

FIRE FLOW ANALYSIS REPORT & CALCULATIONS

For

Harris Creek Farms & Reserves @ Mitchell Mill

City of Raleigh

Original: 29 May 2025



**QUANTECH ENGINEERING LLP
& THE CSC GROUP LLC**

www.thescgrp.com

F-1517



15000 Weston Parkway
Cary, N.C. 27513
(919) 996-9455

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Narrative:

The proposed project, Harris Creek, is a new residential development located in the Town of Rolesville, North Carolina. Our project with the water main extension will be in coordination and cost sharing with another developments just south of ours called The Reserve at Mitchell Mill. This Harris Creek Project will include providing water services to 120 single family residential lots. The Reserve at Mitchell Mill project will include providing water services to 272 single family residential lots and 118 townhomes. In order to provide water services, we will need to extent the water main at the corner of Mitchell Mill Road and Watkins Road, spacing the fire hydrants so that they are no more than 400' apart we have added 23 fire hydrants being proposed along Mitchell Mill, 11 along Jonesville Road, and in addition to the waterline extension there are 12 fire hydrants inside Harris Creek and another 31 within the development of the Reserve at Mitchell Mill. The water line required by the City of Raleigh along Mitchell Mill and Jonesville is 12" or larger and though we are extending off a 12" line, our calculations indicates that we will need at least a 15" main running the length of Mitchell Mill Road then it can go down to a 12" line up Jonesville, and for the developments we are proposing an 8" water main along throughout both subdivisions.

Peak Demands:

The peak domestic demand for each lot was calculated to be 0.70 gpm, based on a daily rate of 400 gpd (NCDEQ 15A: 18C .0400) and a 2.5 peaking factor.

$$400 \text{ gpd} * \frac{1 \text{ day}}{24 \text{ hrs}} * \frac{1 \text{ hr}}{60 \text{ min}} * 2.5 \text{ peaking factor} = 0.70 \text{ gpm}$$

Therefore, to ensure every component is designed for the full build-out condition, the model was expanded to include the water lines, hydrants, and peak domestic demands (0.70 gpm per lot) for the Harris Creek and the Reserve at Mitchell Mill development.

Design Procedure:

The fire flow calculations were performed using the WaterCAD program created by Bentley. The model uses existing hydrant flow data to determine how much flow is coming to the site. The model was built using hydrant flow data taken from the hydrant closest to our proposed tie-in at the corner of Mitchell Mill and Watkins, this hydrant flow test yielded the minimum separation value (10 psi) for the static flow and the residual flow.

The model was built assuming that both the Harris Creek development and the Reserve at Mitchell Mill development were fully built out. Since both proposed tie-in connections will happen during Phase 1 of the development, each additional phase after that only increases the demand on the system without providing any additional flow. Therefore, there was no need to assess individual phases, as the worst case scenario is the final build-out condition.

To run the program, the residential demands for each lot, as well as all the future demands were applied to the nearest pipe and distributed throughout the system. The program then calculates the amount of fire flow that remains available at each node during peak demand conditions.

The required fire flow for single family residences is 1,500 gpm @ 20 psi, and the required fire flow for townhomes is 2,000 gpm @ 20 psi. See the report as hydrant 357 to hydrant 369 shows needing 2,000 gpm while the rest of the data is only requiring 1,500 gpm.

Results:

The results from this fire flow analysis show that all the hydrants in this development as well as all hydrants within the both development have at least 1,500 gpm of fire flow for the single family homes and 2,000 gpm of fire flow for the townhomes available at 20 psi during peak demand conditions.



TEST LOCATION

Address/Location Description 4108 Mitchell Mill

Test hydrant Facility ID WHYD 200760

Flow hydrant Facility ID WHYD 200761

APPLICATION INFORMATION

Name The CSC Group, LLC

Address 15000 Weston Parkway; Cary NC 27513

Contact Person Bryan Harris

Phone 919-996-9455

Email Bryan@TheCSCgrp.com

SYSTEM INFORMATION

Test Date 27 May 2025

Time of Test 1419

Nearest Elevated Tank New Hope

Test Hydrant Elevation 294

Main Size 12"

Pressure Zone 495

Tank Hydraulic Grade 480.84

Use 20ft below pressure zone (tank overflow) for design*

Pump Info List of pumps were on at time of test

Theoretical Pressure 78.4

EMJ lowside pump 4 / Hwy 64 pump 2 / EB Bain Pump /

Wade Ave Pump 1 / North Hills Pump 1

RESULTS

Static Pressure 78 psi

Number of Outlets Flowing 1

Residual Pressure 68 psi

Flow Hydrant Discharge Pressure 56 psi

Outlet Diameter 2.5 inches

Volume of Discharge 1,255 gpm

Water usage during test 1,900 Total Gal

Test Completed by: Bryan Harris

SEAL (if applicable)

Testing Company: Quantech Engineering, LLP

Checked by: Harry Lovic

Date 27 May 2025

Notes: Both FHs that were used were in good condition, the valves turned easily, the 2.5" caps were easy to remove and there was no sign of leaks or damages, The paint also appeared to be in good condition



Please attach the following supporting documentation to this form;
Labeled map of location of test identifying test hydrant and flow hydrant
Calculation demonstrating how the discharge flow was determined
Calculation demonstrating the available fire flow at a residual pressure of 20 psi
Printout of any recorded data supporting the static and residual pressure at the test hydrant.
Printout of any recorded data supporting the discharge pressure of the flow hydrant.

*To maintain system water quality, storage tanks may be maintained as low as 20' below overflow.

updated August 2019

FIRE FLOW TEST

Project Name: Harris Creek
Project Location: Jonesville Road

Test Date: 2025-May-27
Performed by: Bryan Harris

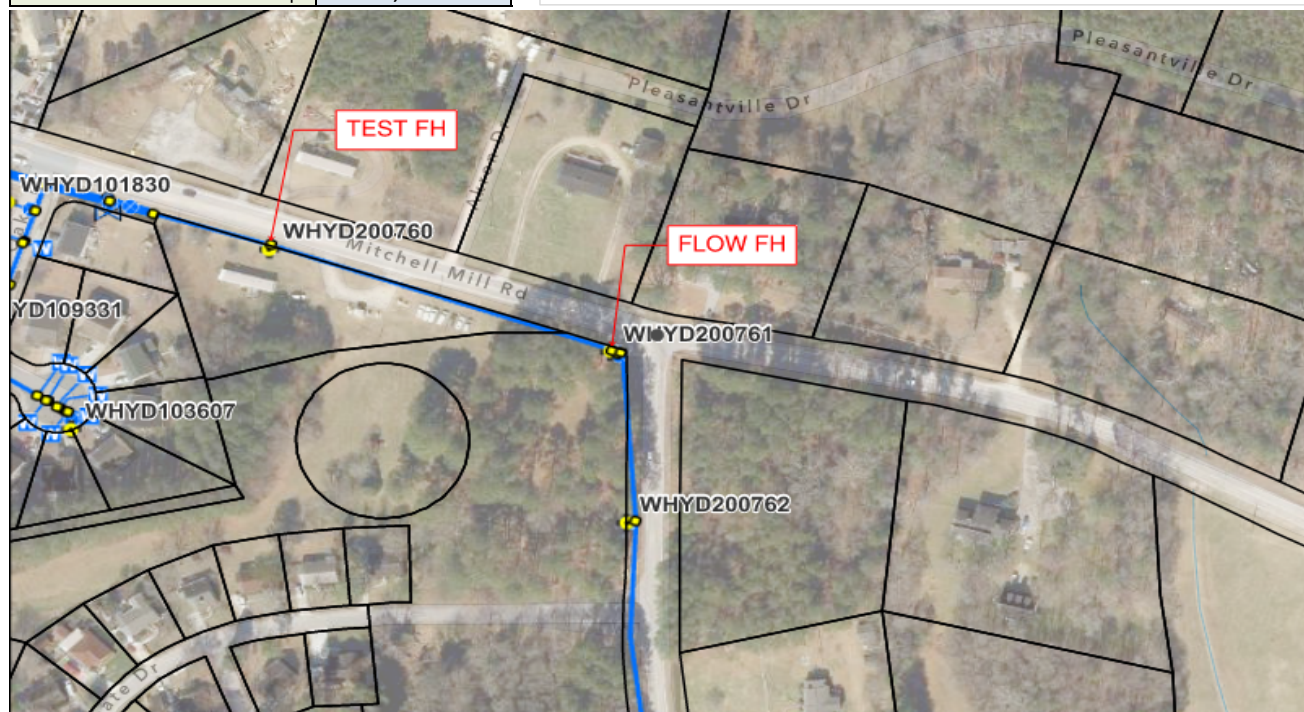
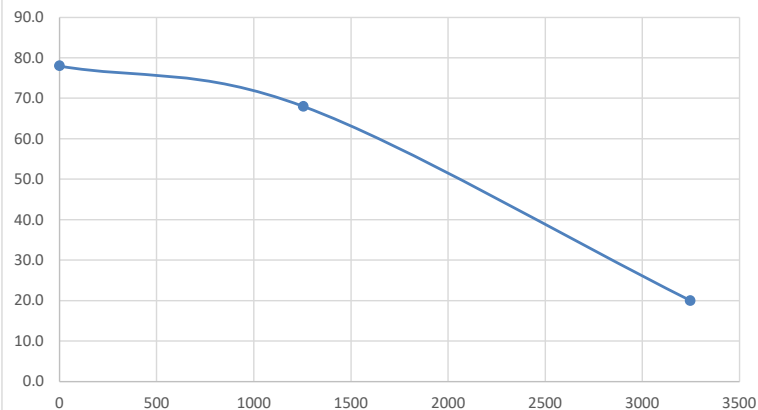
Supply Being Tested 12" Main (New Hope)

Location of Pressure Hydrant: 4108 Mitchell Mill
Hydrant ID (if applicable): WHYD200760
Elevation: 294.00

Location of Flow Hydrant: 4115 Mitchell Mill
Hydrant ID (if applicable): WHYD200761
Elevation: 290.00
Outlet Dia: 2.50

Outlet "C" Factor: 0.90
Static (psi): 78.0
Residual (psi): 68.0
Pitot (psi): 56.0
Flow (gpm): 1,255.7
Flow available at 20 psi 3,247.2

Fire Hydrant Flow Curve



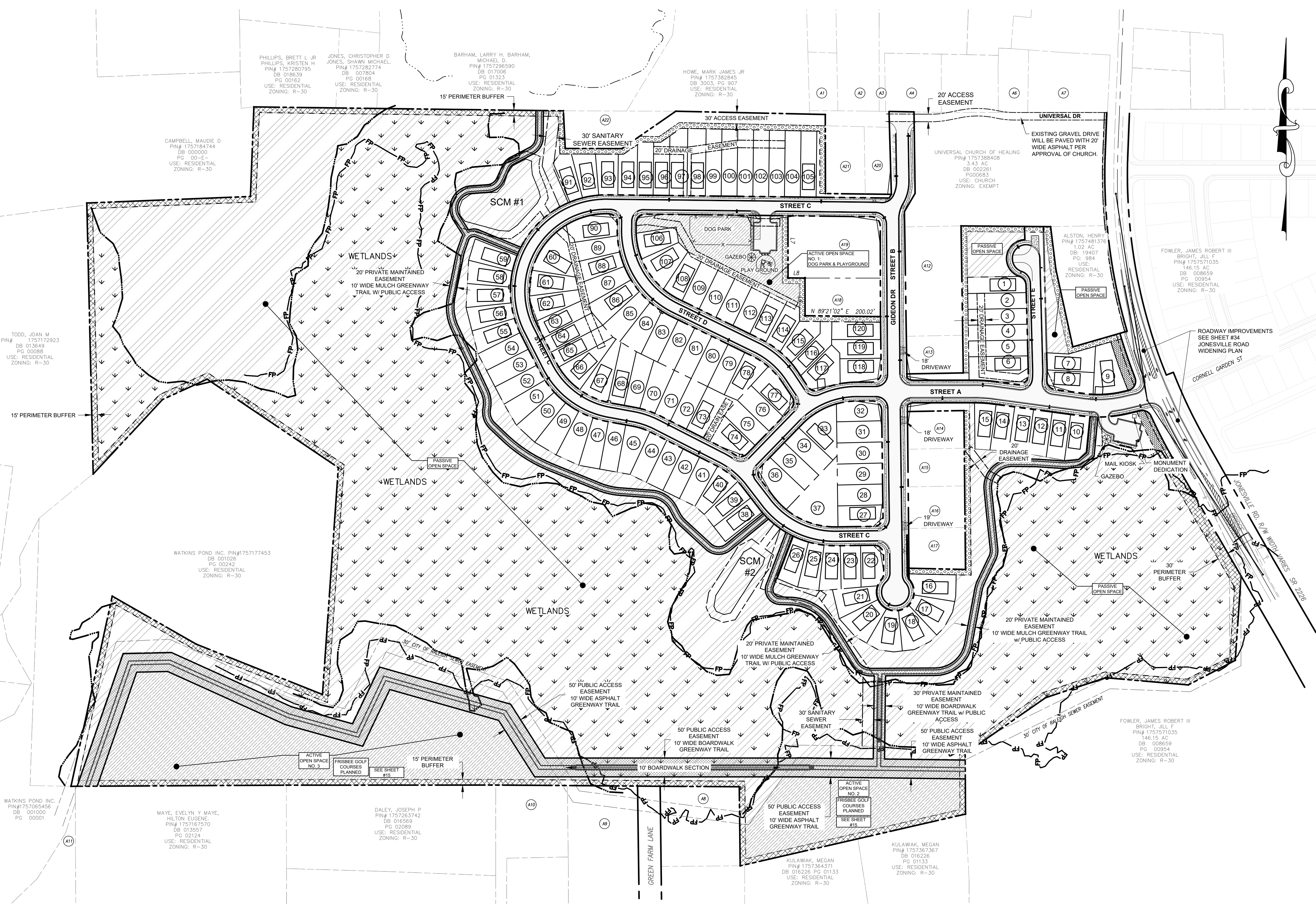
Curve Numbers for WaterCAD		
Flow	Head	+ Elev
0.00	180.18	474.18
1,255.7	157.08	451.08
3,247.2	46.20	340.20

Pressure Zone
495.00

Pressure Zone minus 20'
475.00 - FH Elev = 185.00
x 0.433

Theoretical Pressure
78.43

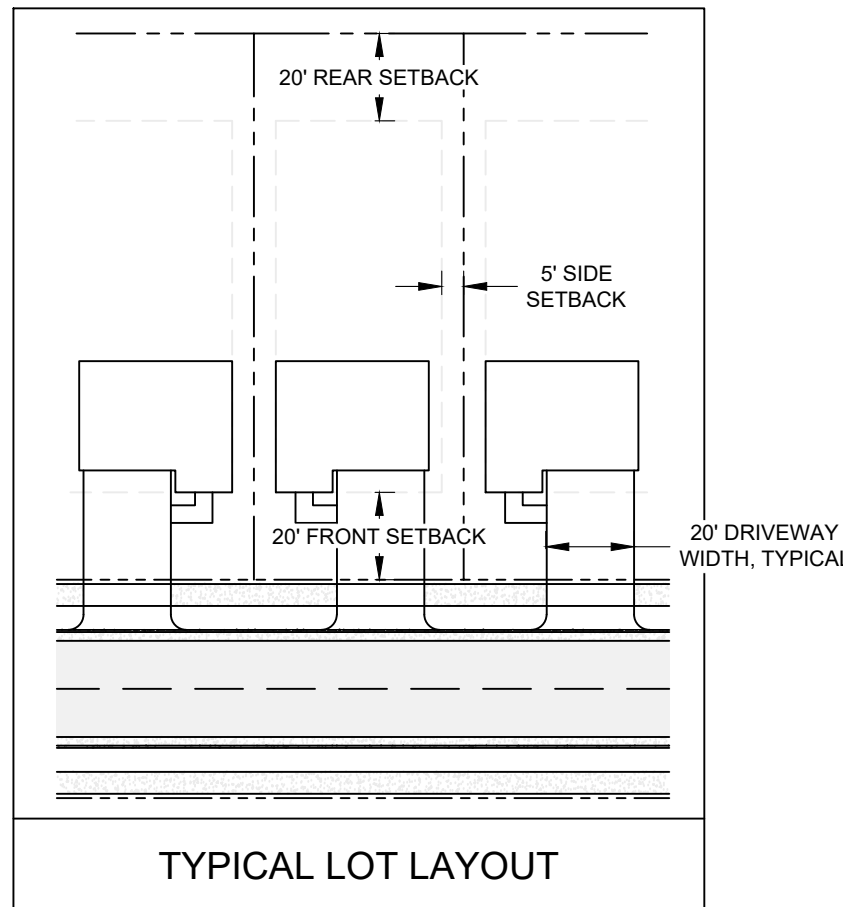




ADJACENT PROPERTIES					
PLAN ID	PIN #	OWNER	DB/PG	USE	ZONING
A1	1757-38-4791	ROSARIO, MODESTO ESCARFULLER	19545 / 517	Residential	R-30
A2	1757-38-5884	CURTIS, HENDALL HEIRS	20-E / 3830	Residential	R-30
A3	1757-38-7858	GARCIA, SALVADOR	18610 / 2740	Residential	R-30
A4	1757-38-5884	FERRELL, CHARLES E & FERRELL, SHARON R	7662 / 727	Residential	R-30
A5	1757-38-8780	POWER ELEVEN CONSTRUCTION, LLC	19349 / 1245	Residential	R-30
A6	1757-48-0701	HARTSFIELD, ROZELIA J HEIRS HATTIE SMITH	10-E / 1220	Residential	R-30
A7	1757-48-1740	HARTSFIELD, ROZELIA J HEIRS HATTIE SMITH	10-E / 1220	Residential	R-30
A8	1757-36-1783	BIRMINGHAM, JOHN DAVIS	3642 / 732	Residential	R-30
A9	1757-26-9620	CARPENTER, BOBBY RAY CARPENTER, ALBERTA L	19601 / 2199	Residential	R-30
A10	1757-26-6697	RIVERS, SUSAN MARSHALL	3406 / 539	Residential	R-30
A11	1757-16-4026	SOUTTER, SUSAN R SOUTTER, ROBERT QUENTIN	17592 / 381	Residential	R-30
A12	1757-38-7189	DUNN, JAMES WILLIAM HEIRS MONTAGUE, BUNNIE DUNN	N/A	Vacant	R-30
A13	1757-38-7090	WW OVERTIME LLC	19202 / 2051	Vacant	R-30
A14	1757-37-7799	WHITLEY, CLEVELAND G HEIRS	N/A	Residential	R-30
A15	1757-37-7699	JARVIS, MARIE D CURTIS, HURLEY MAE	11946 / 1968	Vacant	R-30
A16	1757-37-8610	JARVIS, MYRON JARVIS, MARIE	9106 / 1133	Residential	R-30
A17	1757-37-7497	JARVIS, MARIE D CURTIS, HURLEY MAE	11946 / 1968	Residential	R-30
A18	1757-38-5155	HARRIS, OLLIE VIRGIN HEIRS HARRIS, LORINE B	98-E / 2613	Vacant	R-30
A19	1757-38-5249	CHEN, PING LI FANXING	19823 / 2163	Residential	R-30
A20	1757-27-7811	ROUSE, ELLEN CURTIS	19170 / 1070	Vacant	R-30
A21	1757-38-5562	QUIRINO, MARIA ESTELA	17501 / 945	Residential	R-30
A22	1757-28-9559	WILDER, THOMAS H III WILDER, MAGGIE	12-E / 3295	Residential	R-30

SITE PLAN LEGEND

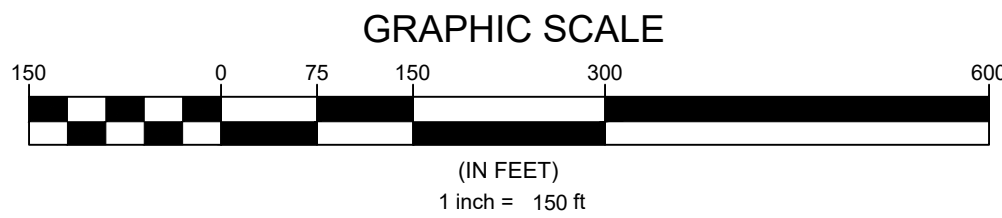
PROPOSED R.O.W.	---
PROPOSED LOT LINE	---
PROPOSED BUILDING SETBACK	---
PROPOSED EASEMENT	---
PROPOSED OPEN SPACE PASSIVE	---
PROPOSED OPEN SPACE ACTIVE	---
PROPOSED GREENWAY	---
PROPOSED 30' JONESVILLE RD STREETScape	---
PROPOSED 15' BOUNDARY BUFFER CONSERVATION	---
PROPOSED 15' BOUNDARY LANDSCAPE BUFFER	---
PROPOSED 5' SIDEWALK	---
EXISTING BOUNDARY / R.O.W.	---
EXISTING EASEMENT	---
EXISTING 100 YEAR FLOOD PLAIN	---
EXISTING WETLANDS	---



GENERAL SITE NOTES:

- SEE SHEET 14 FOR ROADWAY SECTIONS AND LINE & CURVE TABLES.

SITE DATA TABLE	
OWNER:	KENNETH INVESTMENTS, LLC Contact: STEPHAN GEORGE 10030 GREEN LEVEL CHURCH RD, STE 802 CARY, NC 27519
ENGINEER:	QUANTECH ENGINEERING BRYAN A. HARRIS, PE 15000 WESTON PARKWAY, STE. 174 CARY, NC 27513 PHONE: (919) 815-9987 EMAIL: BRYAN@QUANTECHENG.COM
DEVELOPER:	THE CSC GROUP, LLC STEVE GEORGE 600 PARK OFFICES DRIVE, STE 372 RESEARCH TRIANGLE, NC 27709 PHONE: (919) 815-9987
ENVIRONMENTAL CONSULTANT:	MORRIS & RITCHIE ASSOCIATES 530 HINTON POND ROAD, SUITE 104 KNIGHTDALE, NC 27545
SURVEYOR:	BATEMAN CIVIL SURVEY COMPANY JOSH DAVIDSON 2524 RELIANCE AVE APEX, NC 27539 PHONE: 919 557-1080 Ext 109 josh@batemancivilsurvey.com
SITE ADDRESS:	4928 UNIVERSAL DR WAKE FOREST, NC 27587-6356
PIN:	1757277811, 1757471559, 1757383572, 1757384572, 1757385054, 1757375975, 1757375965, 1757375765, 1757375665, 1757375575, 1757375464, 1757375365, 1757375276, 1757375333, 1757375109, 1757376013, 1757388816
DEED BOOK / PAGE:	019248 / 01884 (all parcels)
PLAT BOOK / PAGE:	BM2007 / 01224
TOTAL SITE AREA:	94.99 AC
EXISTING ZONING:	RM-CZ
CURRENT USE:	RESIDENTIAL
PROPOSED USE:	RESIDENTIAL-CLUSTER (MEDIUM DENSITY)
RIVER BASIN:	NEUSE RIVER BASIN
SUB WATERSHED:	NEUSE (UPPER) - 03020201
FEMA FIRM PANEL #:	3720175700K
RESIDENTIAL DENSITY CALCULATIONS (CLUSTER SUBDIVISION)	
MAXIMUM DENSITY ALLOWED:	5.0 UNITS / AC
PROPOSED DENSITY:	120 UNITS / 94.99 AC = 1.26 UNITS / AC
LOTS (CLUSTER)	
MINIMUM LOT WIDTH:	42.0 FT
MINIMUM LOT AREA:	6,000 SF
MINIMUM BUILDING SETBACKS:	FRONT: 20' REAR: 20' CORNER: 10' SIDE: 5'
OPENSOURCE (MEDIUM DENSITY, CLUSTER)	
OPEN SPACE (REQUIRED 12%):	11.40 AC
OPEN SPACE (PROPOSED):	63.31 AC
PASSIVE (REQUIRED):	5.70 AC
PASSIVE (PROPOSED):	55.75 AC
PASSIVE (NOT IN SCM OR ENVIRONMENTAL AREAS):	7.11 AC
ACTIVE (REQUIRED):	5.70 AC
ACTIVE (PROPOSED):	7.56 AC
ACTIVE SPACES (REQUIRED):	2 MEDIUM AREA (1.0 - 2.5 AC) 1 LARGE AREA (> 2.5 AC)
ACTIVE SPACES (PROVIDED):	(2) MEDIUM AREAS Area 1 = (44,640 SF, 1.02 AC) Area 2 = (78,467 SF, 1.80 AC) (1) LARGE AREA Area 3 = (206,621 SF, 4.74 AC)
TREE SAVE SUMMARY (CLUSTER)	
EXISTING QUALIFIED TREES:	514 Total
REQUIRED TREES SAVE:	52 (10% of Total)
PROPOSED TREES SAVE:	267 (52% of Total)
STREET DATA	
STREET A	1,125 LF 50' RW 35' BC - BC
STREET B	1,245 LF VARIABLE RW 35' BC - BC
STREET C	2,360 LF 50' RW 35' BC - BC
STREET D	705 LF 50' RW 27' BC - BC
STREET E	370 LF 50' RW 27' BC - BC
DEDICATED ROAD R.O.W.	7.64 ACRES



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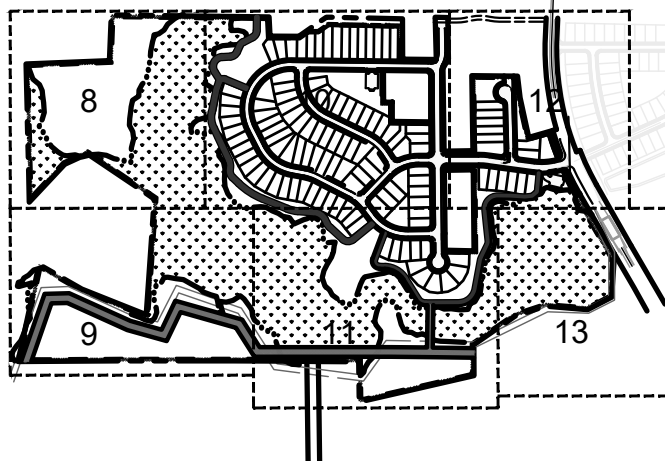
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Surveyor
BCSO Bateman Civil Survey Company
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Jurisdiction / Municipality
Rolesville
Town of Rolesville
502 Southtown Cir
Rolesville, NC 27571
Phone: 919-554-6517
PSP-24-05

Other Consultants

Sheet map:
N
W
E
S



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NORTH CAROLINA
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53676
BRYAN A. HARRIS
ENGINEER
FINAL DRAWING - FOR REVIEW PURPOSES ONLY

Issued / Print Date: 2025-April-30 (09:13)
File Name: 7 Overall Site Plan.dwg

Last Saved by: Tim Newsome
Drawn by: TAN

Project:

HARRIS CREEK FARMS

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REVISIONS		
No.	Date	Description
1	11/08/24	Town of Rolesville Planning Dept. comments
2	02/07/25	Town of Rolesville Planning Dept. comments

Sheet Title:

OVERALL SITE PLAN

Sheet#:



LEGEND:

[Yellow Box]	PHASE 1: 42.33 AC
[Orange Box]	PHASE 2: 22.02 AC
[Green Box]	PHASE 3: 20.26 AC
[Blue Box]	PHASE 4: 18.32 AC
[Purple Box]	PHASE 5: 16.71 AC
[Pink Box]	PHASE 6: 19.05 AC

NOTES:
SEE COVER SHEET FOR ALL SETBACK REQUIREMENTS
SEE SHEET C-3.0 FOR ADJACENT PROPERTY DETAILS
SEE SHEETS C-6 FOR OPEN SPACE INFORMATION

TOWNHOME NOTES:
STATES INTERNAL TOWNHOME DRIVEWAYS ARE PRIVATE EASEMENTS AS PER CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT

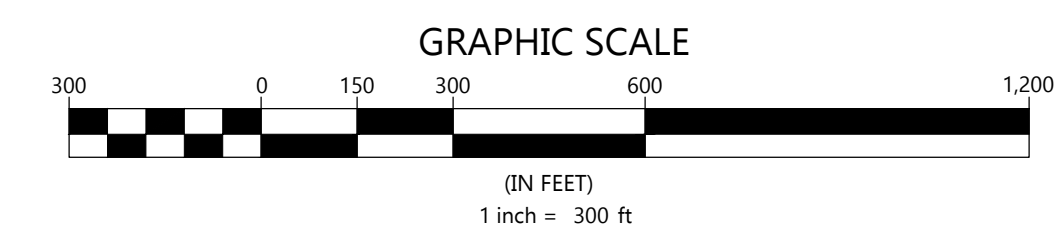
GRAPHIC SCALE

200 0 100 200 400 600
(IN FEET)
1 inch = 200 ft.

MAGNETIC NORTH
ADOPTED BOM 1980 PG 396
NAD 83
ADOPTED BOM 1992 PG 655
7°32'15.0"

THIS PLANSET AND ANY ASSOCIATED DOCUMENTS ARE PRELIMINARY AND NOT AUTHORIZED FOR CONSTRUCTION UNTIL SIGNED, DATED, AND OFFICIALLY RELEASED FOR CONSTRUCTION BY THE ENGINEER OF RECORD.

CONSTRUCTION INFRASTRUCTURE DRAWINGS CID-24-004			SEAL			REVISIONS			DATE		
01	08/04/2024	SRG	01	08/04/2024	SRG						
02	11/07/2024	SRG	02	11/07/2024	SRG						
03	02/07/2024	SRG	03	02/07/2024	SRG						



W1.01



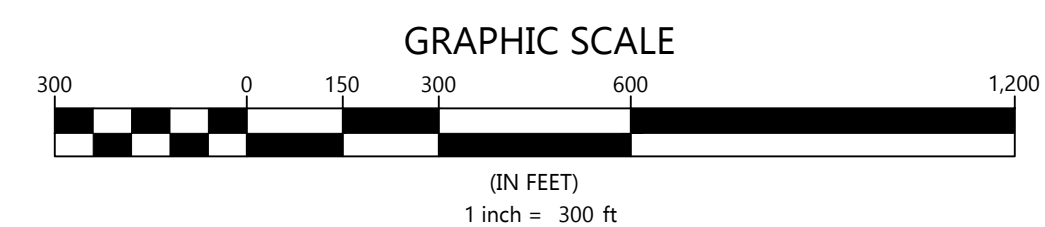
(IN FEET)
1 inch = 300 ft

W1.02

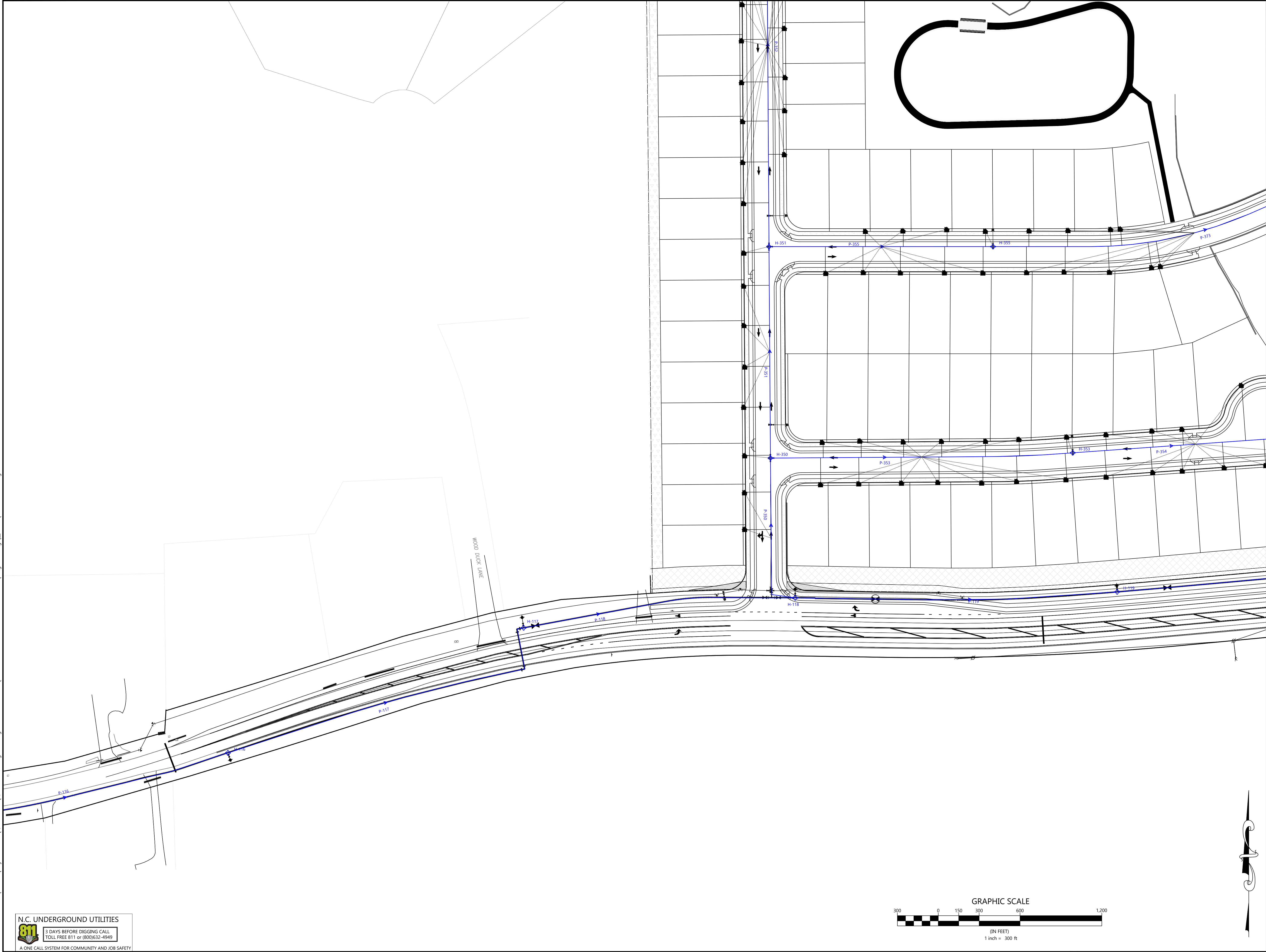



GRAPHIC SCALE

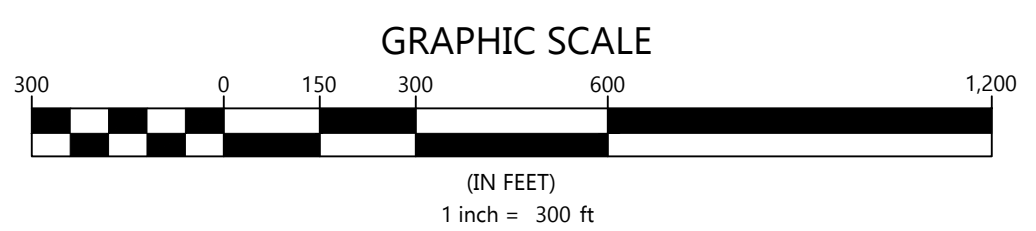
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File Location: C:\Users\BryanHarris\Quantech\Engineering - Documents\Harris Creek Farm - Jonesville\Engineering_DWG\WaterCAD.dwg




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Surveyor

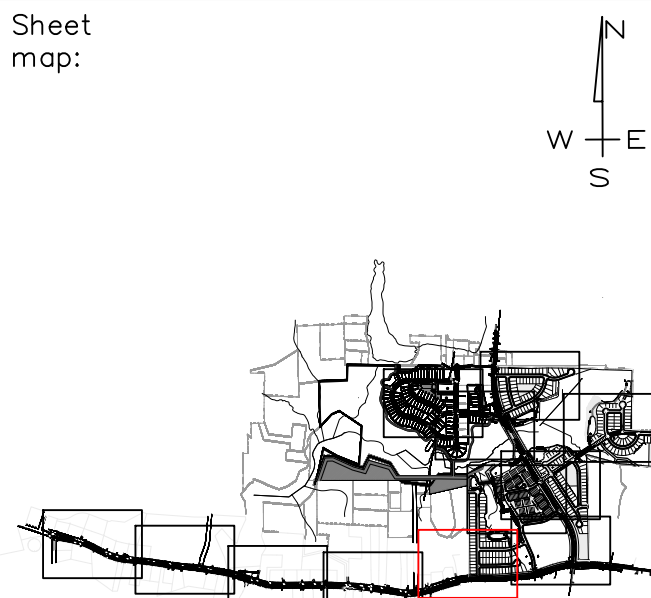
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Sheet map:



Seal:



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Project:

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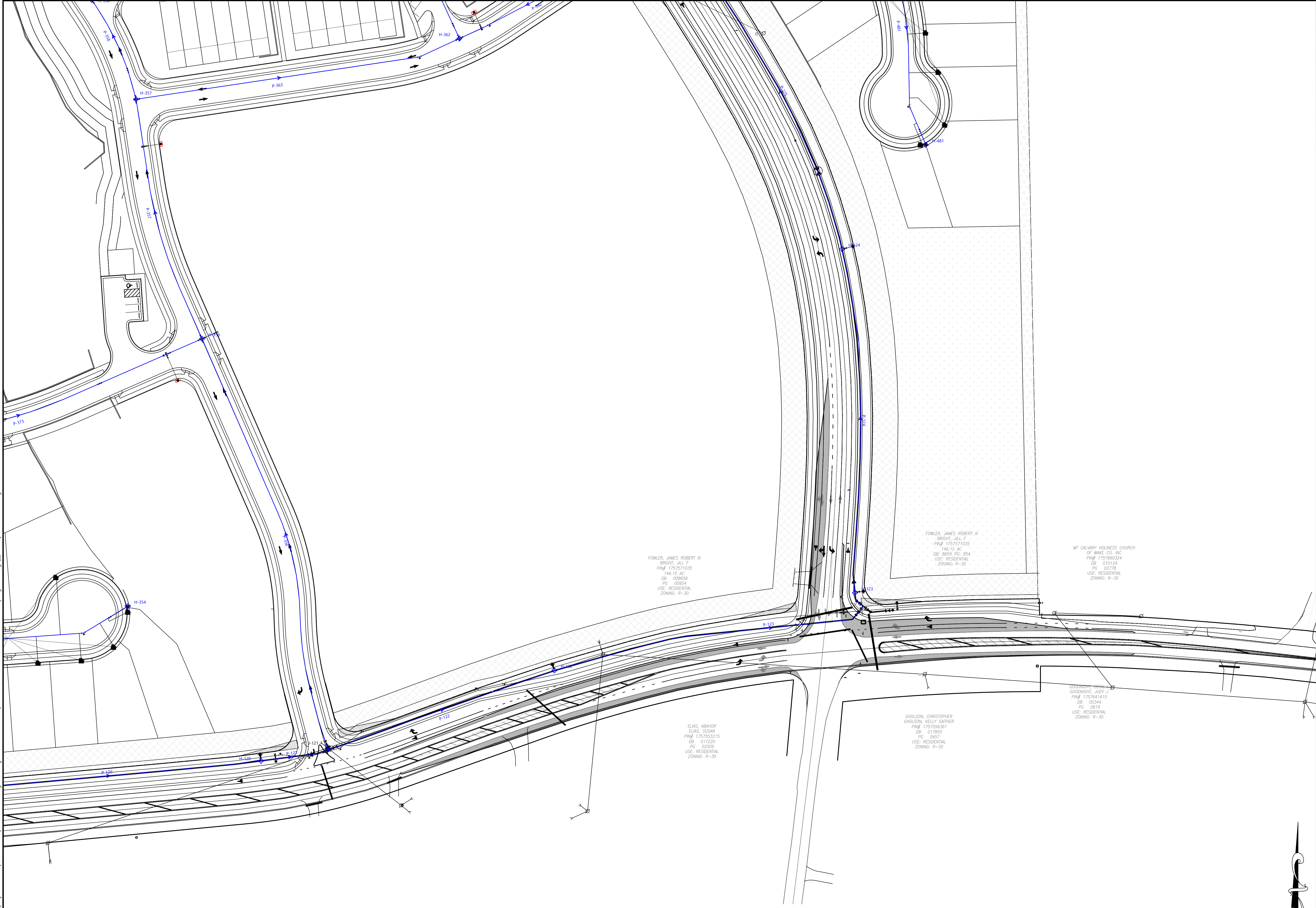
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**WaterCAD
MAP**

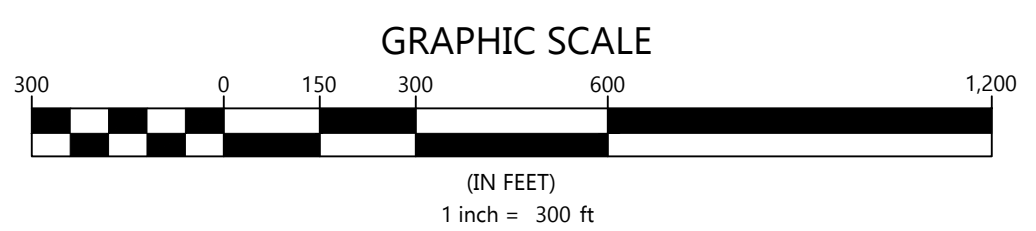
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WaterCAD MAP

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