19, 2007; WQC 3402 issued March, 2003; WQC Number 3362, issued March 18, 2002; WQC 3287, issued June 1, 2000; WQCs 3106 and 3108 issued February 11, 1997.