Wake Forest Board of Commissioners Work Session
Meeting Agenda
October 03, 2023 at 6:00 PM

1. Presentations

1.1. Chamber Government Affair - DC Trip

1.2. Proclamation Recognizing October 2023 as "Community Planning Month"
Agenda Summary_BoC.pdf
Planning_Month_Proclamation_2023_October.docx

1.3. Public Hearing on a petition requesting contiguous annexation submitted by Morris Wake Forest LLC property associated with Morris Subdivision located at 0 N Main St, 1159 N Main St, 1161 N Main St, and 1163 N Main St being Wake County PINs 1841-98-8364, 1841-88-6835, 1841-88-3996, and 1841-89-0142 being approximately 22.949 acres.
100323 BOC Agenda Summary.pdf
Attachment A Legal Description East Parcel AN-22-07.pdf
Attachment B Legal Description West Parcel AN-22-07.pdf
Attachment C East Parcel Annexation Map AN-22-07.pdf
Attachment D ANNEXATION MAP_WEST PARCEL AN-22-07.pdf
Attachment E Contiguous Annexation Petition AN-22-07.pdf
DRAFT ORDINANCE AN-22-07.docx

1.4. Consideration of a petition requesting contiguous annexation submitted by Morris Wake Forest LLC property associated with Morris Subdivision located at 0 N Main St, 1159 N Main St, 1161 N Main St, and 1163 N Main St being Wake County PINs 1841-98-8364 , 1841-88-6835, 1841-88-3996, and 1841-89-0142 being approximately 22.949 acres.

1.5. Public Hearing on a petition requesting contiguous annexation submitted by High Bar Creek LLC, Huggy Bear LLC, and Nancy H. Dameron Trust for property associated with the Reserve at Dunn Creek Subdivision rezoning request RZ-22-05, located at 0 Friendship Chapel Road and 0 NC 98 Bypass being Wake County PINs 1840-66-0542, 1840-67-6254, 1840-76-1824, and 1840-65-7710 being approximately 67.4249 acres.

100323 BOC Agenda Summary AN-23-02.pdf
Attachment A - Legal Description AN-23-02.pdf
Attachment B - Annexation Map AN-23-02.pdf
Attachment C - Annexation Petition AN-23-02.pdf
DRAFT ORDINANCE AN-23-02.docx

1.6. Consideration of a petition requesting contiguous annexation submitted by High Bar Creek LLC, Huggy Bear LLC, and Nancy H. Dameron Trust for property associated with the Reserve at Dunn Creek Subdivision rezoning request RZ-22-05, located at 0 Friendship Chapel Road and 0 NC 98 Bypass being Wake County PINs 1840-66-0542, 1840-67-6254, 1840-76-1824, and 1840-65-7710 being approximately 67.4249 acres.

1.7. Public Hearing on Draft Wake Forest Public Transit Plan (CPA-23-02)
BOC Agenda Summary.pdf
CPA-23-02 Staff Report.pdf
Attachment A - Application.pdf
Exhibit 1 - Draft Wake Forest Public Transit Plan (August 2023 Version)
Exhibit 2 - Amendments.pdf
Ordinance.docx

1.8. Consideration of Draft Wake Forest Public Transit Plan (CPA-23-02)

1.9. Presentation of LEGISLATIVE CASE RZ-23-05, 2117 Averette Road, a rezoning map amendment filed by Douglas and Sarah Machado to rezone 2.822 acres located at 2117 Averette Road, being Wake County Tax PIN 1851-90-8235, from Wake County's Residential-30 (R-30) to General Residential 5 (GR5).
BOC Agenda Summary RZ-23-05.pdf
RZ-23-05 Staff Report.pdf
Attachment A - Neighborhood Meeting Information.pdf
Attachment B - Application.pdf
Attachment C - Maps.pdf
Attachment D - Planning Board Recommendation.pdf

1.10. Presentation of LEGISLATIVE CASE RZ-20-05-01, Fuller Capital Boulevard Property, a rezoning map amendment filed by Red Line Engineering to rezone 29.367 acres located at 4925 Unicon Drive, 4975 Unicon Drive, and 10200 Capital Blvd (portion), being Wake County Tax PINs 1739-51-8319, 1739-61-2717, 1739-51-4482 (portion) from Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) to Light Industrial Conditional District (LI-CD).

BOC Agenda Summary RZ-20-05-01.pdf

RZ-20-05-01 Staff Report.pdf
Attachment A - Neighborhood Meeting Information.pdf
Attachment B - Application.pdf
Attachment C - Maps.pdf
Attachment D - Ordinance RZ-20-05.pdf
Attachment E - Planning Board Recommendation.pdf

1.11. Presentation of LEGISLATIVE CASE RZ-21-08, Joyner Property, a rezoning filed by McAdams Company to rezone 124.68 acres located at 1180 and 1200 (portion) Club Villas Dr, being Wake County Tax PINs 1841091336 and 1831895139 (portion) from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) to General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O). (*While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.)
BOC Agenda Summary RZ-21-08.pdf
RZ-21-08 Staff Report.pdf
Attachment A - Neighborhood Meeting Information.pdf
Attachment B - Application.pdf
Attachment C - Maps.pdf
Attachment D - Special Use Permit SU-99-02 Approvals.pdf
Attachment E - Special Use Permit SU-99-02-01 Approval.pdf
Attachment F - Planning Board Recommendation & Plan Consistency Analysis.pdf
Attachment G - TIA Executive Summary and NCDOT Review Report.pdf
Exhibit 1 - Proposed Conditional District Plan.pdf

1.12. Presentation of the UNRBA Consensus Principles
Summary.docx
AttachmentA-CPIIResolution.docx
Attachment B_ConsensusPrinciples II_20230920_Board approved.pdf
Attachment C_2023_09_20 Final UNRBA Concepts and Principles for Reexamination.pdf

1.13. Providing update to the US 1 Traffic Study at S Main Street and Burlington Mills Road intersections, executed by Exult Engineering
Summary_FINAL Draft US 1 Traffic Study.pdf
FINAL US 1 Traffic Study Appendix.pdf
FINAL US 1 Traffic Study Report.pdf

1.14. Presentation on Coach Lantern/ Forestville Road Signal Design
Summary_Forestville Coach Lantern Signal Intersection.pdf

Forestville Rd at Green Drake_Coach Lantern Warrant Study (9.15.23).pdf
Agreement - 540 - A. Morton Thomas and Associates, Inc..pdf
AMT_1_ MSA_Executed.pdf

1.15. Presentation on PRCR Master Plan Feedback
Summary Sheet - PRCR Master Plan Presentation - Feedback.pdf
Wake Forest BOC Listening Session Oct. 3, 2023.pdf

1.16. PRESENTATION OF MUNICIPAL INFRASTRUCTURE IMPROVEMENTS AT THE U-TURNS ON HWY 98 NEAR THE SOUTH FRANKLIN INTERSECTION.

Attachment_A_summary_Signalized_Uturns_98.docx
Attachment_B_Resolution Uturns 98.docx
Attachment_C_Reimbursement Agreement - Holding Village (Traffic Control Improvements).pdf
Attachment D_Exhibit A_Construction Plans.pdf
Attachment_E_Exhibit_B_Reimbursement Estimate.pdf
Attachment_F_Exhibit C - NCDOT Traffic Agreement.pdf
Attachment_G_Traffic Signals for U-Turns on Hwy 98.pptx

1.17. PRESENTATION FOR MUNICIPAL INFRASTRUCTURE IMPROVEMENTS
Summary_S._Franklin_Exp.docx
Attachment_A_Resolution Franklin Exp.docx
Attachment_B_DA S. Franklin Exp.pdf
Attachment_C_CIP Franklin Exp.pdf
Attachment_D_S. Franklin Expansion.pptx

2. Discussion of Monthly Financial Report

2.1. August Financial Summaries
Monthly Financial Report_summary.pdf
August 31, 2023 Financial Summaries.pdf

3. Review of Draft Agenda for Upcoming Regular Meeting

3.1. Review of Draft Agenda for Upcoming Regular Meeting
DraftBOCAgenda_Oct202317.pdf

4. Other Business

5. Commissioner Reports

6. Adjournment

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-262-
Submitted by: Terry Savary
Submitting Department: Administration
Meeting Date: October 3, 2023

SUBJECT
Chamber Government Affair - DC Trip

Recommendation:

Item Summary:

ATTACHMENTS

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-247-
Submitted by: Courtney Tanner
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Proclamation Recognizing October 2023 as "Community Planning Month"

Recommendation:

Item Summary:

ATTACHMENTS

- Agenda Summary_BoC.pdf
- Planning_Month_Proclamation_2023_October.docx

Agenda Item: Proclamation Recognizing October 2023 as "Community Planning Month"

Summary: The Town of Wake Forest is celebrating Community Planning by publicly recognizing the participation and dedication of the members of the Planning Board, Town planners, and other citizen planners who have contributed their time and expertise to the improvement of the Town of Wake Forest.

Attachments: Proclamation

NATIONAL COMMUNITY PLANNING MONTH
PROCLAMATION

WHEREAS, change is constant and affects all cities, towns, suburbs, counties, boroughs, townships, rural areas, and other places; and

WHEREAS, community planning and planners can help manage this change in a way that provides better choices for how people work and live; and

WHEREAS, community planning provides an opportunity for all residents to be meaningfully involved in discussions regarding the future of their community; and

WHEREAS, the full benefits of planning requires public officials and citizens who understand, support, and demand excellence in planning and plan implementation; and

WHEREAS, the month of October is designated as National Community Planning Month throughout the United States of America and its territories, and

WHEREAS, the American Planning Association and its professional institute, the American Institute of Certified Planners, endorse National Community Planning Month as an opportunity to highlight the contributions sound planning and plan implementation make to the quality of our neighborhoods and environment; and

WHEREAS, the celebration of National Community Planning Month gives us the opportunity to publicly recognize the participation and dedication of the members of planning boards and other citizen planners who have contributed their time and expertise to the improvement of the Town of Wake Forest; and

WHEREAS, we recognize the many valuable contributions made by the professional community of the Town of Wake Forest and extend our heartfelt thanks for the continued commitment to public service by these professionals;

BE IT RESOLVED THAT, the month of October 2023 is hereby designated as “Community Planning Month” in the Town of Wake Forest in conjunction with the celebration of National Community Planning Month.

Adopted this 3rd day of October, 2023.

Attest:

Town Clerk



Mayor

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2021-668-
Submitted by: Emma Linn
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Public Hearing on a petition requesting contiguous annexation submitted by Morris Wake Forest LLC property associated with Morris Subdivision located at 0 N Main St, 1159 N Main St, 1161 N Main St, and 1163 N Main St being Wake County PINs 1841-98-8364, 1841-88-6835, 1841-88-3996, and 1841-89-0142 being approximately 22.949 acres.

Recommendation:

Item Summary:

ATTACHMENTS

- 100323 BOC Agenda Summary.pdf
- Attachment A Legal Description East Parcel AN-22-07.pdf
- Attachment B Legal Description West Parcel AN-22-07.pdf
- Attachment C East Parcel Annexation Map AN-22-07.pdf
- Attachment D ANNEXATION MAP_WEST PARCEL AN-22-07.pdf
- Attachment E Contiguous Annexation Petition AN-22-07.pdf
- DRAFT ORDINANCE AN-22-07.docx

Agenda Item: Public Hearing on a petition requesting contiguous annexation submitted by Morris Wake Forest LLC property associated with Morris Subdivision located at 0 N Main St, 1159 N Main St, 1161 N Main St, and 1163 N Main St being Wake County PINs 1841-98-8364 , 1841-88-6835, 1841-88-3996, and 1841-89-0142 being approximately 22.949 acres.

Summary: The property proposed for annexation is contiguous to the corporate limits of the Town of Wake Forest. The proposed annexation is associated with rezoning case RZ-22-02, Morris Subdivision.

On August 15th, 2023, the Board accepted the petition, certified the sufficiency of the annexation petition, and adopted the resolution to investigate the annexation petition thus, setting the public hearing date for the annexation petition.

Attachments: Attachment A Legal Description East Parcel AN-22-07
Attachment B Legal Description West Parcel AN-22-07
Attachment C Annexation Map East Parcel AN-22-07
Attachment D Annexation Map West Parcel AN-22-07
Attachment E Contiguous Annexation Petitions AN-22-07
Draft Ordinance

CMP Professional Land Surveyors

Michael A. Moss, PLS L-3794 Telephone (919) 556-3148
Jason L. Panciera, PLS L-3835, CFSNC-140
L. Jordan Parker Jr., PLS L-4685
333 South White Street, Post Office Box 1253
Wake Forest, NC 27588-1253

LEGAL DESCRIPTION

BEGINNING AT A NEW IRON PIPE LOCATED ON THE EASTERN RIGHT-OF-WAY OF N. MAIN STREET (U.S. 1-A), SAID NEW IRON PIPE BEING THE COMMON CORNER OF PARCEL PIN# 1841.08-99-4194 AND SUBJECT PARCEL; THENCE LEAVING RIGHT-OF-WAY S 46°14'13" E A DISTANCE OF 434.62' TO A BENT EXISTING IRON PIPE; THENCE N 88°23'41" E A DISTANCE OF 298.10' TO AN EXISTING IRON PIPE; THENCE S 02°52'48" E A DISTANCE OF 459.80' TO AN EXISTING IRON PIPE; THENCE N 72°49'01" E A DISTANCE OF 364.73' TO AN EXISTING IRON PIPE, SAID EXISTING IRON PIPE HAVING NC GRID NAD 83/2011 COORDINATE N(y): 818,508.97' E(x): 2,150,147.11'; THENCE S 52°29'59" E A DISTANCE OF 693.84' TO AN EXISTING IRON PIPE; THENCE S 37°26'42" W A DISTANCE OF 207.89' TO A NEW IRON PIPE; THENCE S 37°26'42" W A DISTANCE OF 488.53' TO AN EXISTING IRON PIPE; THENCE N 57°59'27" W A DISTANCE OF 270.84' TO A NEW IRON PIPE; THENCE N 37°20'42" E A DISTANCE OF 236.23' TO A NEW IRON PIPE; THENCE N 07°42'24" W A DISTANCE OF 74.28' TO AN EXISTING IRON PIPE; THENCE N 58°14'39" W A DISTANCE OF 56.31' TO AN EXISTING IRON PIPE; THENCE N 09°22'29" E A DISTANCE OF 208.66' TO AN EXISTING IRON PIPE; THENCE N 80°39'14" W A DISTANCE OF 208.71' TO AN EXISTING IRON PIPE; THENCE S 22°43'39" W A DISTANCE OF 206.12' TO AN EXISTING IRON PIPE; THENCE N 82°57'02" W A DISTANCE OF 154.22' TO AN EXISTING IRON PIPE; THENCE S 83°46'54" W A DISTANCE OF 4.21' TO A NEW IRON PIPE; THENCE N 10°48'29" W A DISTANCE OF 366.13' TO A NEW IRON PIPE; THENCE S 83°16'21" W A DISTANCE OF 189.00' TO A NEW IRON PIPE; THENCE S 65°30'28" W A DISTANCE OF 160.90' TO A NEW IRON PIPE; THENCE N 29°31'43" W A DISTANCE OF 521.70' TO A NEW IRON PIPE;THENCE N 52°58'54" E A DISTANCE OF 15.13' TO A BENT EXISTING IRON PIPE; THENCE N 32°23'14" E A DISTANCE OF 271.16' TO A NEW IRON PIPE; THENCE N 45°10'03" W A DISTANCE OF 131.85' TO AN EXISTING IRON PIPE, SAID EXISTING IRON PIPE BEING LOCATED ON THE EASTERN RIGHT-OF-WAY OF N. MAIN STREET (U.S. 1-A), SAID EXISTNG IRON PIPE BEING THE COMMON CORNER OF PARCEL PIN# 1841.08-99-1062 AND SUBJECT LOT; THENCE ALONG RIGHT-OF-WAY N 32°33'56" E A DISTANCE OF 71.81' TO A NEW IRON PIPE; WHICH IS THE POINT OF BEGINNING, CONTAINING AN AREA OF 807,045 SQUARE FEET, 18.527 ACRES.

CMP Professional Land Surveyors

Michael A. Moss, PLS L-3794 Telephone (919) 556-3148
Jason L. Panciera, PLS L-3835, CFSNC-140
L. Jordan Parker Jr., PLS L-4685
333 South White Street, Post Office Box 1253
Wake Forest, NC 27588-1253

LEGAL DESCRIPTION

BEGINNING AT A NEW IRON PIPE LOCATED ON THE WESTERN RIGHT-OF-WAY OF N. MAIN STREET (U.S. 1-A), SAID NEW IRON PIPE BEING THE COMMON CORNER OF PARCEL PIN#1841.08-88-2891 AND SUBJECT LOT; SAID NEW IRON PIPE BEING LOCATED FROM N.C.G.S MONUMENT “OLD DEPOT” N 27°54'33" E A DISTANCE OF 8,039.44’; THENCE LEAVING RIGHT-OF-WAY N 66°48'10" W A DISTANCE OF 973.55' TO AN EXISTING IRON PIPE, SAID EXISTING IRON PIPE HAVING NC GRID NAD 83/2011 COORDINATE N(y): 819,098.11’ E(x): 2,147,848.57’; THENCE N 13°24'42" W A DISTANCE OF 100.00' TO AN EXISTING IRON BAR; THENCE N 34°05'18" E A DISTANCE OF 99.03' TO AN EXISTING IRON PIPE; THENCE S 67°36'00" E A DISTANCE OF 1,066.00' TO A NEW IRON PIPE, SAID NEW IRON PIPE LOCATED ON N. MAIN STREET (U.S. 1-A) RIGHT-OF-WAY, SAID NEW IRON PIPE BEING THE COMMON CORNER OF PARCEL PIN# 1841.08-79-7617 AND SUBJECT PARCEL; THENCE ALONG RIGHT-OF-WAY WITH A TURNING TO THE RIGHT WITH AN ARC LENGTH OF 30.42', WITH A RADIUS OF 1,544.53', WITH A CHORD BEARING OF S 35°01'59"W, WITH A CHORD LENGTH OF 30.41', TO A NEW IRON PIPE; THENCE WITH A TURNING TO THE RIGHT WITH AN ARC LENGTH OF 30.89', WITH A RADIUS OF 1,544.53', WITH A CHORD BEARING OF S 36°10'12"W, WITH A CHORD LENGTH OF 30.89', TO A NEW IRON PIPE; THENCE WITH A CURVE TURNING TO THE RIGHT WITH AN ARC LENGTH OF 137.95', WITH A RADIUS OF 1,544.53', WITH A CHORD BEARING OF S 39°18'06"W, WITH A CHORD LENGTH OF 137.90',; TO A NEW IRON PIPE; WHICH IS THE POINT OF BEGINNING, CONTAINING AN AREA OF 192,624 SQUARE FEET, 4.422 ACRES.

I, MICHAEL A. MOSS CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY PERFORMED UNDER MY SUPERVISION FROM REFERENCES AS NOTED HEREON; THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION SHOWN IN THE REFERENCES, THAT THE RATIO OF PRECISION OR POSITIONAL ACCURACY AS CALCULATED IS GREATER THAN 1:10000; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED, WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER AND SEAL

THIS_____DAY OF_____A.D. 2023.

_____ L-3794
PROFESSIONAL LAND SURVEYOR LICENSE NUMBER

THAT THE SURVEY IS OF AN EXISTING PARCEL OR PARCELS OF LAND OR ONE OR MORE EXISTING EASEMENTS AND DOES NOT CREATE A NEW STREET OR CHANGE AN EXISTING STREET. FOR THE PURPOSES OF THIS SUBSECTION, AN "EXISTING PARCEL OR EXISTING EASEMENT" IS AN AREA OF LAND DESCRIBED IN A SINGLE LEGAL DESCRIPTION OR LEGALLY RECORDED SUBDIVISION THAT HAS BEEN OR MAY BE LEGALLY CONVEYED TO A NEW OWNER BY DEED IN ITS EXISTING CONFIGURATION.

PRELIMINARY FOR REVIEW PURPOSES ONLY

_____ L-3794
PROFESSIONAL LAND SURVEYOR LICENSE NUMBER

ANNEXATION MAP: AN-22-07, (MORRIS SUBDIVISION)
18.527 ACRES
TOWN OF WAKE FOREST
FULFILLS REQUIREMENTS OF N.C.G.S. 160A-29
ORDINANCE #_____
ADOPTED: NC GRID NAD 83 (2011)
EFFECTIVE DATE OF ANNEXATION:

I, THERESA SAVARY, TOWN CLERK, TOWN OF WAKE FOREST, NORTH CAROLINA CERTIFY THAT THIS IS A TRUE AND ACCURATE MAP OF ANNEXATION ADOPTED THE _____ DAY OF _____, 20____, BY THE WAKE FOREST BOARD OF COMMISSIONERS. I SET MY HAND AND SEAL OF THE TOWN OF WAKE FOREST,

_____, 20____

_____
THERESA SAVARY

ANNEXATION MAP FOR

MORRIS SUBDIVISION

0 N. MAIN STREET
OWNER: MORRIS WAKE FOREST, LLC
REF: D.B. 19249, PAGE 1857
REF: B.M. 2023, PAGE 1112
TOWN OF WAKE FOREST
WAKE COUNTY, NORTH CAROLINA

120 60 0 120 360

SCALE 1"=120'

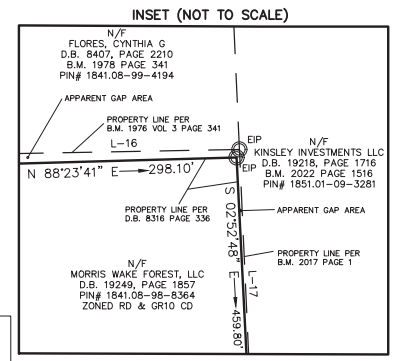
JULY 13, 2023
ZONED RD & GR10 CD (RZ-22-02)
PIN# 1841.08-98-8364

TOTAL AREA TO BE ANNEX
807,045 S.F./18.527 AC.

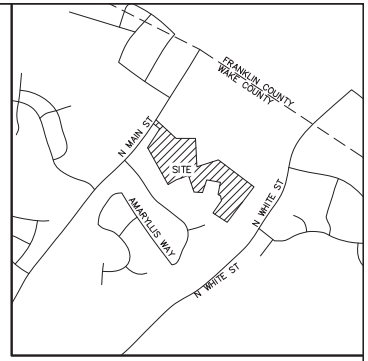
LAND SURVEYOR/CONTACT

CMP, PC
MICHAEL A. MOSS, PLS
333 S. WHITE STREET
WAKE FOREST, NC 27587
(919) 556-3148
MIKE@CMPPLS.COM

INSET (NOT TO SCALE)



ADOPTED FROM NAD 83/2011



VICINITY MAP

LEGEND:

EIP – EXISTING IRON PIPE
EIB – EXISTING IRON BAR
BEIP – BENT IRON PIPE
BEIB – BENT IRON BAR
CM – CONCRETE MONUMENT
EPK – EXISTING PK NAIL
SPK – SET PK NAIL
NIP – NEW IRON PIPE SET
R/W – RIGHT OF WAY
CATV – CABLE TV BOX
EB – ELECTRIC BOX
TEL – TELEPHONE PEDESTAL
PP – POWER POLE
OHL – OVERHEAD LINE
LP – LIGHT POLE
WM – WATER METER
WV – WATER VALVE
CO – SEWER CLEAN-OUT

LINE TABLE		
LINE	BEARING	DISTANCE
L-1	N 38°19'48" W	65.63'
L-2	N 32°59'16" E	11.20'
L-3	N 32°59'16" E	10.06'
L-4	S 41°04'07" E	67.79'
L-5	S 44°30'30" E	62.18'
L-6	S 44°58'58" E	134.00'
L-7	N 32°33'56" E	71.81'
L-8	N 07°42'24" W	74.28'
L-9	N 58°14'39" W	56.31'
L-10	N 82°57'02" W	154.22'
L-11	S 83°46'54" W	170.93'
L-12	N 57°59'27" W	198.68'
L-13	N 29°26'04" W	771.67'
L-14	N 29°31'43" W	521.70'
L-15	S 47°26'54" E	432.79'
L-16	N 88°56'11" E	294.73'
L-17	S 02°33'53" E	466.03'
L-18	N 28°50'56" E	8262.24'
L-19	N 52°58'54" E	15.13'

NOTES:

1) AREA COMPUTED BY COORDINATE METHOD.

LINE TYPE LEGEND

PROPERTY LINE – LINE SURVEYED
RIGHT-OF-WAY
ADJOINING LINE – LINE NOT SURVEYED
OVERHEAD LINE
BUILDING SETBACK
EASEMENT
BUFFER
FLOOD HAZARD SOILS

CMP

PROFESSIONAL LAND SURVEYORS, C-1525, 333 S. WHITE STREET, P.O. BOX 1253, WAKE FOREST N.C., 27588, (919) 556-3148

(X:\SUBS\MORRIS-BLUE HEEL BOUNDARY - JC)

I, MICHAEL A. MOSS CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY PERFORMED UNDER MY SUPERVISION FROM REFERENCES AS NOTED HEREON; THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION SHOWN IN THE REFERENCES, THAT THE RATIO OF PRECISION OR POSITIONAL ACCURACY AS CALCULATED IS GREATER THAN 1:10000; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED, WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER AND SEAL

THIS_____DAY OF_____A.D. 2023.

_____ L-3794
PROFESSIONAL LAND SURVEYOR LICENSE NUMBER

PRELIMINARY
FOR REVIEW PURPOSES ONLY

THAT THE SURVEY IS OF AN EXISTING PARCEL OR PARCELS OF LAND OR ONE OR MORE EXISTING EASEMENTS AND DOES NOT CREATE A NEW STREET OR CHANGE AN EXISTING STREET. FOR THE PURPOSES OF THIS SUBSECTION, AN "EXISTING PARCEL" OR "EXISTING EASEMENT" IS AN AREA OF LAND DESCRIBED IN A SINGLE, LEGAL DESCRIPTION OR LEGALLY RECORDED SUBDIVISION THAT HAS BEEN OR MAY BE LEGALLY CONVEYED TO A NEW OWNER BY DEED IN ITS EXISTING CONFIGURATION.

_____ L-3794
PROFESSIONAL LAND SURVEYOR LICENSE NUMBER

LAND SURVEYOR/CONTACT

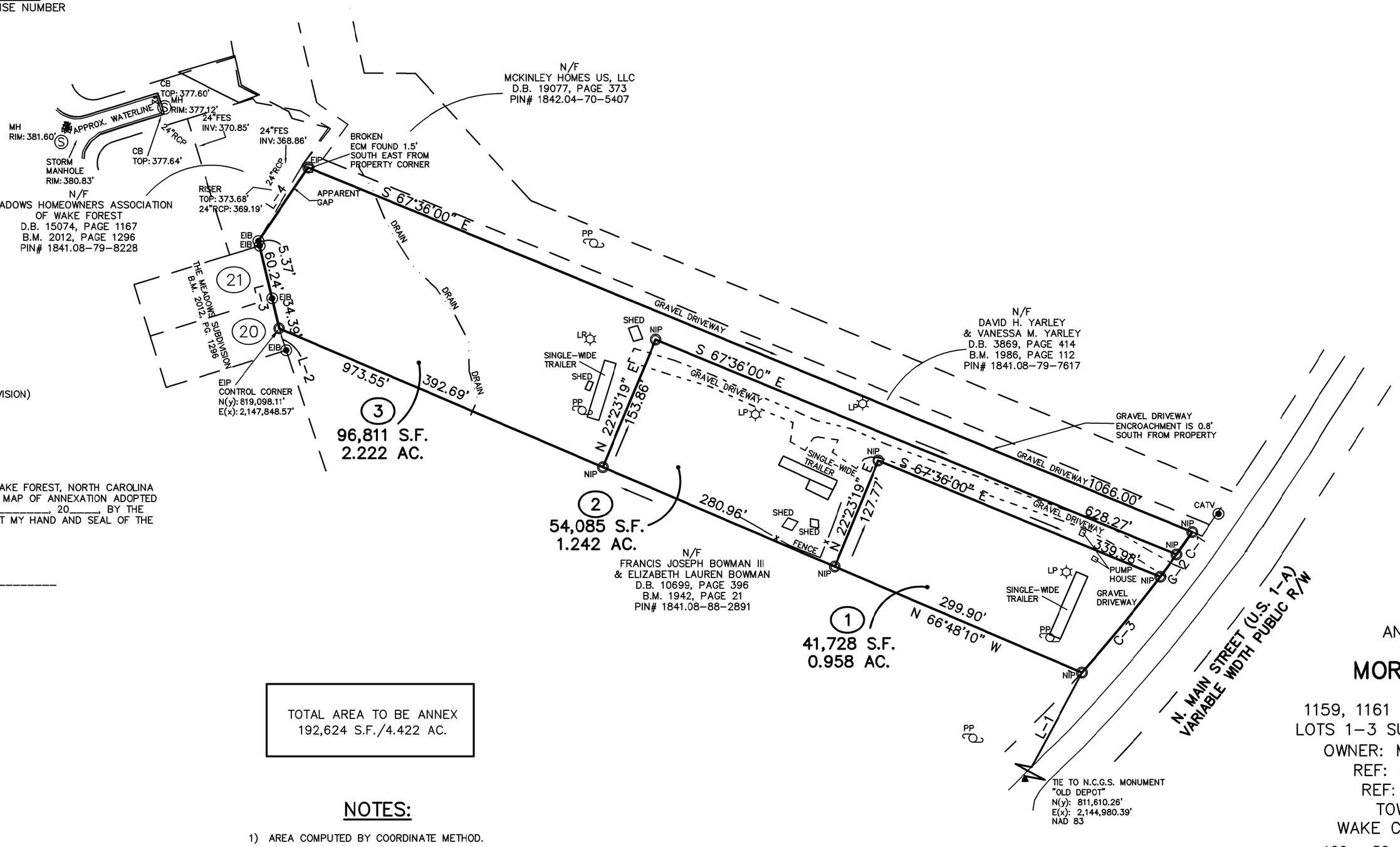
CMP, PC
MICHAEL A. MOSS, PLS
333 S. WHITE STREET
WAKE FOREST, NC 27587
(919) 556-3148
MIKE@CMPPLS.COM

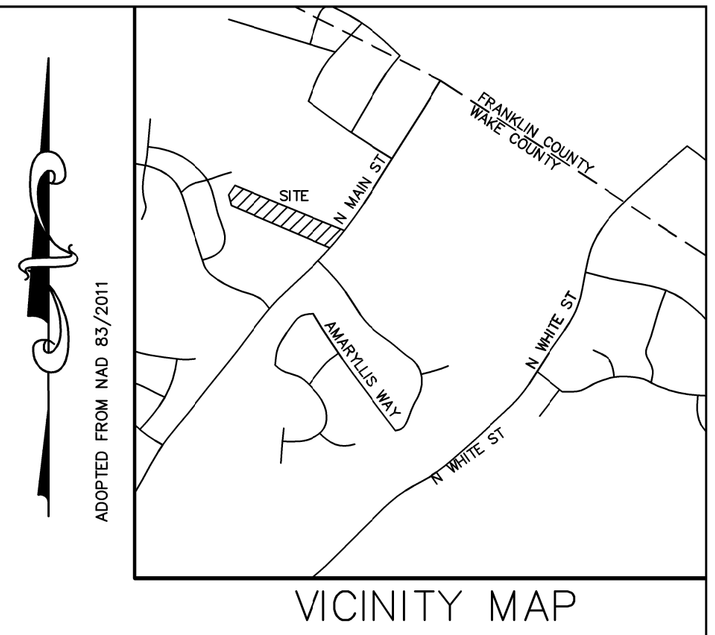
ANNEXATION MAP: AN-22-07, (MORRIS SUBDIVISION)
4.422 ACRES
TOWN OF WAKE FOREST
FULFILLS REQUIREMENTS OF N.C.G.S. 160A-29
ORDINANCE #_____
ADOPTED: NC GRID NAD 83 (2011)
EFFECTIVE DATE OF ANNEXATION:

I, THERESA SAVARY, TOWN CLERK, TOWN OF WAKE FOREST, NORTH CAROLINA CERTIFY THAT THIS IS A TRUE AND ACCURATE MAP OF ANNEXATION ADOPTED THE _____ DAY OF _____, 20____, BY THE WAKE FOREST BOARD OF COMMISSIONERS. I SET MY HAND AND SEAL OF THE TOWN OF WAKE FOREST,

_____, 20___

_____
THERESA SAVARY





VICINITY MAP

LINE TABLE		
LINE	BEARING	DISTANCE
L-1	N 27°54'33" E	8039.44'
L-2	N 18°16'53" W	25.59'
L-3	S 13°24'42" E	100.00'
L-4	N 34°05'18" E	99.03'

CURVE TABLE				
CURVE	ARC LENGTH	RADIUS	CHORD LENGTH	CHORD BEARING
C-1	30.42'	1544.53'	30.41'	S 35°01'59" W
C-2	30.89'	1544.53'	30.89'	S 36°10'12" W
C-3	137.95'	1544.53'	137.90'	S 39°18'06" W

LEGEND:

EIP – EXISTING IRON PIPE
EIB – EXISTING IRON BAR
BEIP – BENT IRON PIPE
BEIB – BENT IRON BAR
CM – CONCRETE MONUMENT
EPK – EXISTING PK NAIL
SPK – SET PK NAIL
NIP – NEW IRON PIPE SET
R/W – RIGHT OF WAY
CATV – CABLE TV BOX
EB – ELECTRIC BOX
TEL – TELEPHONE PEDESTAL
PP – POWER POLE
OHL – OVERHEAD LINE
LP – LIGHT POLE
WM – WATER METER
WV – WATER VALVE
CO – SEWER CLEAN-OUT

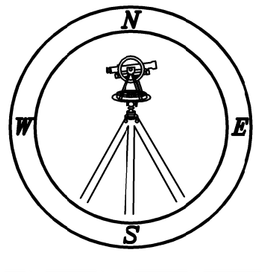
TOTAL AREA TO BE ANNEX
192,624 S.F./4.422 AC.

NOTES:

1) AREA COMPUTED BY COORDINATE METHOD.

LINE TYPE LEGEND

PROPERTY LINE – LINE SURVEYED
RIGHT-OF-WAY
ADJOINING LINE – LINE NOT SURVEYED
OVERHEAD LINE
BUILDING SETBACK
EASEMENT
BUFFER
FLOOD HAZARD SOILS



CMP

PROFESSIONAL LAND SURVEYORS, C-1525, 333 S. WHITE STREET, P.O. BOX 1253, WAKE FOREST N.C., 27588, (919) 556-3148

ANNEXATION MAP FOR

MORRIS SUBDIVISION

1159, 1161 & 1163 NORTH MAIN STREET
LOTS 1-3 SUBDIVISION FOR ALICE TAYLOR
OWNER: MORRIS WAKE FOREST, LLC
REF: D.B. 19249, PAGE 1857
REF: B.M. 1985, PAGE 296
TOWN OF WAKE FOREST
WAKE COUNTY, NORTH CAROLINA

100 50 0 100 200

SCALE 1"=100'
JULY 13, 2023
ZONED RD
PIN # 1841.08-88-6835
PIN # 1841.08-88-3996
PIN # 1841.08-89-0142

(X:\SUBS\MORRIS-BLUE HEEL BOUNDARY - JC)

DocuSign Envelope ID: F344A97A-4AA5-49F3-98FB-C6DE7EB664CD

TOWN of WAKE FOREST

Planning Department
Wake Forest Town Hall – 3rd Floor
301 S. Brooks Street
Wake Forest, NC 27587
t 919.435.9510
f 919.435.9539
www.wakeforestnc.gov

CONTIGUOUS ANNEXATION PETITION APPLICATION

(Last updated: July 2013)

Submittal Date: _____

To the Board of Commissioners of the Town of Wake Forest:

I/we the undersigned owner(s) of real property respectfully request that the area described in the paragraph below and as shown in the attached survey map of the property be annexed into the Town of Wake Forest.

The area to be annexed is contiguous to the Town of Wake Forest corporate limits and the boundaries of such territory are as follows *(attach or insert below a metes & bounds description with a matching survey map)*:

See attached map and description.

Note: If ownership is a corporation or partnership, please provide such name and the name and signature of the person authorized to sign on behalf of the corporation or partnership. If in joint ownership, please provide names and signatures of ALL owners.

Name	Address	Signature	Date
Morris Wake Forest LLC	0, 1159, 1161, and 1163 N MAIN ST WAKE FOREST NC 2758	DocuSigned by: W. Kyle Graves 8B3B39201B7E4E8...	8/9/2023
Name	Address	Signature	Date
Name	Address	Signature	Date
Name	Address	Signature	Date

For additional information or assistance, please call the Planning Department at (919) 435-9510.

ORDINANCE 2023-XXX

ORDINANCE OF THE BOARD OF COMMISSIONERS OF THE TOWN OF WAKE FOREST, NORTH CAROLINA

(Contiguous annexation submitted by Morris Wake Forest LLC property associated with Morris Subdivision located at 0 N Main St, 1159 N Main St, 1161 N Main St, and 1163 N Main St being Wake County PINs 1841-98-8364 , 1841-88-6835, 1841-88-3996, and 1841-89-0142 being approximately 22.949 acres.)

WHEREAS, the Board of Commissioners has adopted a resolution under N.C.G.S. 160A-31, as amended, stating its intent to annex the area described below; and

WHEREAS, the Board of Commissioners has by said resolution directed the Town Clerk to investigate the sufficiency of said petition; and

WHEREAS, the Town Clerk has certified the sufficiency of said petition and a public hearing on the question of this annexation was held at the Town of Wake Forest Town Hall at 6:00 p.m. on October 3, 2023, after due notice by publication on September 19, 2023; and

WHEREAS, the Board of Commissioners does hereby find as a fact that said petition meets the requirements of N.C.G.S. 160A-31, as amended; and

NOW, THEREFORE, BE IT ORDAINED by the Board of Commissioners of the Town of Wake Forest, North Carolina:

Section 1. By virtue of the authority granted by N.C.G.S. 160A-31, as amended, the following described territory is hereby annexed and made part of the Town of Wake Forest as of the 3rd day of October, 2023.

(See Attachment A – Legal Description East Parcel, Attachment B – Legal Description West Parcel, Attachment C - Annexation Map East Parcel, and Attachment D - Annexation Map West Parcel)

Section 2. Upon and after the 3rd day of October, 2023, the territory and its citizens and property shall be subject to all debts, laws, ordinances, and regulations in force in the Town of Wake Forest and shall be entitled to the same privileges and benefits as other parts of the Town of Wake Forest. Said territory shall be subject to municipal taxes according to N.C.G.S. 160A-58.10.

Section 3. The Mayor and the Town of Wake Forest shall cause to be recorded in the office of the Register of Deeds of Wake County, and in the office of the Secretary of State at Raleigh, North Carolina, an accurate map of the annexed territory, described in Section 1 hereof, together with a duly certified copy of this ordinance.

Adopted and effective this 3rd day of October 2023.

_____

Vivian A. Jones
Mayor

ATTEST:

_____

Theresa Savary
Town Clerk

APPROVED AS TO FORM:

_____

Hassan Kingsberry
Town Attorney

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2021-668-
Submitted by: Emma Linn
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Consideration of a petition requesting contiguous annexation submitted by Morris Wake Forest LLC property associated with Morris Subdivision located at 0 N Main St, 1159 N Main St, 1161 N Main St, and 1163 N Main St being Wake County PINs 1841-98-8364 , 1841-88-6835, 1841-88-3996, and 1841-89-0142 being approximately 22.949 acres.

Recommendation:

Item Summary:

ATTACHMENTS

-

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-193-
Submitted by: Emma Linn
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Public Hearing on a petition requesting contiguous annexation submitted by High Bar Creek LLC, Huggy Bear LLC, and Nancy H. Dameron Trust for property associated with the Reserve at Dunn Creek Subdivision rezoning request RZ-22-05, located at 0 Friendship Chapel Road and 0 NC 98 Bypass being Wake County PINs 1840-66-0542, 1840-67-6254, 1840-76-1824, and 1840-65-7710 being approximately 67.4249 acres.

Recommendation:

Item Summary:

ATTACHMENTS

- 100323 BOC Agenda Summary AN-23-02.pdf
- Attachment A - Legal Description AN-23-02.pdf
- Attachment B - Annexation Map AN-23-02.pdf
- Attachment C - Annexation Petition AN-23-02.pdf
- DRAFT ORDINANCE AN-23-02.docx

Agenda Item: Public Hearing on a petition requesting contiguous annexation submitted by High Bar Creek LLC, Huggy Bear LLC, and Nancy H. Dameron Trust for property associated with the Reserve at Dunn Creek Subdivision rezoning request RZ-22-05, located at 0 Friendship Chapel Road and 0 NC 98 Bypass being Wake County PINs 1840-66-0542, 1840-67-6254, 1840-76-1824, and 1840-65-7710 being approximately 67.4249 acres.

Summary: The property proposed for annexation is contiguous to the corporate limits of the Town of Wake Forest. The proposed annexation is associated with rezoning case RZ-22-05, Reserve at Dunn Creek Subdivision.

On August 15th, 2023, the Board accepted the petition, certified the sufficiency of the annexation petition, and adopted the resolution to investigate the annexation petition thus, setting the public hearing date for the annexation petition.

Attachments: Attachment A Legal Description AN-23-02
Attachment B Annexation Map AN-23-02
Attachment C Contiguous Annexation Petition AN-23-02
Draft Ordinance

AREA TO BE ANNEXED (SOUTH OF HWY 98):

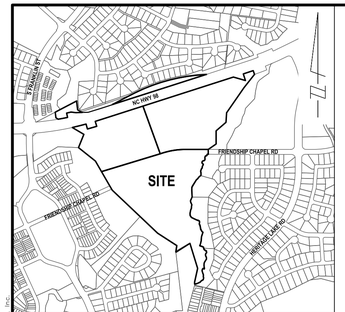
TRACT 1 (SOUTH OF HWY 98), TRACT 2 AND TRACT 3:
BEGINNING AT A CONCRETE MONUMENT LOCATED ON THE SOUTHERN CONTROLLED ACCESS RIGHT-OF-WAY LINE OF NC HIGHWAY 98 AND BEING THE NORTHEASTERN PROPERTY CORNER OF LANDS NOW OR FORMERLY OF HIGH BAR CREEK, LLC AS RECORDED IN DEED BOOK 15086, PAGE 271, WAKE COUNTY REGISTRY, AND HAVING NC GRID (NAD '83/2011) COORDINATES OF N: 807467.20 FEET E: 2147955.98 FEET; THENCE ALONG AND WITH SAID RIGHT-OF-WAY LINE SOUTH 19°10'24" EAST A DISTANCE OF 55.68 FEET TO A POINT LOCATED ON THE NORTHWESTERN PROPERTY CORNER OF LOT 2 AS RECORDED IN BOOK OF MAPS 2020, PAGE 1948, WAKE COUNTY REGISTRY; THENCE SOUTH 38°34'11" WEST A DISTANCE OF 237.45 FEET TO A POINT; THENCE SOUTH 34°39'43" WEST A DISTANCE OF 425.94 FEET TO A POINT; THENCE SOUTH 03°49'13" WEST A DISTANCE OF 134.00 FEET TO A POINT; THENCE SOUTH 49°11'44" WEST A DISTANCE OF 181.77 FEET TO A POINT; THENCE SOUTH 00°01'45" EAST A DISTANCE OF 184.17 FEET TO A POINT; THENCE SOUTH 55°16'14" WEST A DISTANCE OF 134.42 FEET TO AN EXISTING IRON PIPE LOCATED ON THE NORTHERN RIGHT-OF-WAY LINE OF FRIENDSHIP CHAPEL ROAD; THENCE CROSSING SAID RIGHT-OF-WAY SOUTH 00°02'08" EAST A DISTANCE OF 70.00 FEET TO A POINT LOCATED ON THE NORTHERN PROPERTY LINE OF LANDS NOW OR FORMERLY OF THE TOWN OF WAKE FOREST AS RECORDED IN DEED BOOK 14534, PAGE 2554 AND SHOWN ON BOOK OF MAPS 2011, PAGE 143, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID NORTHERN PROPERTY LINE SOUTH 89°58'08" WEST A DISTANCE OF 19.90 FEET TO A POINT LOCATED IN THE CENTERLINE OF A CREEK; THENCE ALONG AND WITH SAID CREEK CENTERLINE SOUTH 04°55'51" EAST A DISTANCE OF 18.56 FEET TO A POINT; THENCE SOUTH 70°20'48" WEST A DISTANCE OF 28.31 FEET TO A POINT; THENCE SOUTH 05°08'40" WEST A DISTANCE OF 57.66 FEET TO A POINT; THENCE SOUTH 71°58'56" WEST A DISTANCE OF 38.45 FEET TO A POINT; THENCE SOUTH 07°21'34" WEST A DISTANCE OF 24.28 FEET TO A POINT; THENCE SOUTH 49°02'52" EAST A DISTANCE OF 24.24 FEET TO A POINT; THENCE SOUTH 17°02'18" WEST A DISTANCE OF 59.25 FEET TO A POINT; THENCE SOUTH 22°44'25" WEST A DISTANCE OF 49.08 FEET TO A POINT; THENCE SOUTH 08°02'46" EAST A DISTANCE OF 43.48 FEET TO A POINT; THENCE SOUTH 38°00'07" WEST A DISTANCE OF 73.83 FEET TO A POINT; THENCE SOUTH 48°54'23" WEST A DISTANCE OF 25.75 FEET TO A POINT; THENCE SOUTH 30°22'44" WEST A DISTANCE OF 125.59 FEET TO A POINT; THENCE SOUTH 01°50'26" EAST A DISTANCE OF 130.97 FEET TO A POINT; THENCE SOUTH 25°51'48" WEST A DISTANCE OF 58.52 FEET TO A POINT; THENCE SOUTH 23°42'21" EAST A DISTANCE OF 50.94 FEET TO A POINT; THENCE SOUTH 03°11'15" WEST A DISTANCE OF 62.46 FEET TO A POINT; THENCE SOUTH 38°36'07" WEST A DISTANCE OF 19.94 FEET TO A POINT; THENCE SOUTH 10°51'57" WEST A DISTANCE OF 55.37 FEET TO A POINT; THENCE SOUTH 04°04'42" EAST A DISTANCE OF 27.37 FEET TO A POINT; THENCE SOUTH 35°05'35" EAST A DISTANCE OF 31.21 FEET TO A POINT; THENCE SOUTH 64°53'31" EAST A DISTANCE OF 118.71 FEET TO A POINT; THENCE SOUTH 29°36'04" EAST A DISTANCE OF 15.59 FEET TO A POINT; THENCE SOUTH 08°12'59" WEST A DISTANCE OF 35.12 FEET TO A POINT; THENCE SOUTH 31°34'01" EAST A DISTANCE OF 20.49 FEET TO A POINT; THENCE SOUTH 08°57'53" EAST A DISTANCE OF 51.19 FEET TO A POINT; THENCE SOUTH 31°56'11" EAST A DISTANCE OF 38.51 FEET TO A POINT; THENCE SOUTH 53°26'28" EAST A DISTANCE OF 12.14 FEET TO A POINT; THENCE SOUTH 15°56'37" WEST A DISTANCE OF 49.54 FEET TO A POINT; THENCE SOUTH 08°12'01" WEST A DISTANCE OF 113.46 FEET TO A POINT; THENCE SOUTH 21°45'03" WEST A DISTANCE OF 32.17 FEET TO A POINT; THENCE SOUTH 70°11'33" EAST A DISTANCE OF 57.07 FEET TO A POINT; THENCE SOUTH 07°41'03" EAST A DISTANCE OF 32.70 FEET TO A POINT; THENCE SOUTH 51°17'11" EAST A DISTANCE OF 52.33 FEET TO A POINT; THENCE SOUTH 30°30'09" WEST A DISTANCE OF 41.74 FEET TO A POINT; THENCE SOUTH

17°34'49" EAST A DISTANCE OF 62.02 FEET TO A POINT; THENCE SOUTH 32°46'14" WEST A DISTANCE OF 62.25 FEET TO A POINT; THENCE SOUTH 05°40'53" WEST A DISTANCE OF 41.50 FEET TO A POINT; THENCE SOUTH 07°17'09" EAST A DISTANCE OF 53.28 FEET TO A POINT; THENCE NORTH 66°51'10" WEST A DISTANCE OF 20.84 FEET TO A POINT; THENCE SOUTH 35°21'29" WEST A DISTANCE OF 25.72 FEET TO A POINT; THENCE SOUTH 17°51'30" EAST A DISTANCE OF 70.15 FEET TO A POINT; THENCE SOUTH 01°05'33" WEST A DISTANCE OF 68.74 FEET TO A POINT; THENCE SOUTH 58°51'39" WEST A DISTANCE OF 99.52 FEET TO A POINT; THENCE SOUTH 64°39'13" WEST A DISTANCE OF 25.16 FEET TO A POINT; THENCE NORTH 89°08'09" WEST A DISTANCE OF 13.11 FEET TO A POINT LOCATED ON THE EASTERN PROPERTY LINE OF LANDS NOW OR FORMERLY OF THE STATE OF NORTH CAROLINA AS RECORDED IN DEED BOOK 9069, PAGE 1 AND SHOWN ON BOOK OF MAPS 2001, PAGE 16, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID EASTER PROPERTY LINE NORTH 00°10'52" WEST A DISTANCE OF 28.63 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 12°35'52" EAST A DISTANCE OF 197.69 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 17°13'19" WEST A DISTANCE OF 366.06 FEET TO AN EXISTING IRON PIPE; THENCE SOUTH 57°08'54" WEST A DISTANCE OF 233.34 FEET TO AN EXISTING IRON PIPE LOCATED ON THE EASTERN PROPERTY LINE OF OPEN SPACE 3 AS RECORDED IN BOOK OF MAPS 2021, PAGE 2316, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID EASTERN PROPERTY LINE NORTH 08°40'06" EAST A DISTANCE OF 97.75 FEET TO A POINT; THENCE NORTH 57°08'41" WEST A DISTANCE OF 318.06 FEET TO A POINT; THENCE NORTH 46°41'15" WEST A DISTANCE OF 438.01 FEET TO A POINT LOCATED ON THE EASTERN PROPERTY LINE OF OPEN SPACE 6 AS RECORDED IN BOOK OF MAPS 2021 PAGE 2201, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID EASTERN PROPERTY LINE NORTH 46°37'21" WEST A DISTANCE OF 436.47 FEET TO A POINT; THENCE NORTH 30°09'45" WEST A DISTANCE OF 469.04 FEET TO A POINT LOCATED ON THE EASTERN PROPERTY LINE OF OPEN SPACE 7 AS RECORDED IN BOOK OF MAPS 2022, PAGES 81-82, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID EASTERN PROPERTY LINE NORTH 51°18'22" WEST A DISTANCE OF 302.80 FEET TO A POINT LOCATED ON THE SOUTHEASTERN PROPERTY CORNER OF LOT 9 AS RECORDED IN BOOK OF MAPS 2020, PAGE 387, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID EASTERN PROPERTY LINE NORTH 21°45'45" EAST A DISTANCE OF 200.14 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 59°22'22" WEST A DISTANCE OF 187.76 FEET TO AN EXISTING IRON PIPE LOCATED ON THE SOUTHERN CONTROLLED ACCESS RIGHT-OF-WAY LINE OF NC HIGHWAY 98; THENCE ALONG AND WITH SAID RIGHT-OF-WAY NORTH 76°08'02" EAST A DISTANCE OF 198.48 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE SOUTH 15°18'47" EAST A DISTANCE OF 72.59 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 73°17'05" EAST A DISTANCE OF 136.23 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 19°08'55" WEST A DISTANCE OF 72.47 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 72°39'16" EAST A DISTANCE OF 128.31 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 72°09'47" EAST A DISTANCE OF 1,900.67 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE SOUTH 74°04'42" EAST A DISTANCE OF 175.45 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 17°59'47" WEST A DISTANCE OF 97.07 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 71°49'32" EAST A DISTANCE OF 145.81 FEET TO AN EXISTING CONCRETE MONUMENT, THE POINT OF BEGINNING, CONTAINING 64.7419 ACRES, AND BEING A PORTION OF THE AREA TO BE ANNEXED.

AREA TO BE ANNEXED (NORTH OF HWY 98):

TRACT 1 (NORTH OF HWY 98):
BEGINNING AT AN EXISTING IRON PIPE LOCATED ON THE NORTHERN CONTROLLED ACCESS RIGHT-OF-WAY LINE OF NC HIGHWAY 98 AND BEING THE SOUTHEASTERN PROPERTY CORNER OF LANDS NOW OR FORMERLY OF RP HV LAKESIDE, LLC AS RECORDED IN DEED BOOK 18882, PAGE 2451, WAKE COUNTY REGISTRY, AND HAVING NC GRID (NAD '83/2011) COORDINATES OF N: 806788.36 FEET E: 2145233.32 FEET; THENCE ALONG AND WITH SAID EASTERN PROPERTY LINE NORTH 59°54'01" WEST A DISTANCE OF 39.81 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 07°47'37" WEST A DISTANCE OF 77.78 FEET TO AN EXISTING IRON PIPE LOCATED ON THE SOUTHERN PROPERTY LINE OF LANDS NOW OR FORMERLY OF FRANKLIN STREET TOWNES, LLC AS RECORDED IN DEED BOOK 16431 PAGE 1335 AND SHOWN ON BOOK OF MAPS 2018 PAGE 619, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID SOUTHERN PROPERTY LINE NORTH 61°50'41" EAST A DISTANCE OF 339.40 FEET TO A POINT LOCATED ON THE NORTHWESTERN PROPERTY CORNER OF OPEN SPACE 2 AS RECORDED IN BOOK OF MAPS 1997, PAGE 523, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID WESTERN PROPERTY LINE SOUTH 06°56'59" EAST A DISTANCE OF 127.64 FEET TO A POINT; THENCE SOUTH 60°14'35" EAST A DISTANCE OF 72.58 FEET TO A POINT LOCATED ON THE NORTHERN CONTROLLED ACCESS RIGHT-OF-WAY LINE OF NC HIGHWAY 98; THENCE ALONG AND WITH SAID RIGHT-OF-WAY LINE SOUTH 88°07'49" WEST A DISTANCE OF 87.92 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 83°28'18" WEST A DISTANCE OF 67.48 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE SOUTH 77°36'27" WEST A DISTANCE OF 63.28 FEET TO A POINT; THENCE SOUTH 11°49'47" EAST A DISTANCE OF 62.40 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE SOUTH 79°11'06" WEST A DISTANCE OF 131.11 FEET TO AN EXISTING IRON PIPE, TO THE POINT OF BEGINNING, CONTAINING 0.9401 ACRES, AND BEING A PORTION OF THE AREA TO BE ANNEXED.

TRACT 4:
COMMENCING AT AN EXISTING IRON PIPE LOCATED ON THE NORTHERN CONTROLLED ACCESS RIGHT-OF-WAY LINE OF NC HIGHWAY 98 AND BEING THE SOUTHEASTERN PROPERTY CORNER OF LANDS NOW OR FORMERLY OF RP HV LAKESIDE, LLC AS RECORDED IN DEED BOOK 18882, PAGE 2451, WAKE COUNTY REGISTRY, AND HAVING NC GRID (NAD '83/2011) COORDINATES OF N: 806788.36 FEET E: 2145233.32 FEET; THENCE ALONG AND WITH SAID CONTROLLED ACCESS RIGHT-OF-WAY LINE NORTH 79°11'06" EAST A DISTANCE OF 131.11 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 11°49'47" WEST A DISTANCE OF 62.40 FEET TO A POINT; THENCE NORTH 77°36'27" EAST A DISTANCE OF 63.28 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE SOUTH 83°28'18" EAST A DISTANCE OF 67.48 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 88°07'49" EAST A DISTANCE OF 171.92 FEET TO AN EXISTING CONCRETE MONUMENT; THENCE NORTH 72°51'00" EAST A DISTANCE OF 181.25 FEET TO A POINT; THENCE NORTH 72°09'47" EAST A DISTANCE OF 161.18 FEET TO THE POINT OF BEGINNING; THENCE LEAVING SAID CONTROLLED ACCESS RIGHT-OF-WAY LINE NORTH 62°51'03" EAST A DISTANCE OF 291.02 FEET TO AN EXISTING IRON PIPE LOCATED ON THE SOUTHERN PROPERTY LINE OF LANDS NOW OR FORMERLY OF DEACON'S RIDGE HOMEOWNER'S ASSOCIATION, INC. AS RECORDED IN DEED BOOK 7836, PAGE 834 AND SHOWN ON BOOK OF MAPS 1997, PAGE 1941, WAKE COUNTY REGISTRY; THENCE ALONG AND WITH SAID SOUTHERN PROPERTY LINE ALONG A CURVE TO THE RIGHT AN ARC DISTANCE OF 1,096.85 FEET, SAID CURVE HAVING A RADIUS OF 2,500.01 FEET, A CHORD DIRECTION OF NORTH 74°38'36" EAST AND A CHORD DISTANCE OF 1,088.08 FEET TO A POINT LOCATED ON THE NORTHERN CONTROLLED ACCESS RIGHT-OF-WAY LINE OF NC HIGHWAY 98; THENCE ALONG AND WITH SAID RIGHT-OF-WAY LINE SOUTH 72°09'47" WEST A DISTANCE OF 1374.24 FEET TO THE POINT OF BEGINNING, CONTAINING 1.7429 ACRES, AND BEING A PORTION OF THE AREA TO BE ANNEXED.



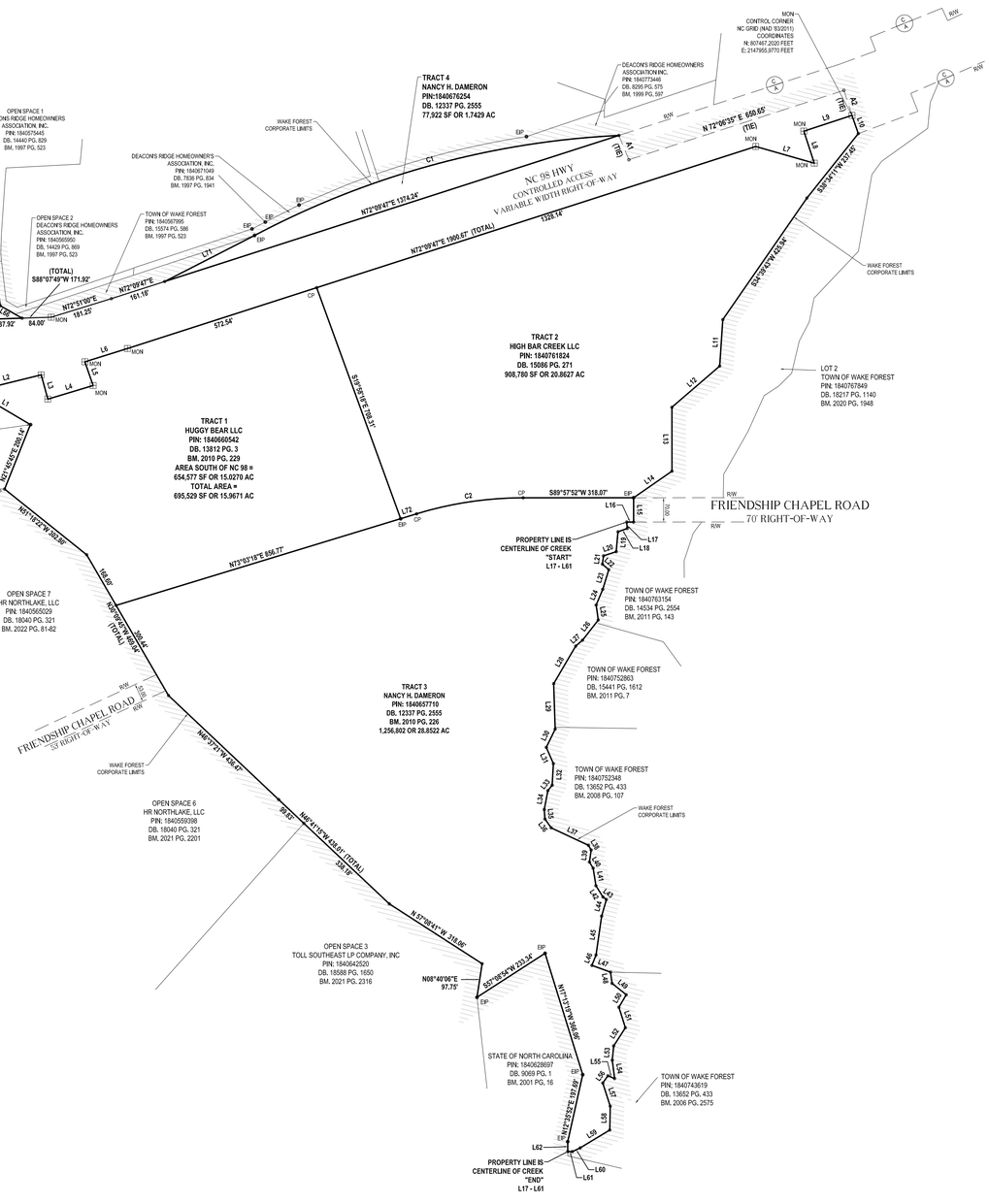
VICINITY MAP - 1" = 1000'

NOTE:
1. AREAS BY COORDINATE GEOMETRY UNLESS SHOWN OTHERWISE.
2. ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES.
3. ALL STREETS ARE PUBLIC RIGHTS-OF-WAY UNLESS SHOWN OTHERWISE.
4. NO NCGS MONUMENT WITHIN 2,000 FEET OF PROPERTIES.
5. FEMA FLOOD HAZARD AREAS PER FIRM NUMBER 3720184000K, DATED JULY 19, 2022. PROPERTIES LIE WITHIN ZONES X, AE, AND FLOODWAY.
6. PROPERTY IS ZONED "OS-CD", "RMX-CD" AND "UR-CD".
7. PROPERTY MAY BE SUBJECT TO NEUSE RIVER BUFFERS.
8. BUFFER DELINEATION TO BE DETERMINED BY DWR BEFORE FINAL APPROVAL.
9. THE COORDINATES SHOWN ON THIS PLAT WERE DERIVED BY REAL TIME NETWORK (RTN) GLOBAL POSITIONING SYSTEM (GPS). THIS METHOD RESULTS IN (NAD 1983(2011) - (CORS 96) POSITIONS AND NORTH AMERICAN VERTICAL DATUM '88 (MEAN SEA LEVEL) ELEVATIONS USING THE CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) MAINTAINED BY NORTH CAROLINA GEODETIC SURVEY. CLASS A SURVEY, 0.033 FT POSITIONAL ACCURACY, VRS FIELD PROCEDURE, GEOID12A AND UNITS IN FEET.

LINE TABLE		
LINE	BEARING	DISTANCE
L1	N 59°42'22" W	187.76'
L2	N 76°58'02" E	196.48'
L3	S 15°18'43" E	72.59'
L4	N 73°17'05" E	136.23'
L5	N 19°08'59" W	72.47'
L6	N 72°39'16" E	128.31'
L7	S 74°04'42" E	175.45'
L8	N 17°59'47" W	97.07'
L9	N 71°49'02" E	145.81'
L10	S 19°10'24" E	55.68'
L11	S 03°49'13" W	134.00'
L12	S 49°11'44" W	181.77'
L13	S 00°03'45" E	184.11'
L14	S 55°18'14" W	134.42'
L15	S 00°02'08" E	70.00'
L16	S 89°58'08" W	19.90'
L17	S 04°55'51" E	18.56'
L18	S 70°20'48" W	28.31'
L19	S 05°08'40" W	57.66'
L20	S 71°58'56" W	38.45'
L21	S 07°21'34" W	24.28'
L22	S 49°02'52" E	24.24'
L23	S 17°05'18" W	59.25'
L24	S 22°44'25" W	49.08'
L25	S 08°05'46" E	43.46'
L26	S 38°00'07" W	73.83'
L27	S 48°54'23" W	25.75'
L28	S 30°22'44" W	125.59'
L29	S 01°50'06" E	130.97'
L30	S 25°51'48" W	58.52'
L31	S 23°42'21" E	50.94'
L32	S 03°11'15" W	62.46'
L33	S 38°38'07" W	19.94'
L34	S 10°57'57" W	55.37'
L35	S 04°04'42" E	27.37'
L36	S 35°05'35" E	31.21'
L37	S 64°53'31" E	118.71'
L38	S 29°36'04" E	15.59'
L39	S 08°12'59" W	35.12'
L40	S 31°34'01" E	20.49'
L41	S 08°52'53" E	51.19'
L42	S 31°56'11" E	38.51'
L43	S 53°26'28" E	12.14'
L44	S 15°56'37" W	49.64'
L45	S 08°12'01" W	113.46'
L46	S 21°45'03" W	32.17'
L47	S 70°11'53" E	57.07'
L48	S 07°41'03" E	32.70'
L49	S 51°17'11" E	52.33'
L50	S 35°30'09" W	41.74'
L51	S 17°34'49" E	62.02'
L52	S 32°48'14" W	62.25'
L53	S 09°40'59" W	41.50'
L54	S 07°17'09" E	53.28'
L55	N 66°51'10" W	20.84'
L56	S 35°21'29" W	25.72'
L57	S 17°51'30" E	70.15'
L58	S 01°05'33" W	68.74'
L59	S 58°51'39" W	99.52'
L60	S 64°39'13" W	25.16'
L61	N 89°08'09" W	13.11'
L62	N 00°10'52" W	28.63'
L63	N 59°54'01" W	39.81'
L64	N 07°47'59" W	77.18'
L65	S 06°56'59" E	127.64'
L66	S 60°14'35" E	72.58'
L67	N 83°28'18" W	67.48'
L68	S 77°36'27" W	63.28'
L69	S 11°49'47" E	62.40'
L70	S 79°11'06" W	131.11'
L71	N 62°51'03" E	291.02'
L72	N 72°59'10" E	47.91'

CURVE TABLE				
CURVE	RADIUS	LENGTH	CHORD DIRECTION	CHORD
C1	2,500.01'	1,096.80'	N 74°38'36" E	1,088.08'
C2	1,050.00'	311.44'	N 81°26'40" E	310.30'

ANNEXATION LINE TABLE		
LINE	BEARING	DISTANCE
A1	S 22°18'39" E	75.69'
A2	S 17°54'18" E	75.63'



AREA WITHIN TRACT 1	695,529 SF OR 15.9671 AC
AREA WITHIN TRACT 2	908,780 SF OR 20.8627 AC
AREA WITHIN TRACT 3	1,256,802 SF OR 28.8522 AC
AREA WITHIN TRACT 4	75,922 SF OR 1.7429 AC
TOTAL AREA TO BE ANNEXED	2,937,033 SF OR 67.4249 AC

OWNERS:

HUGGY BEAR LLC
3336 WHITE OAK RD
RALEIGH NC 27609-7619

HIGH BAR CREEK LLC
3336 WHITE OAK RD
RALEIGH NC 27609-7619

NANCY H. DAMERON
3336 WHITE OAK RD
RALEIGH NC 27609-7619

ANNEXATION MAP: AN-23-02
0 FRIENDSHIP CHAPEL ROAD & 0 NC 98 BYPASS
(HUGGY BEAR LLC, HIGH BAR CREEK LLC & NANCY H. DAMERON)
67.4249± ACRES

TOWN OF WAKE FOREST
FULFILLS REQUIREMENTS OF N.C.G.S. 160A-29 ORDINANCE #
ADOPTED:
EFFECTIVE DATE OF ANNEXATION:

I, THERESA SAVARY, TOWN CLERK, TOWN OF WAKE FOREST, NORTH CAROLINA CERTIFY THAT THIS IS A TRUE AND ACCURATE MAP OF ANNEXATION ADOPTED THE _____ DAY OF _____, 20____, BY THE WAKE FOREST BOARD OF COMMISSIONERS. I SET MY HAND AND SEAL OF THE TOWN OF WAKE FOREST,

_____, 20_____

_____

THERESA SAVARY

SCALE: 1" = 200'
0 100 200 400 600 800

NORTH CAROLINA PROFESSIONAL SEAL L-5240 LAND SURVEYOR DAN GREGORY

BASS, NIXON & KENNEDY, INC.
CONSULTING ENGINEERS
• 6310 CHAPEL HILL ROAD, SUITE 250, RALEIGH, NORTH CAROLINA 27607
• TELEPHONE: (919)851-4422 or (800)354-1879
• FAX: (919)851-8866
• CERTIFICATION NUMBERS: NCBELS (C-0110); NCBLA (C-0267)

NO.	DATE	DESCRIPTION	BY
3	8-8-2023	REVISED PER COMMENTS	JDW
2	7-25-2023	REVISED HWY 98 R/W PER COMMENTS	JDW
1	6-6-2023	REVISED PER COMMENTS #1	JDW

REVISIONS

21332 JOB NO. | 5-10-2023 DATE | JDW DRAWN BY | DG CHK BY: | SCALE: 1" = 200'

ANNEXATION MAP
HUGGY BEAR LLC, HIGH BAR CREEK LLC & NANCY H. DAMERON
PROPERTY OF
PINS: 1840660542, 1840761824, 1840657710, 1840676254
0 FRIENDSHIP CHAPEL ROAD & 0 NC 98 BYPASS
CASE #: AN-23-02
WAKE COUNTY NORTH CAROLINA
WAKE FOREST

SHEET 1 OF 1

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Plotted: 08/08/2023 15:55:41 PM
By: jonathan.weaver
Z:\PROJECTS\2021\21332 - Wake Forest Hwy 98 Assemblage (Huggy Bear)\SURVEY\21332CARLSON\dwg\21332 ANNEXATION PLAT.dwg
Adobe PDF

TOWN *of*
WAKE FOREST

Planning Department
Wake Forest Town Hall – 3rd Floor
301 S. Brooks Street
Wake Forest, NC 27587
t 919.435.9510
f 919.435.9539
www.wakeforestnc.gov

CONTIGUOUS ANNEXATION PETITION APPLICATION

(Last updated: July 2013)

Submittal Date: _____

To the Board of Commissioners of the Town of Wake Forest:

I/we the undersigned owner(s) of real property respectfully request that the area described in the paragraph below and as shown in the attached survey map of the property be annexed into the Town of Wake Forest.

The area to be annexed is contiguous to the Town of Wake Forest corporate limits and the boundaries of such territory are as follows *(attach or insert below a metes & bounds description with a matching survey map)*:

See attached.

Note: If ownership is a corporation or partnership, please provide such name and the name and signature of the person authorized to sign on behalf of the corporation or partnership. If in joint ownership, please provide names and signatures of ALL owners.

Name	Address	Signature	Date
High Bar Creek LLC	Friendship Chapel Road	T. Barker Dameron III	May 2, 2023
		T. Barker Dameron III, Manager	
Huggy Bear LLC	Friendship Chapel Road	T. Barker Dameron III	May 2, 2023
		T. Barker Dameron III, Manager	
Nancy H Dameron Trust U/T/A dated June 4, 1993	Friendship Chapel Road	T. Barker Dameron III	May 2, 2023
		T. Barker Dameron III, Trustee	

For additional information or assistance, please call the Planning Department at (919) 435-9510.

ORDINANCE 2023-XXX

ORDINANCE OF THE BOARD OF COMMISSIONERS OF THE TOWN OF WAKE FOREST, NORTH CAROLINA

(Contiguous annexation submitted by High Bar Creek LLC, Huggy Bear LLC, and Nancy H. Dameron Trust for property associated with the Reserve at Dunn Creek Subdivision rezoning request RZ-22-05, located at 0 Friendship Chapel Road and 0 NC 98 Bypass being Wake County PINs 1840-66-0542, 1840-67-6254, 1840-76-1824, and 1840-65-7710 being approximately 67.4249 acres.)

WHEREAS, the Board of Commissioners has adopted a resolution under N.C.G.S. 160A-31, as amended, stating its intent to annex the area described below; and

WHEREAS, the Board of Commissioners has by said resolution directed the Town Clerk to investigate the sufficiency of said petition; and

WHEREAS, the Town Clerk has certified the sufficiency of said petition and a public hearing on the question of this annexation was held at the Town of Wake Forest Town Hall at 6:00 p.m. on October 3, 2023, after due notice by publication on September 19, 2023; and

WHEREAS, the Board of Commissioners does hereby find as a fact that said petition meets the requirements of N.C.G.S. 160A-31, as amended; and

NOW, THEREFORE, BE IT ORDAINED by the Board of Commissioners of the Town of Wake Forest, North Carolina:

Section 1. By virtue of the authority granted by N.C.G.S. 160A-31, as amended, the following described territory is hereby annexed and made part of the Town of Wake Forest as of the 3rd day of October, 2023.

(See Attachment A – Legal Description and Attachment B – Annexation Map)

Section 2. Upon and after the 3rd day of October, 2023, the territory and its citizens and property shall be subject to all debts, laws, ordinances, and regulations in force in the Town of Wake Forest and shall be entitled to the same privileges and benefits as other parts of the Town of Wake Forest. Said territory shall be subject to municipal taxes according to N.C.G.S. 160A-58.10.

Section 3. The Mayor and the Town of Wake Forest shall cause to be recorded in the office of the Register of Deeds of Wake County, and in the office of the Secretary of State at Raleigh, North Carolina, an accurate map of the annexed territory, described in Section 1 hereof, together with a duly certified copy of this ordinance.

Adopted and effective this 3rd day of October 2023.

_____

Vivian A. Jones
Mayor

ATTEST:

_____

Theresa Savary
Town Clerk

APPROVED AS TO FORM:

_____

Hassan Kingsberry
Town Attorney

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-193-
Submitted by: Emma Linn
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Consideration of a petition requesting contiguous annexation submitted by High Bar Creek LLC, Huggy Bear LLC, and Nancy H. Dameron Trust for property associated with the Reserve at Dunn Creek Subdivision rezoning request RZ-22-05, located at 0 Friendship Chapel Road and 0 NC 98 Bypass being Wake County PINs 1840-66-0542, 1840-67-6254, 1840-76-1824, and 1840-65-7710 being approximately 67.4249 acres.

Recommendation:

Item Summary:

ATTACHMENTS

-

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-206-
Submitted by: Courtney Tanner
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Public Hearing on Draft Wake Forest Public Transit Plan (CPA-23-02)

Recommendation:

Item Summary:

ATTACHMENTS

- BOC Agenda Summary.pdf
- CPA-23-02 Staff Report.pdf
- Attachment A - Application.pdf
- Exhibit 1 - Draft Wake Forest Public Transit Plan (August 2023 Version)
- Exhibit 2 - Amendments.pdf
- Ordinance.docx

Agenda Item: Consideration of Draft Wake Forest Public Transit Plan (CPA-23-02)

Summary: The Town of Wake Forest began offering bus service in 2008 as a partnership between the City of Raleigh and the Town of Wake Forest, with GoRaleigh operating the route and the City of Raleigh paying for the portion of the route located in Raleigh. The fare free fixed route service, the Wake Forest Loop, offers Wake Forest residents access to commercial and shopping opportunities, medical facilities, and public services in the Wakefield neighborhood in Raleigh. The Town is also served by the Wake Forest-Raleigh Express (WRX), a commuter service route from GoTriangle, and operated by GoRaleigh. The bus service runs hourly during peak hours between Downtown Wake Forest, Triangle Town Center, and Downtown Raleigh.

After conducting a popup event, four open houses, two online surveys, and evaluating existing conditions, Toole Design developed several transit service alternatives to address the five identified purposes for expanding transit in Wake Forest. Feedback provided by the Board of Commissioners, Planning Board, and the public was used to develop preferred scenario action item matrix.

The Planning Board forwarded a unanimous recommendation of approval and asked the Board of Commissioners consider the following:

1. Encourage GoRaleigh to add Route 2L earlier than FY2029.
2. Add an additional bus to each loop to decrease wait time to 30 minutes and improve rider experience.
3. Prioritize adding bus shelters at stops to improve the experience of those using the bus.

The Draft Wake Forest Public Transit Plan (August Version 2023) was presented to the Board of Commissioners at the September 5th work session.

Attachments: See Staff Report

TOWN of WAKE FOREST

Staff Report
CPA-23-02: Wake Forest Public Transit Plan

Meeting Date	October 3, 2023
Requested Actions	Public Hearing on Draft Wake Forest Public Transit Plan (August 2023 Version)
Case Manager	Courtney Tanner, Planning Director
Planning Board Recommendation	Forwarded a unanimous recommendation of approval and asked the Board of Commissioners consider the following: 1. Encourage GoRaleigh to add Route 2L earlier than FY2029. 2. Add an additional bus to each loop to decrease wait time to 30 minutes and improve rider experience. 3. Prioritize adding bus shelters at stops to improve the experience of those using the bus.

PUBLIC MEETINGS

Public Comment Session	Public Hearing
August 21, 2023	October 3, 2023

CASE INFORMATION

Applicant	Town of Wake Forest 301 S Brooks Street Wake Forest, NC 27587
See Attachment A for copy of the Application.	

CASE SUMMARY

The Town of Wake Forest began offering bus service in 2008 as a partnership between the City of Raleigh and the Town of Wake Forest, with GoRaleigh operating the route and the City of Raleigh paying for the portion of the route located in Raleigh. The fare free fixed route service, the Wake Forest Loop, offers Wake Forest residents access to commercial and shopping opportunities, medical facilities, and public services in the Wakefield neighborhood in Raleigh. The Town is also served by the Wake Forest-Raleigh Express (WRX), a commuter service route from GoTriangle, and operated by GoRaleigh. The bus service runs hourly during peak hours between Downtown Wake Forest, Triangle Town Center, and Downtown Raleigh.

After conducting a popup event, four open houses, two online surveys, and evaluating existing conditions, Toole Design developed several transit service alternatives to address the five identified purposes for expanding transit in Wake Forest. Feedback provided by the Board of Commissioners, Planning Board, and the public was used to develop preferred scenario action item matrix.

STAFF RECOMMENDATION

Staff recommends approval of the August 2023 draft Wake Forest Public Transit Plan.

ATTACHMENTS

Attachment A: Application

EXHIBITS

Exhibit 1: Draft Wake Forest Public Transit Plan (August 2023 version)
Exhibit 2: Amendments

Comprehensive Plan Amendment Application

(Comprehensive Plan Amendment - Planning Board Workflow)

Town of Wake Forest, NC
301 S. Brooks St.
Wake Forest, NC 27587-2932
TEL (919) 435-9510 | FAX (919) 435-9539

Project Overview #1086952

Project Title: Wake Forest Public Transit Plan
Application Type: Comprehensive Plan Amendment
Workflow: Comprehensive Plan Amendment - Planning Board
Jurisdiction: Town of Wake Forest (Wake County)
State: NC
County: Wake

Confirmation Checklist Items Submitted

A submittal checklist is available to view additional documents which are required to submitted with this application. After answering the application questions, you will be asked to upload the required documents.

VIEW COMPREHENSIVE PLAN AMENDMENT SUBMITTAL CHECKLIST

Missing items will result in the application being declined and returned to the applicant to resubmit. A revised and complete application including all missing items must be received or the application will be not be deemed complete and routed for review.

Please confirm you have reviewed the associated submitted checklist for this permit and confirm you will submit all documents required on the submittal checklist: Yes

Pre-Application Meeting

Has a pre-application conference been held?: No

*Note: This type of project requires a pre-application conference be completed prior to official submittal. If this has not been completed, please return to the home screen and select **Pre-Application Conference** from the application type drop down list in order to schedule your required meeting.*

Pre-Application Conference Date:
Staff Member Met With:
IDT Project Number:

Project Contact - Applicant/Owner

Please enter all project contacts related to your application.

This is an important step to ensure all members of the applicant team receive email notifications associated with the project which may include comments, requested revisions, scheduled meetings or hearings, and final decisions. This also informs Town staff of the team members assigned role with the project.

Project Contact - Applicant
Kip Padgett

Town of Wake Forest
301 S Brooks Street
Wake Forest, NC 27587
P:9194359411

Amendment Type

Please provide answers to the questions below. Other application materials specified in the submittal checklist must be uploaded as separate documents. You will have the opportunity to upload documents prior to finalizing and submitting this application.

Plan Being Amended: Wake Forest Community Plan

Type of Amendment: Text

Description of Request:
Town staff has drafted the Wake Forest Public Transit Plan and intends to bring the document before the Planning Board for consideration.

TOWN *of*
WAKE FOREST

WAKE FOREST PUBLIC TRANSIT PLAN

DRAFT-AUGUST 2023

ACKNOWLEDGEMENTS

Board of Commissioners

Vivian Jones
Mayor

Jim Dyer
Commissioner

Chad Sary
Commissioner

Keith Shackleford
Commissioner

Nick Sliwinski
Commissioner

Adam Wright
Commissioner

Planning Board

Karin Kuropas
Chair

Michael Hickey
Vice Chair

Michael Almquist
Board Member

Thomas Ballman
Board Member (through December 2022)

Sheila Bishop
Board Member

Christopher Joyner
Board Member (through May 2023)

Michael Siderio
Board Member

Town of Wake Forest Staff

Courtney Tanner
Planning Director

Emma Linn
Planner II – Long Range Planning

Tim Bailey
Public Works Director

Joe Medlin
Street Maintenance Manager

Brad West
Long Range Planning Manager

Wake Forest Communications Team

Stakeholders

GoRaleigh

GoTriangle

Wake County

Capital Area Metropolitan Planning Organization (CAMPO)

Project Consultants

Toole Design Group
Public Participation Partners (P3)

Thank You!

We would also like to thank the many people in Wake Forest that set aside time to attend open houses and respond to surveys to provide their valuable perspectives on transit services throughout the development of this Public Transit Plan.

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Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change.

EXECUTIVE SUMMARY

The Town of Wake Forest is seeking to expand its transit service. The Wake Forest Loop (WFL) circulator and the Wake Forest-Raleigh Express (WRX) have served the Town since 2008. The circulator service provides residents access to public services, medical facilities, and commercial destinations in Wake Forest and the Wakefield neighborhood in Raleigh. The express service provides commuter access to downtown Raleigh.

With a rapid increase in population and development, expanded transit services are necessary in Wake Forest to provide residents, employees, and visitors additional mobility options beyond that of an automobile. The Town conducted the Wake Forest Public Transit Plan (Transit Plan) to explore the options to expand transit to serve growing parts of the Town and connect to key activity centers. The Transit Plan summarizes the evaluation of existing transit services in Wake Forest, discusses the viability of different transit expansion alternatives, and recommends a preferred option to expand transit – including the service type, cost of the service expansion, and steps to implement the service.

An interdepartmental group of Town staff, with the support of a consultant team (the “project team”) developed the Transit Plan with input from the community. The project team held open house events at key milestones and conducted a community survey, a rider survey, and a pop-up engagement event to better understand the community’s transit needs and solicit feedback on alternative service scenarios.

The Transit Plan presents the preferred alternative and next steps to implement the service, including an overview the preferred alternative operations – map(s) and operating assumptions.

PURPOSE AND NEED FOR EXPANDED TRANSIT IN WAKE FOREST

Although the Town of Wake Forest is currently served by transit services, rapid growth and development over the past decade require renewed understanding of how the transit services can be expanded to meet the current and future needs of the Town. Expanded transit service in the Town will provide an additional mobility option for residents, employees, and visitors to reach destinations inside and outside of the Town. Additional mobility options can support the Town's ability to grow while lessening the impact of the growth on the existing roadway network.

PREVIOUS PLANS AND STUDIES

A review of previous plans and studies by the Town of Wake Forest, transit service providers, and regional partnering agencies provided insight into the purpose and need for expanding transit in the Town. The plans and studies summarized below have set the foundation from which the Transit Plan and the transit service alternatives considered are based.

- The Town of Wake Forest **Community Plan**, adopted in April 2022, prioritizes transit as a key element of its long-term vision for the Town. It includes recommendations to nurture supportive urban development for transit, walking, and bicycling, with specific land use typologies and designated areas for Transit-Oriented Development. The Plan also proposes actions such as incorporating pedestrian/bicyclist/transit-oriented areas in shopping centers, expanding route networks, constructing smart bus shelters with interactive features, and exploring long-term transit options like fixed or microtransit.
- The Town's **Comprehensive Transportation Plan** (CTP) is a long-range multi-modal Plan that aims to develop a safe, efficient, and inclusive transportation system. With a low percentage of residents utilizing existing services, the Plan acknowledges the current barriers to transit use. To address these barriers, the CTP recommends implementing additional bus loops, developing interactive websites and real-time technology, incorporating public art and wayfinding at bus shelters, and exploring microtransit options.
- The **Northeast Community Plan**, adopted in late 2021, focuses on improving transit options in the historically Black Northeast Community. The Plan acknowledges limited connectivity and the lack of transit frequency in the area. Recommendations include exploring new transit connections and routes to link the community to commercial and job centers, investigating innovative multimodal technologies like microtransit, and considering the viability of adding transit routes to points north of the community.
- The **Wake Bus Plan** provides an overview of the recommended transit service and capital investments from FY2025 to FY2030 across Wake County. The Plan focuses on four big moves, including regional connections, frequent transit networks, and enhanced access to transit. The Plan proposes replacing Route 401X in the Town of Rolesville with a potential microtransit service, a new Route2L that connects the northern terminus of Route 2 to Wake Forest, and capital investment for the Wake Forest Park and Ride Lot.

EXISTING AND PLANNED TRANSIT

The Town of Wake Forest is currently served by two fixed-route transit services and a paratransit service. The services are provided by GoRaleigh, a local transit provider operating services throughout the City of Raleigh and Wake County areas.

- The **Wake Forest Loop (WFL)** is a bidirectional circulator that operates largely within the Town (and partially within Raleigh on the southwestern portion of the loop). WFL A runs clockwise and WFL B runs counterclockwise. Both loops operate every 75 minutes from approximately 6:00 AM to 8:00 PM Mondays to Fridays, and every 65 minutes from approximately 8:00 AM to 9:00 PM on Saturdays.
- The **Wake Forest-Raleigh Express (WRX)** is a commuter service that connects Wake Forest to Downtown Raleigh, via Triangle Town Center. The WRX provides service on Mondays to Fridays approximately between 6:00 AM to 7:30 PM. In the northbound direction from Downtown Raleigh to Wake Forest, there are two buses in the morning and three buses in the evening. In the southbound direction from Wake Forest to Downtown Raleigh, there are three buses in the morning and two buses in the evening. Buses are an hour apart in both the morning and evening.
- **GoRaleigh Access** provides a paratransit service for people with disabilities and covers trips that originate within 3/4-mile of any GoRaleigh bus stop. The service is available to anyone who qualifies under the Americans with Disabilities Act and requires an application. Trips need to be scheduled between 8:15 AM and 4:45 PM for the same day or next day. Trips may be scheduled via an online form, phone call, or email.
- **GoWake Access** offers door-to-door service in Wake County, allowing individuals who require specialized transportation assistance to schedule trips for various purposes such as medical appointments, employment, education, and other essential activities. It is designed to provide accessible transportation options for individuals with disabilities, people 60 years or older, people who need work-related transportation, residents in rural service zones, or people who participate in a sponsored eligible service such as Medicaid.

There are several planned transit services in Wake Forest based on regional transit and county plans.

- **Route 2L** is a planned route by GoRaleigh that will provide new hourly service from Downtown Wake Forest to WakeMed North Hospital.[1] The route will be scheduled for timed transfers at the hospital to and from Route 2 in the peak direction. Route 2 provides half-hourly service to Downtown Raleigh via Falls of Neuse Road and Five Points.
- The **S-Line** is an existing freight corridor between Tampa, FL and Washington, DC and was noted as an "Option for Future Expansion."[2] The North Carolina Department of Transportation (NCDOT) is facilitating a group of municipal and regional stakeholders to study passenger rail options to provide a local commuter and regional intercity rail service through the S-Line. There are three potential S-Line stations, including a downtown stop, that will go through Wake Forest.
- **Rolesville Microtransit** is being planned by GoRaleigh to open in FY2024 per the FY2025-2030 Wake Bus Plan. The operating scenarios for the service are still being developed, however, the current proposal includes specific drop-off/pickup locations in Wake Forest. The microtransit service would replace the 401X in Rolesville.

[1] https://online.flippingbook.com/view/745228616/55/
[2] https://storymaps.arcgis.com/stories/ad165d3a7df8468b8c7f54c86e88b21d

Figure 1 illustrates the existing transit services – the WFL and the WRX in Wake Forest, as well as services in the surrounding areas – the 25L in Raleigh, and the 401X in Rolesville. The proposed transit services shown are the Route 2L, proposed S-Line stations in Wake Forest, and the preliminary microtransit zone in Rolesville which will replace the 401X.

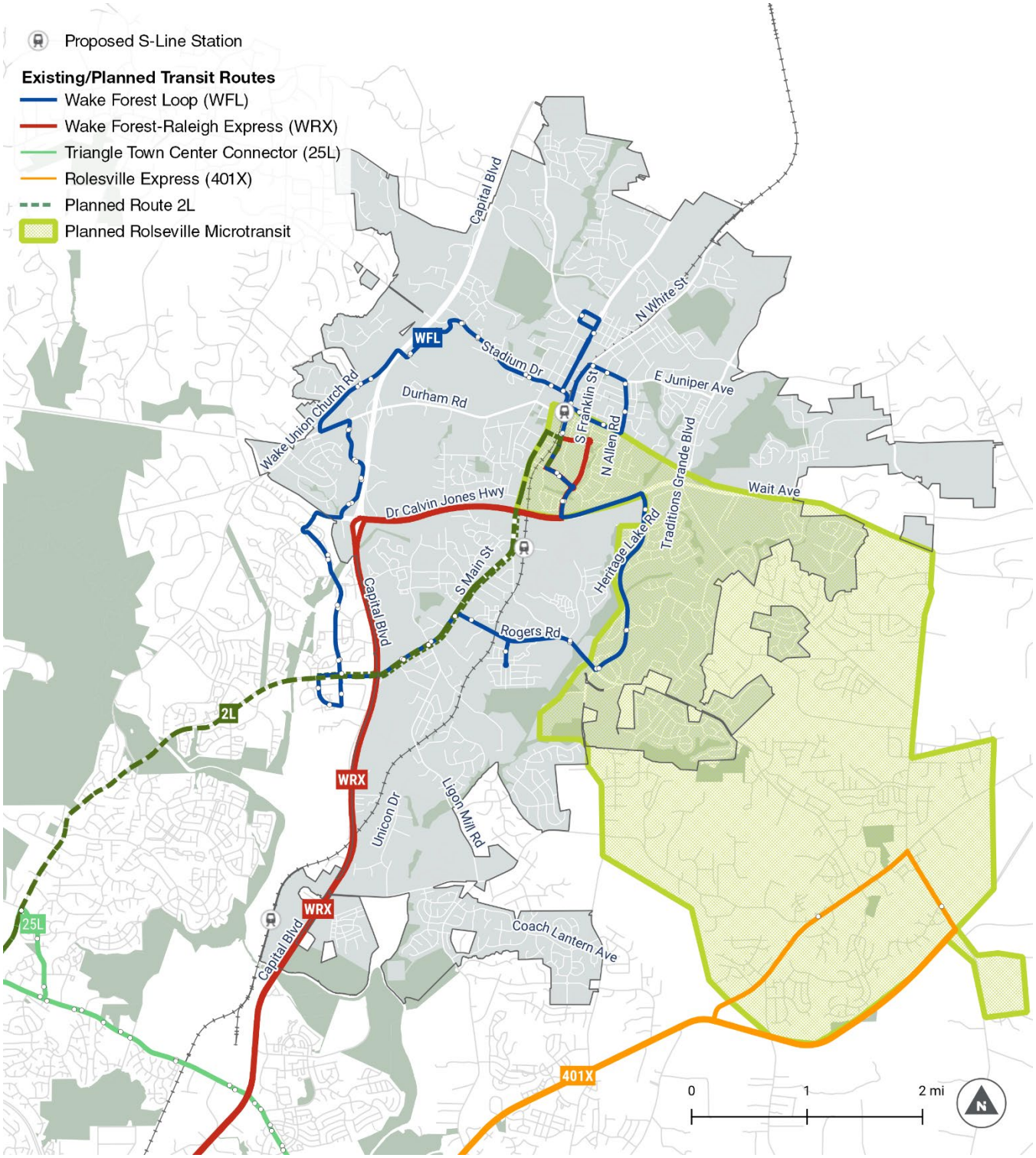


Figure 1. Existing and Proposed Transit Service in Wake Forest (2023)

Ridership on existing transit services in Wake Forest were impacted by the COVID-19 pandemic. The WFL carried approximately 30,000 riders annually until the start of the pandemic in 2020 where ridership was reduced to approximately 15,000-18,000 annually. Ridership began to rise again in 2022, though it has not reached pre-pandemic levels. Similarly, ridership on the WRX dropped from approximately 13,000 riders annually to 7,000 in 2022. This decline in ridership coincides with a national trend in transit ridership away from commuter use and toward all-purpose ridership, with commute-focused express services being slower to rebound to pre-pandemic ridership levels than other services. See Figure 2.

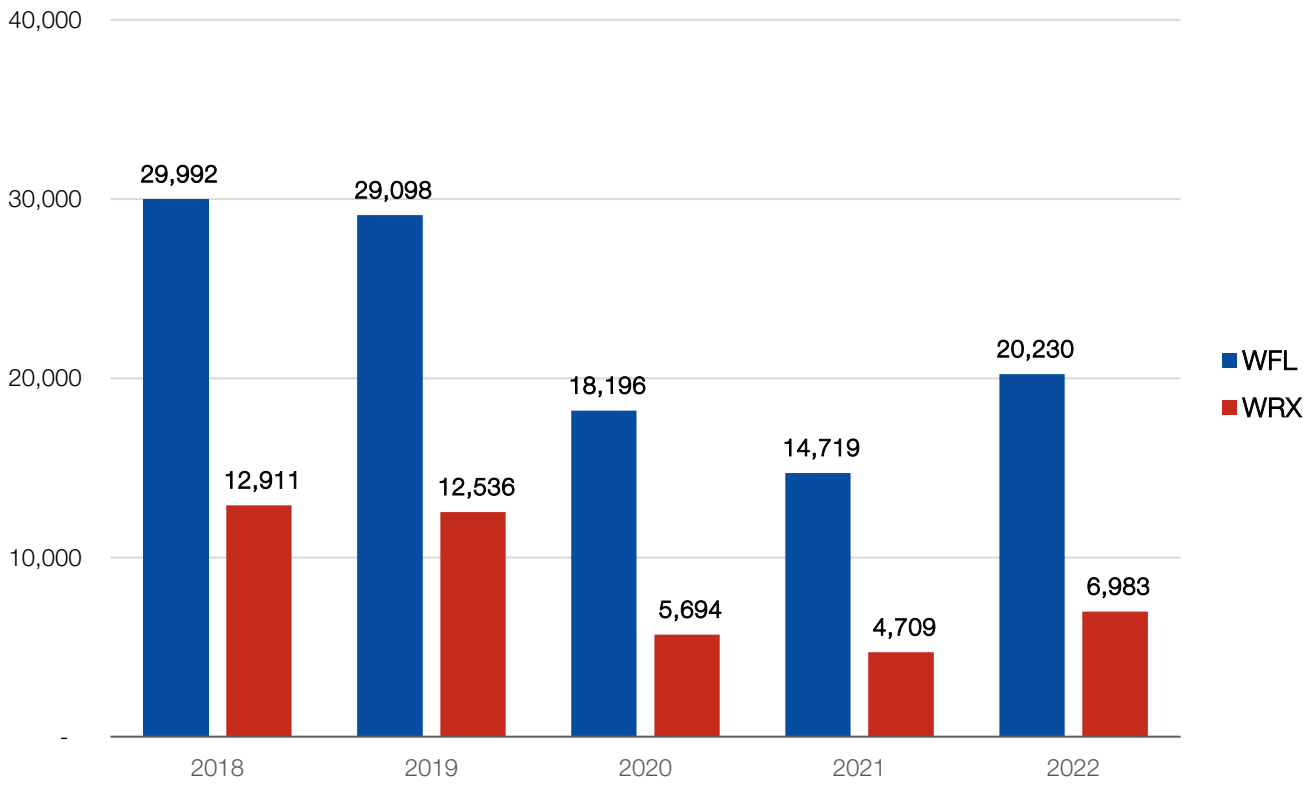


Figure 2. WFL and WRX Annual Ridership (2018-2022)

Figure 3 illustrates the density of weekday ridership on the WFL in 2022. Areas with higher ridership are in Downtown Wake Forest and retail and commercial activity centers on the west side of Town.

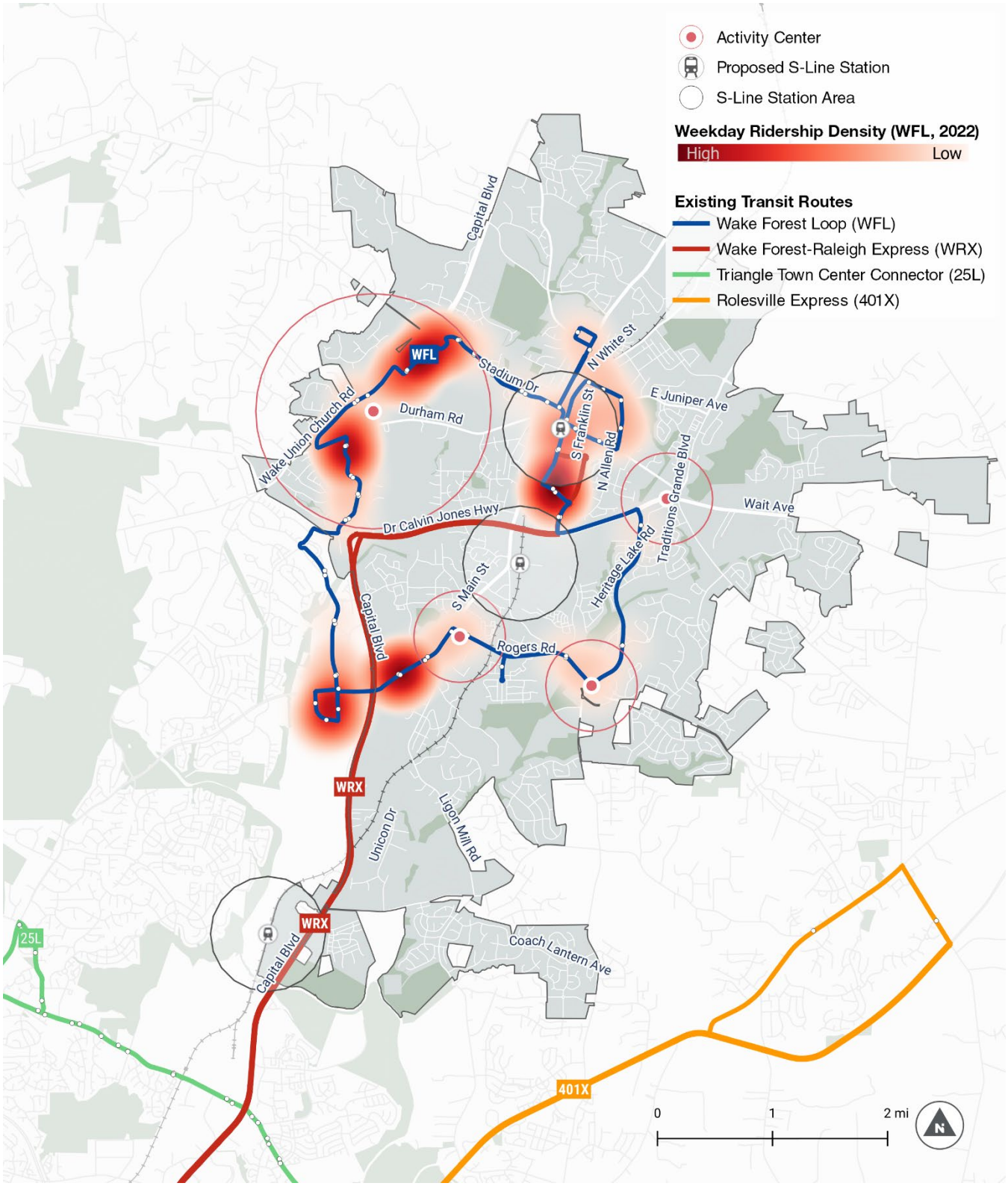


Figure 3. Ridership Density for Weekday WFL (2022)

POPULATION GROWTH AND TRANSIT NEEDS

The population in Wake Forest has been significantly increasing over the past decade. From 2010 to 2020, there was an estimated 32 percent increase in population density in Wake Forest –1,995 persons per square mile in 2010 to 2,638 persons per square mile in 2020.[3] Figure 4 maps the population density in the Town with data from the American Community Survey (ACS) 5-year, 2017-2021 estimates. The parts of Wake Forest that have the highest population density include the sections east of Main Street, near Calvin Jones Highway and Durham Road, north of Stadium Drive, and near Coach Lantern Avenue and Ligon Mill Road.

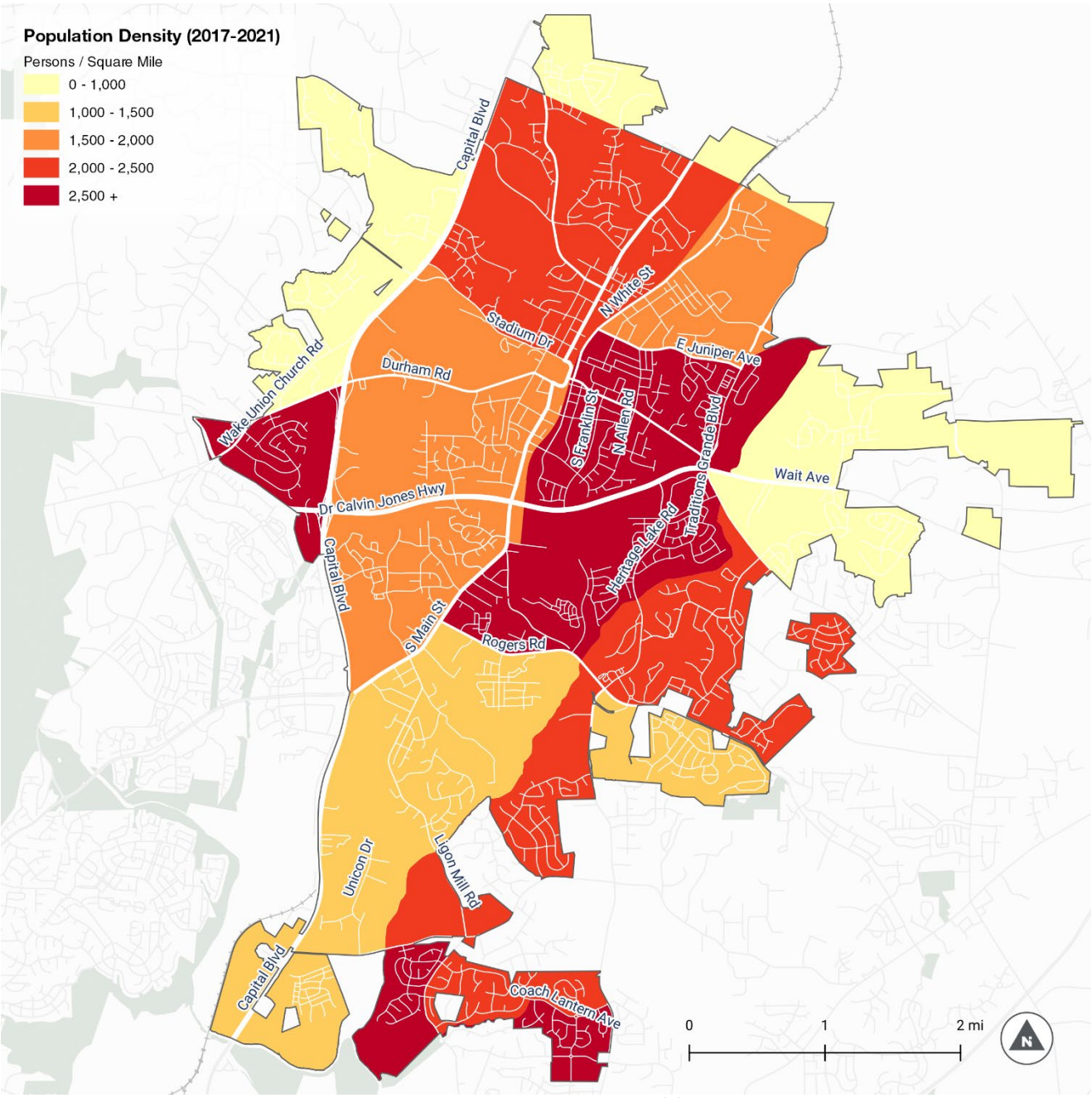


Figure 4. Wake Forest Population Density, Population Estimates from ACS 2017-2021

[3] https://www.census.gov/quickfacts/wakeforesttownnorthcarolina

Beyond population growth, the project team identified four elements that indicate where transit expansion in the Town is needed.

- **Transit Propensity**, the likelihood that people would choose to take transit, can be indicated based on the demographics of the community. Areas that have a higher population density, a higher percent of households below the poverty line, and/or a higher percent of zero vehicle households have been shown by national and regional research to have a higher transit propensity.[4]
- **Transit-Oriented Development & Activity Centers** are identified as growth areas in the Wake Forest Community Plan. It included three proposed Transit-Oriented Development (TOD) sites centered around the proposed S-Line commuter rail stations that would have highly walkable, active developments to support and fully leverage the new transit service. The Wake Forest Community Plan also designated four Activity Centers intended to be unique focal points of the community where residents can gather, socialize, live, work, and shop.
- **Local and Regional Areas** were identified in previous plans as places to connect to transit. The Northeast Community Plan discussed the limited connectivity in the Northeast Community of Wake Forest.[5] Additionally, Wake County has led discussions about a connection between Wake Forest and Rolesville, a Town about five miles southeast of Wake Forest.
- **Multiuse Paths and Greenways** are an important piece of the transit propensity analysis. Existing multiuse paths and greenways provide first- and last-mile connections for transit riders. They can also be destinations for local and regional visitors who want to travel by transit.

Figure 5 illustrates these elements along with existing transit services in the Town and surrounding areas and formed the basis from which the project team developed transit service alternatives.

[4] Regional studies include the GoTriangle FY 2021 Annual Bus Service Performance Report and the Wake County Transit Plan Update.
[5] Northeast Community Plan (https://online.flippingbook.com/view/370447640/2-3/)

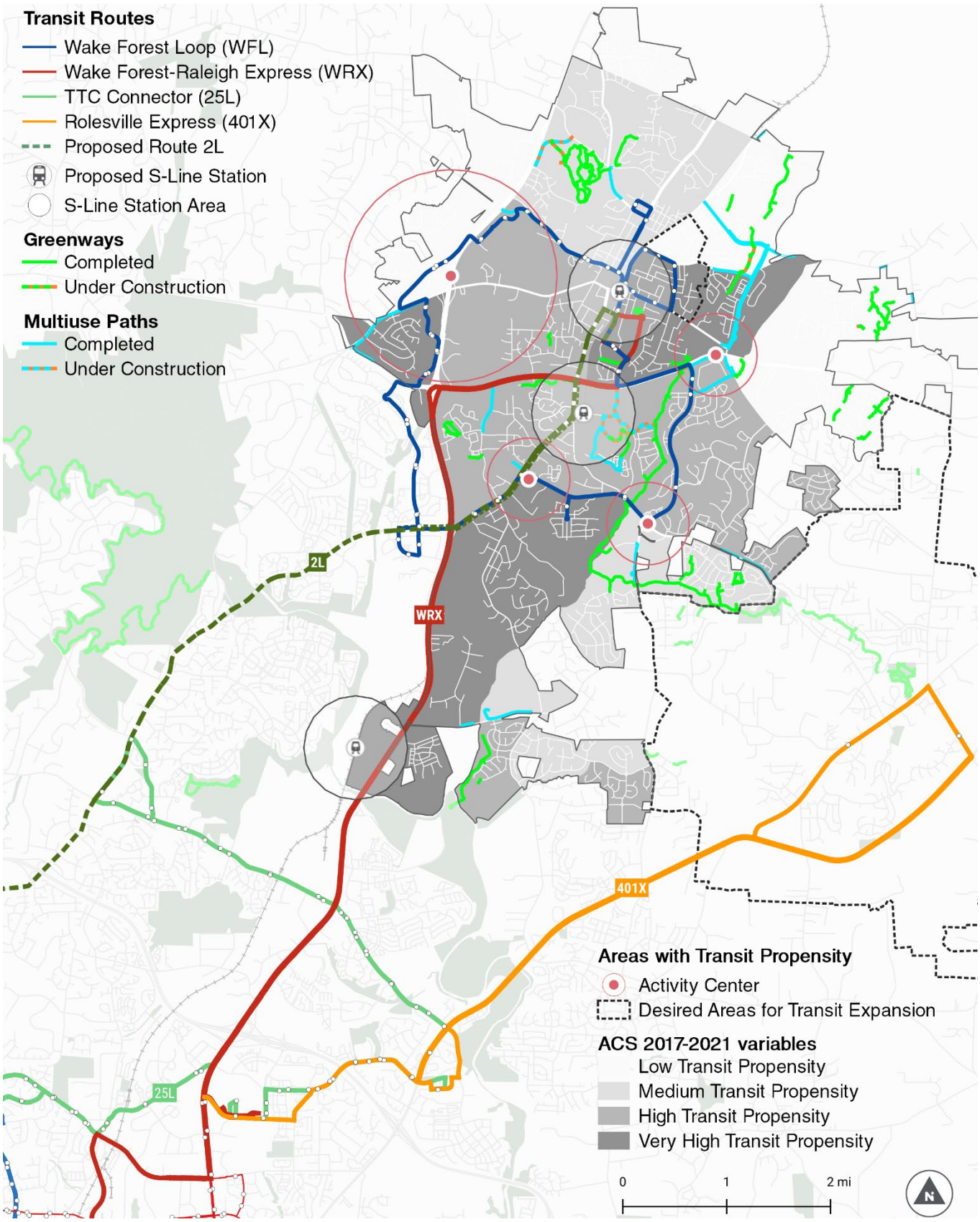


Figure 5. Transit Propensity Wake Forest

COMMUNITY AND STAKEHOLDER FEEDBACK

The project team heard from the people of Wake Forest through multiple means of community and stakeholder engagement. The goals of the engagement process were to 1) better understand how well existing services are working for the public, and 2) consider potential alternatives.

Eight engagement activities were held by the project team to gather feedback from the community and stakeholders. This section outlines these events chronologically as they were held throughout the planning process from October 2022 through July 2023.

October 2022

Board of Comissioners and Planning Board Work Sessions

To kickoff the project, the project team made introductory presentations at the October 4, 2022 Board of Commissions work session and the October 11, 2022 Planning Board meeting. The presentations provided an overview of the transit types, key considerations, and the engagement efforts that would be made to develop the Transit Plan.

December 2022

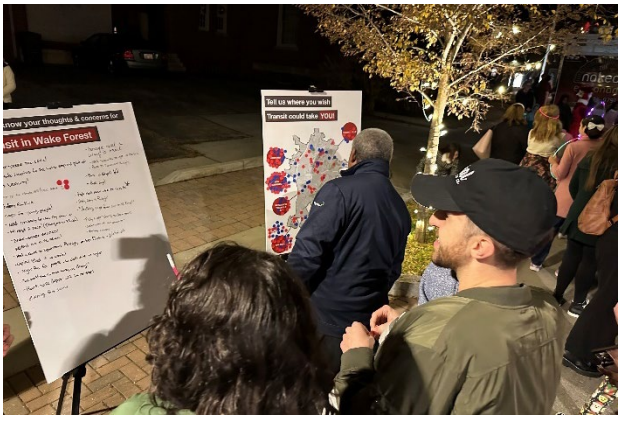
Pop-up Events

The project team attended the Lighting of Wake Forest holiday event on December 2, 2022 to provide information and gather feedback for the Transit Plan. At this pop-up, attendees were invited to place a sticker on a map to indicate where they would like to be able to travel to via bus. The map board received 224 responses and the Town staff along with the project team were able to answer questions about existing transit service from residents.









February 2023

Community Survey

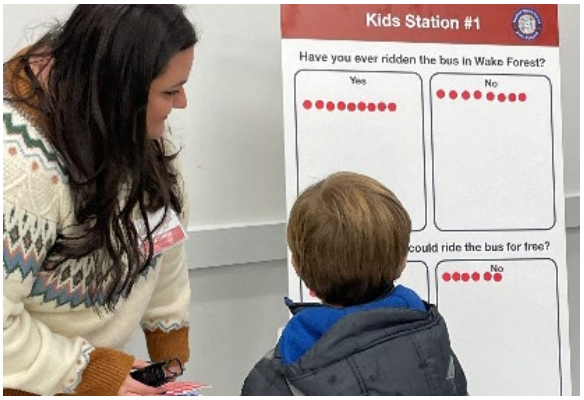
The project team released a community survey to learn more about the public transit preferences of residents. The community survey was made available from December 1, 2022 to February 19, 2023. The survey was available in an online format and a paper form made available at the December 2022 pop-up event. There were 687 unique participants. Results from the survey are summarized below and in Appendix A.

Public Open Houses

Two public open houses—one early afternoon and another in the evening—were hosted at the Alston-Massenburg Center by the project team on February 2, 2023. The goal of these open houses was to provide residents and stakeholders with information on the Transit Plan. Attendees were invited to share feedback on their existing use of transit and future transit needs. These open house events also included activities for kids.

The project team hosted a BBQ to encourage participation and asked participants to ride the bus. The event was advertised via postcards mailed to residents and on the project's webpage.





April 2023

Rider Survey

From March 12, 2023 to April 6, 2023, a survey focused on collecting input from people that use the existing transit services in Wake Forest was released by the project team. A total of 51 participants provided feedback related to existing transit and opportunities for improvement. Results from the survey are summarized below and in Appendix B.

To promote the survey, the project team posted QR codes on sidewalk decals, posted signs at bus stops that took users to the online survey, and handed out information with the QR code to bus riders.





May 2023

Stakeholder Interviews

The project team held interviews with key stakeholders in the region. Interviews were held with regional transit service providers – GoTriangle, GoRaleigh, and GoWake Access on May 9, 2023, and with the Capital Area Metropolitan Planning Organization (CAMPO) on May 15, 2023. At the interviews, the project team presented draft transit service alternatives and received feedback about system compatibility from the transit service providers, and information on program funding from CAMPO.

July 2023

Board of Comissioners and Planning Board Work Sessions

The project team made presentations at the July 6, 2023 Board of Commissions work session and the July 11, 2023 Planning Board meeting. The presentations provided an overview of the transit service alternatives being considered and the strengths and weaknesses of each alternative.

Public Open Houses

The project team hosted two public open houses—one early afternoon and another in the evening—on July 10, 2023 at the Alston-Massenburg Center. The goal of these open houses was to present transit service alternatives to expand transit services in Wake Forest. The strengths and weaknesses of each alternative were presented, and the project team solicited feedback on the community's preferred alternative.

To promote the open house, the project team placed notices on the project's webpage and postcards with details about the open house were mailed to residents (samples below).









In the community survey, 82% of the 679 respondents indicated that they do not ride transit in Wake Forest. See Figure 6.

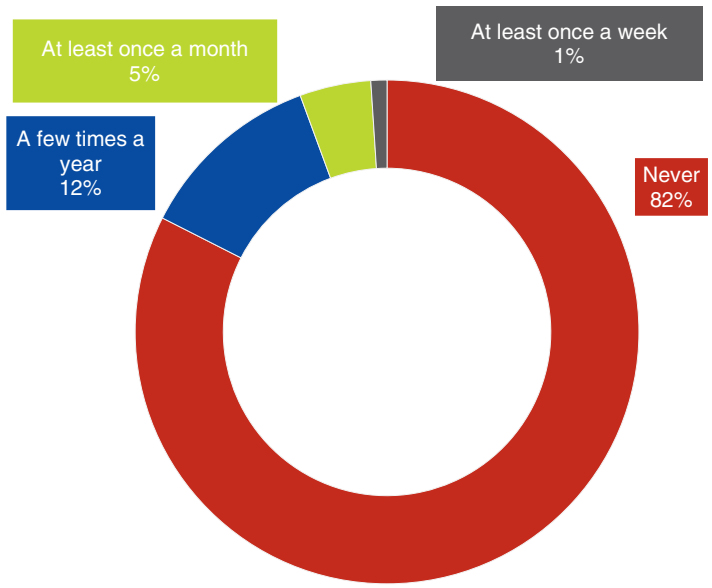


Figure 6. Frequency of Wake Forest Transit Use Among Survey Respondents, Community Survey February 2023

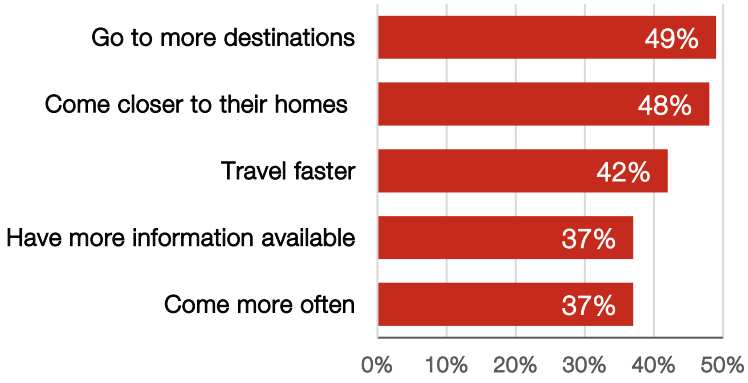


Figure 7. Things That Would Encourage Respondents to Take Transit More, Community Survey February 2023

The low use of transit indicates that the existing transit services are not meeting the mobility needs of the Town. When asked what transit service needed to do differently to encourage people to ride transit more frequently, respondents top three responses were 1) *go to more destinations*, 2) *come closer to their homes*, and 3) *travel faster*. See Figure 7 for the top five reasons given.

Respondents indicated that the top destinations that they would like to access via transit, were:

- Downtown Raleigh (66%),
- Downtown Wake Forest (54%),
- The Rogers Road Shopping Area (37%),
- Joyner Park (36%),
- Downtown Durham (34%),
- South Main Street Wake Forest (34%), and
- Wakefield Commons (33%).

See Appendix A for a full summary of results from the community survey.

In the rider survey, 62% of the 25 people who responded to the question indicated that the primary purpose they take transit (the WFL or WRX) is to get to work, and 21% for shopping or errands. None of the respondents indicated that they used the transit to get school or special events. See Figure 8. "Other" included going to the gym and recreation.

The prevalence of riders using transit to get to work, relates to 80% of respondents using transit at least three days per week.

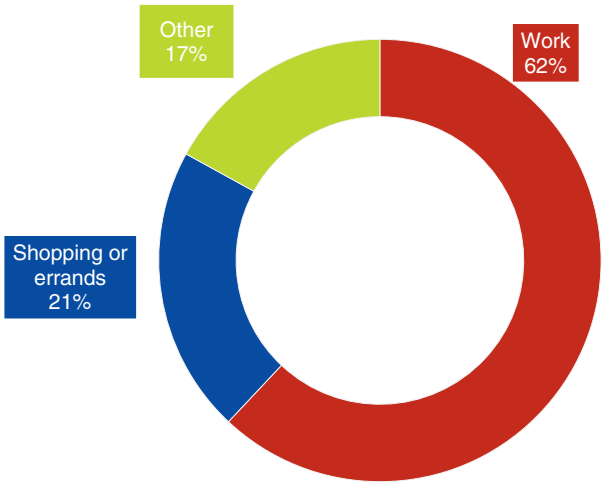


Figure 8. Primary Purposes for Taking Transit, Rider Survey April 2023

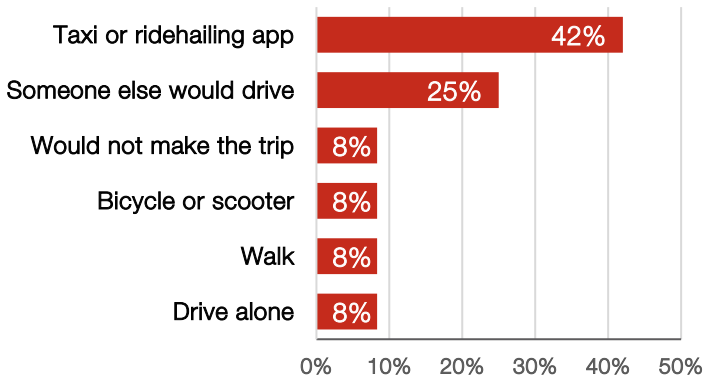


Figure 9. Alternatives if Transit WFL or WRX Were Not Available, Rider Survey April 2023

When asked how they would get to their destinations if the WFL or WRX were not available, respondents top two responses were taxi or ridehailing app (42%) and someone else would drive (24%). See Figure 9 for the top six responses.

Additional key takeaways from the rider survey include:

- 83% of respondents walk to access bus stops,
- The top features desired at bus stops are seating (58%), lighting (54%), and accessible paths (54%),
- 37% of respondents racially identified as Black/African American,
- 79% of respondents are very satisfied or somewhat satisfied with their transit experience, and
- 56% of respondents are from a household making less than $47,000 per year.

See Appendix B for a full summary of results from the rider survey.

TRANSIT SERVICE ALTERNATIVES

The project team developed transit service alternatives based on five key purposes for transit expansion. The purposes and brief justifications for each purpose are listed below:

- **Serve Northeast Wake Forest**
  Identified as a key need in the 2021 Northeast Community Plan, and an area with high transit propensity.
- **Serve Southern Wake Forest**
  Based on population growth and high transit propensity.
- **Connect to key activity centers**
  Based on community feedback to connect to more destinations.
- **Connect to future S-Line Stations**
  Identified as a key connection in 2022 Community Plan and 2021 Northeast Community Plan.
- **Connect to Rolesville**
  Identified as a key connection in the FY2025-2030 Wake Bus Plan.

Based on the five key purposes, options for transit expansion were evaluated. Four transit service expansion alternatives were developed by the project team and are described in a series of maps on the following pages.

- **Alternative A**
  Two new circulator loops by adjusting the existing WFL.
- **Alternative B1**
  New microtransit zone with the WFL.
- **Alternative B2**
  An alternative to B1 with a new microtransit zone and Alternative A circulators.
- **Alternative C**
  New microtransit zone and elimination of the WFL.

ALTERNATIVE A

Modification of the WFL route to create two loops – **East Loop and West Loop** (Figure 10). The West Loop would largely follow the existing WFL route with some adjustments to add Ligon Mill Road and decrease the WFL length and deviations. The proposed East Loop route would go to destinations that the WFL currently connects to as well as new destinations, such as Joyner Park, the Wake Forest Reservoir, and Flaherty Park. In the Town's core both loops would overlap to provide more frequent service in areas with higher ridership stops on the WFL (see Figure 3). The West Loop is approximately 13 miles and would travel in a counterclockwise direction, and the East Loop is 16 miles in a clockwise direction.

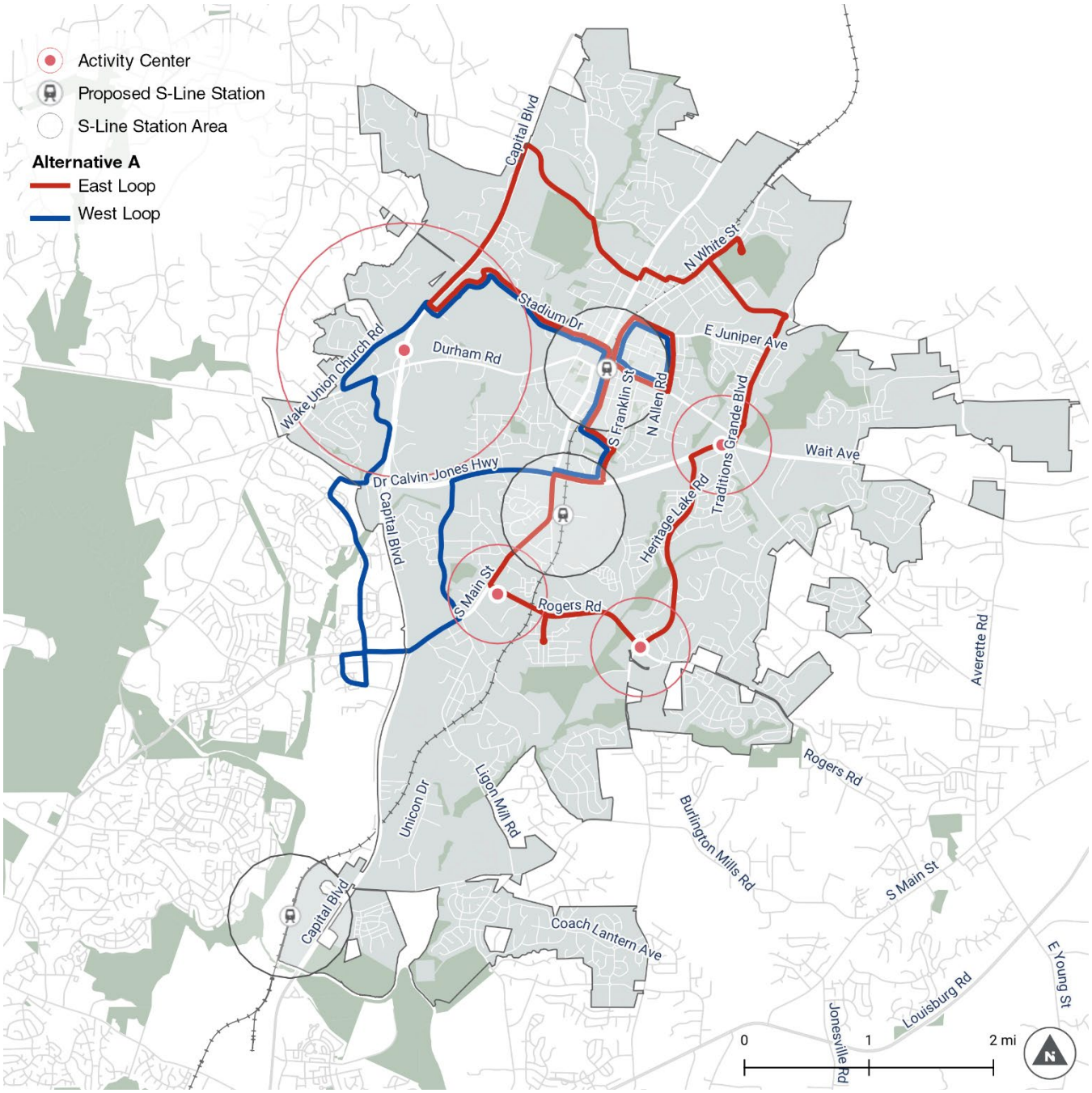


Figure 10. Proposed Transit Alternative – New East Loop and West Loop Circulators

ALTERNATIVE B1

Southern Wake Forest Microtransit Zone + WFL (Figure 11) would provide service to areas in southern Wake Forest via a microtransit service and combine with the existing WFL. This alternative would increase access to destinations through the connection to the current circulator route.

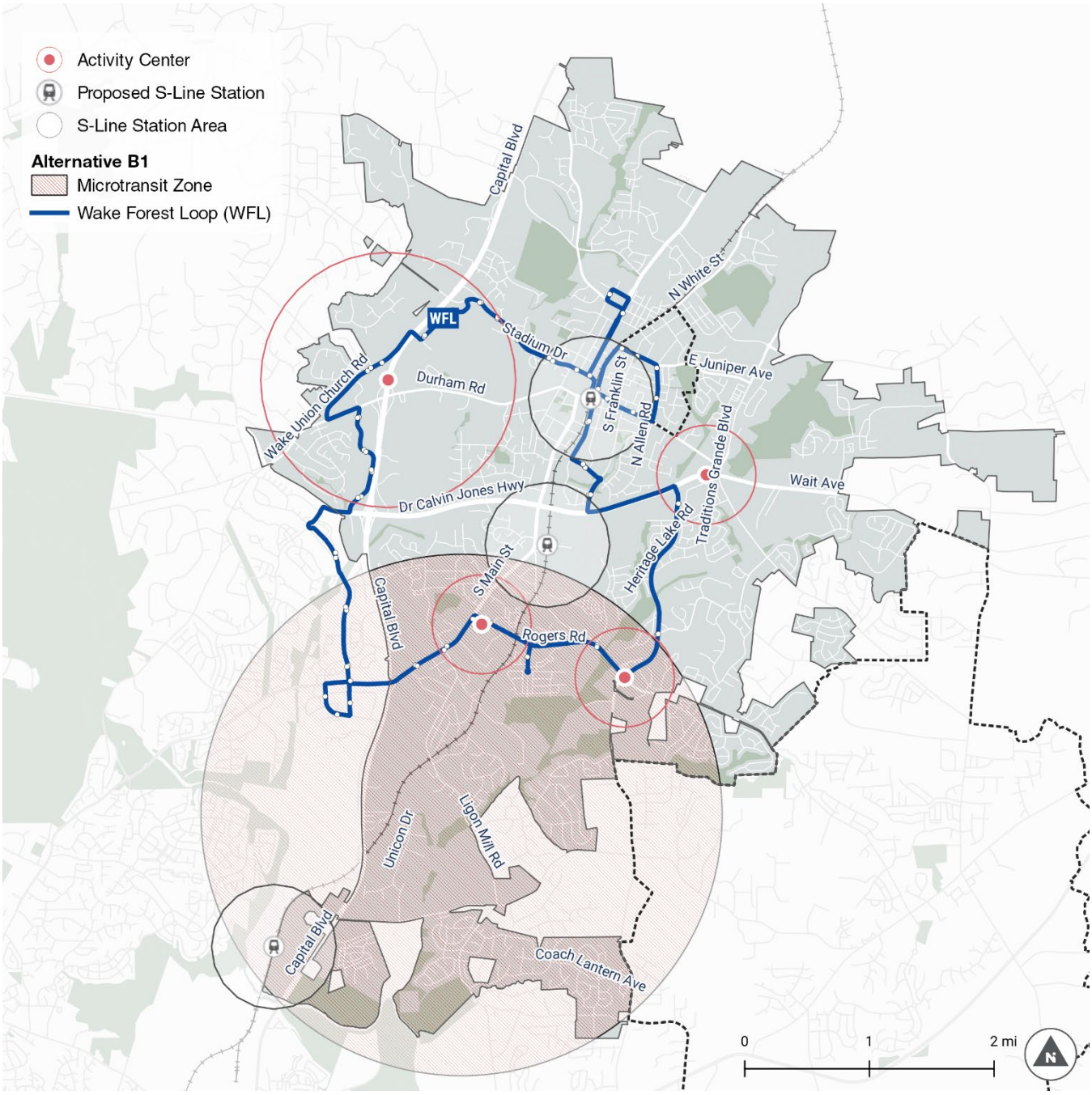


Figure 11. Proposed Transit Alternative – Southern Wake Forest Microtransit and Connection with WFL

ALTERNATIVE B2

Southern Wake Forest Microtransit Zone + Alternative A (Figure 12) would provide service to areas in southern Wake Forest via a microtransit service and combine with the circulator loops proposed in Alternative A. This alternative would increase access to additional destinations, such as Joyner Park, the Wake Forest Reservoir, and Flaherty Park, via a choice of the two circulator loops.

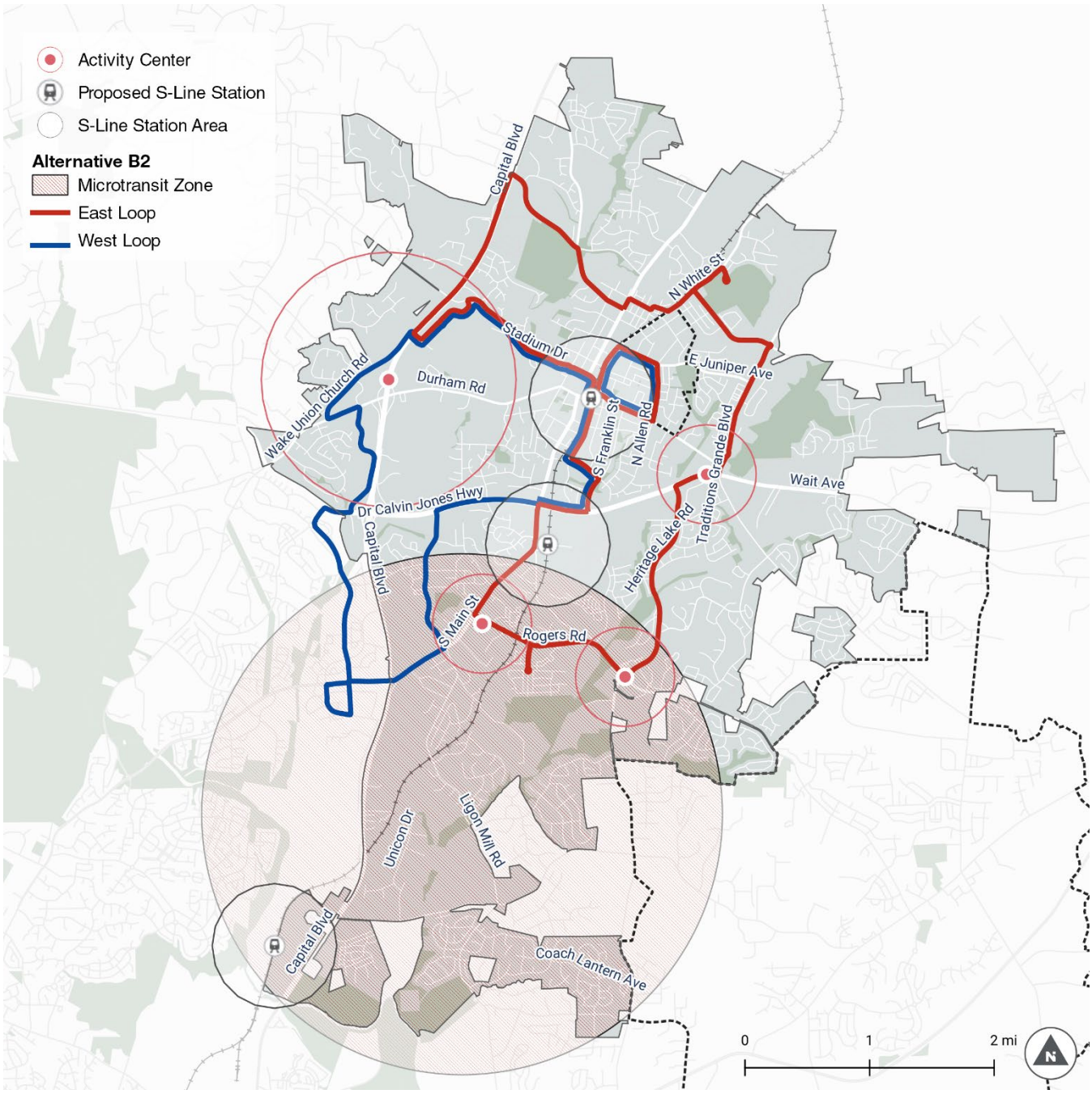


Figure 12. Proposed Transit Alternative – Southern Wake Forest Microtransit and Connection with Alternative A Circulators

ALTERNATIVE C

Wake Forest Microtransit (Figure 13) would be a new microtransit zone that eliminates the WFL and serves all residents and destinations in Wake Forest. The exact boundaries of the microtransit zone would be further refined to include all the Town's boundaries and potentially select destinations outside of the Town when the service is designed for implementation.

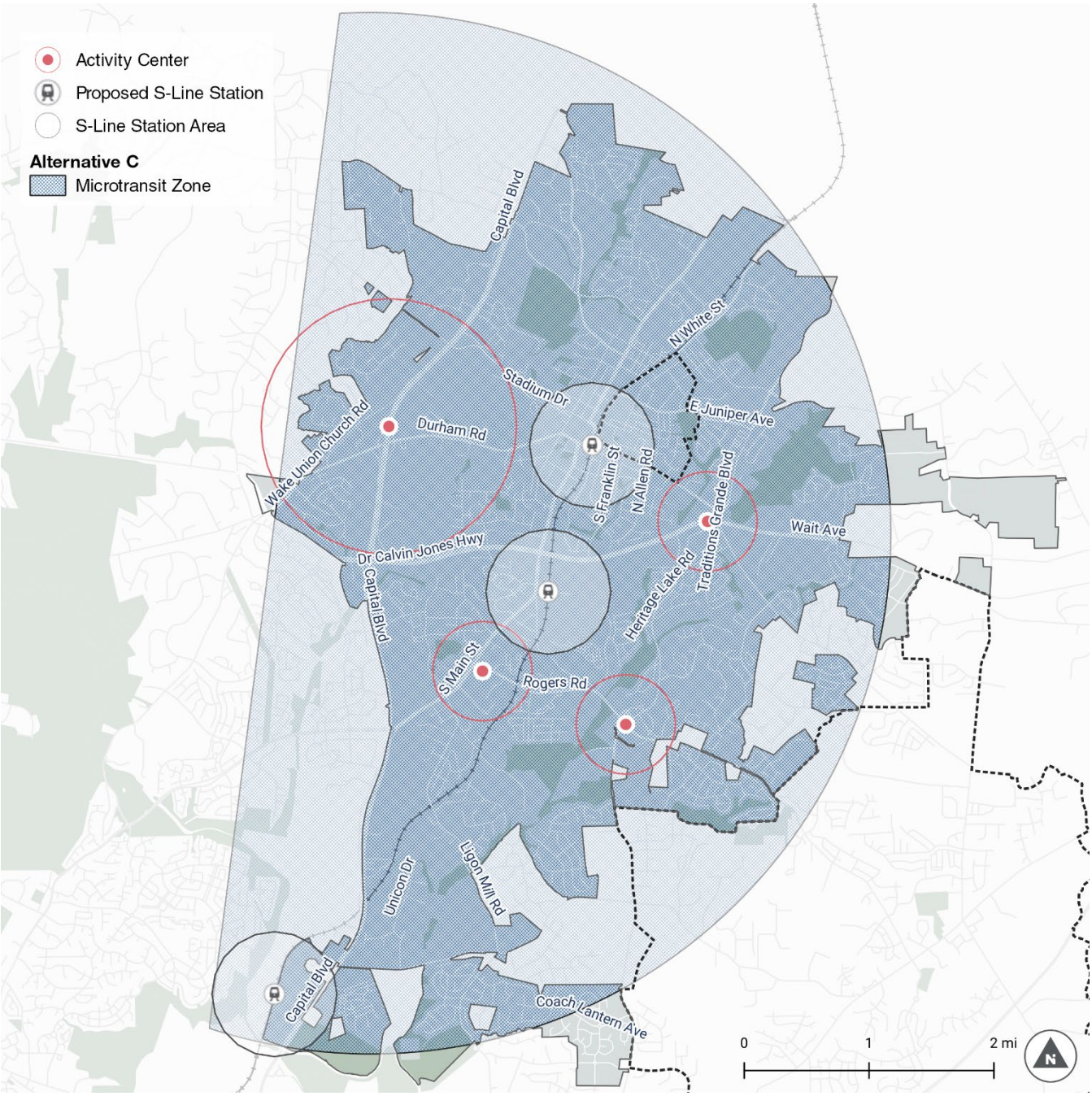


Figure 13. Proposed Transit Alternative – Wake Forest Microtransit

ADDITIONAL CONSIDERATIONS

There are additional considerations of the Transit Plan that go beyond the transit expansion alternatives. These additional considerations include:

- **An expansion of the WRX** to an all-day bidirectional route that would provide additional options for people to travel between Downtown Raleigh and Wake Forest, especially for midday trips for non-work purposes, e.g., going to medical appointments, or shopping.
- **Expanding the WFL** to have a 30-minute frequency to decrease the time that people must wait to get a bus.
- **Extending the Planned Route 2L** to Northeast Wake Forest which is being considered as a new transit service to begin in FY 2029.
- **Rolesville Microtransit** is planned to open in FY 2024 per the FY2025-2030 Wake Bus Plan and could potentially serve specific pick up/drop off nodes within Wake Forest. When it opens, the service will replace the Route 401X. This service could satisfy the transit expansion purpose of connecting Wake Forest to Rolesville

Although these were not considered as part of the transit expansion alternatives, they are potentially viable options that the Town may consider in the future to meet the needs of riders.

Figure 14 illustrates the expanded route additional considerations.

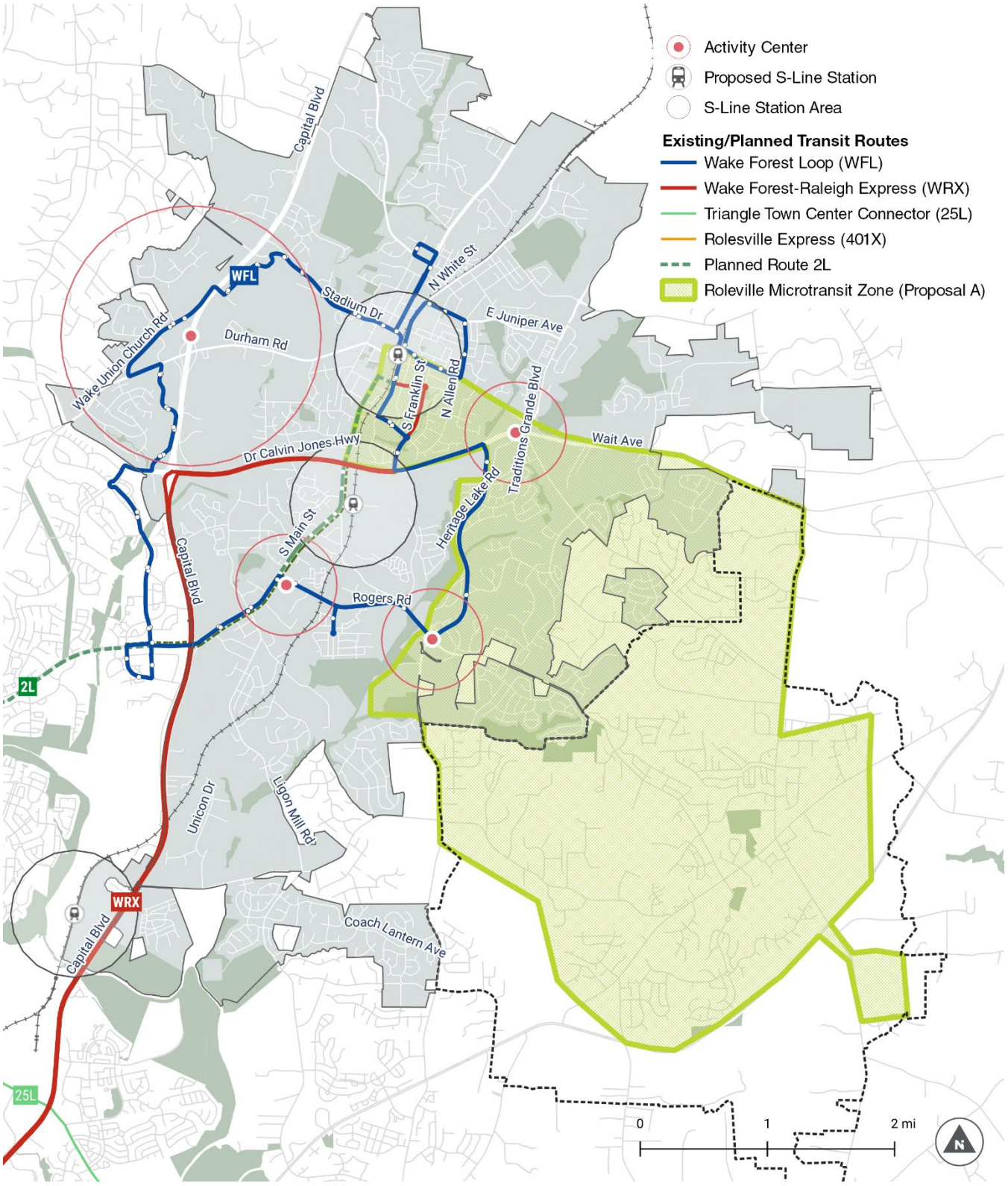


Figure 14. Additional Considerations for Transit Expansion

ALTERNATIVES EVALUATION

The project team evaluated the four alternatives by 1) estimating high-level operating costs for each alternative, 2) assessing how well each alternative met the stated purposes for transit expansion, and 3) summarizing the alternatives' strengths and weaknesses.

HIGH-LEVEL OPERATING COSTS

To compare the alternatives, the project team developed high-level operating costs. These costs are based on initial assumptions about the operating scenario for each alternative and are not final recommendations for how the alternative would operate if implemented.

Table 1 summarizes the comparative high-level operating costs for the alternatives. The annual operating cost for the existing WFL is also provided for comparison. The annual operating cost for Alternative A is similar to the existing WFL's cost ($1,002,000 for the WFL, compared to $1,040,000 for Alternative A). This is primarily because the assumption for Alternative A is similar to the existing WFL. The West Loop of Alternative A will operate in a counterclockwise direction, while the East Loop would be clockwise.

Table 1: Summary of High-Level Annual Operating Costs per Alternative

	Existing WFL	Alternatives			
		A	B1	B2	C
	Loop A $501,000	West Loop $520,000	Microtransit $700,000	Microtransit $700,000	Microtransit $1,400,000
	Loop B $501,000	East Loop $520,000	WFL (A+B) $1,002,000	Alternative A $1,040,000	
Total	$1,002,000	$1,040,000	$1,702,000	$1,740,000	$1,400,000

These costs are only for a high-level comparison of the alternatives, not for presented for programing reasons.

ASSUMPTIONS

Circulator

- Circulator operating cost assumes vehicle revenue hour cost of $109.39 (FY2024 GoRaleigh cost).
- Circulator loops in Alternative A assume the same service times and frequency as the existing WFL.

Microtransit

- Microtransit assumes vehicle revenue hour cost of $80.
- Microtransit cost is based on number of vehicles needed. Ridership demand is a factor of vehicles needed. Generally, the larger the service area, the more demand. More vehicles will help ensure the service can meet the demand, fulfill more riders, and reduce waiting times for riders.
- Microtransit cost assumes top end of cost range – higher ridership demand and more vehicles – two vehicles for Alternatives B1 and B2; four vehicles for Alternative C.

STRENGTHS AND WEAKNESSES

Table 2 summarizes how well each of the four transit service alternatives meets the five stated purposes for transit expansion in Wake Forest. Alternatives B1, B2, and C all similarly meet four of the five purposes, because they provide transit service coverage to a large part of the Town. Alternative A does not connect to areas in southern Wake Forest, and only connects to a portion of the S-line stations. All the alternatives do not satisfy the purpose to connect to Rolesville because they primarily serve destinations and communities within the Town. The Rolesville Microtransit service being planned for FY 2024 service could provide connectivity between the Wake Forest and Rolesville (see the *Additional Considerations* section above).

Table 2: Summary of Transit Expansion Purpose and Alternatives

	Alternative A	Alternative B1	Alternative B1	Alternative C
Connect to Northeast Wake Forest	●	●	●	●
Connect to Southern Wake Forest	◔	●	●	●
Connect to Activity Centers	●	●	●	●
Connect to S-line Stations	◕	●	●	●
Connect to Rolesville	◔	◔	◔	◔

Key: ● – fully meets the purpose; ◕ – partially meets the purpose; ◔ – does not meet the purpose

Table 3 summarizes the strengths and weaknesses for each alternative. It combines the information in Table 1 and Table 2 to compare benefits and shortfalls of each alternative.

Table 3. Summary of Strengths and Weaknesses for Each Alternative

	Strengths	Weaknesses
A	• Connects to key activity centers and high ridership stops. • Increases service in Town's core. • Shortens the WFL with fewer deviations. • Potentially near neutral operating cost change.	• Changes an established service in the Town (WFL). • Two different routes may cause rider confusion. • Misses the S-Line station and high transit propensity area to the south. • Does not connect to Rolesville.
B1 & B2	• Adds service to high transit propensity area. • Complements circulator service(s) to provide additional connectivity. • Connects to key activity centers, S-Line, and high ridership stops. (B2)	• Higher annual operating cost. • Does not connect to Rolesville.
C	• Connects to all activity centers and S-Line stations. • Opportunity to reallocate circulator cost. • Expands services to places not serviced by WFL. • Potentially attracts more choice riders. • Potentially near neutral operating cost change.	• Discontinues established WFL. • No fixed-route service in the Town. • Does not connect to Rolesville.

PREFERRED OPTION

The project team identified Alternative B2 – East and West Loops and the Southern Wake Forest Microtransit as the preferred option to expand transit services in Wake Forest. For the preferred option, the East Loop in Alternative B2 was adjusted to shorten the route length and ensure a shorter travel time to complete the route. The shortened East Loop would not provide service to areas that had low ridership on the WFL along Rogers and Heritage Lake roads (see Figure 3). This alternative would meet the Town's goals to expand transit service for its residents, employees, and visitors by modifying the WFL route to create two loops – East Loop and West Loop combined with a new microtransit service zone in southern Wake Forest. The WRX would continue operating as it does today to provide express service between Wake Forest and downtown Raleigh.

OPERATING CHARACTERISTICS

The project team developed operating characteristics for the two transit services – the East and West loop circulators, and the microtransit zone.

CIRCULATORS

The East and West loops would operate as circulators. The recommended operating characteristics are summarized in Table 4. The loops would have a small adjustment to the WFL's operating hours and frequency. They will provide service 6:00 a.m. to 9:00 p.m. Monday through Saturday, with no service on Sunday. The frequency on each loop will be 60 minutes. Compared to the WFL, this service recommendation standardizes the operating times and can help riders understand and predictably expect the circulators. It will be easier for riders to understand and remember that a bus comes every hour 6:00 a.m. to 9:00 p.m., Mondays to Saturdays.

Table 4: East and West Loops Operating Characteristics

Characteristic	Recommendation
Route Length	12 miles (East Loop) 13 miles (West Loop)
Direction	Clockwise (East Loop) Counterclockwise (West Loop)
Frequency	Every 60 minutes
Days of Operation	Monday to Saturday
Span of Hours	6:00 a.m. to 9:00 p.m.
Cost to Riders	Free
Vehicle Type	40-ft buses
Vehicles Needed	2

The circulators' level of service and quality of service provided to riders can be further improved by increasing the frequency (how many times the bus comes per hour) of the routes. A higher frequency decreases the time riders must wait to get on the bus. To increase the frequency additional vehicles will be needed for each route. The recommendations in Table 4 assume two buses total – one for each loop. If the routes had an additional bus (two buses for each route), the frequency can be increased to two buses per hour, or service every 30 minutes.

MICROTRANSIT

The microtransit zone in southern Wake Forest would provide transit service in an area of the Town with a primarily residential land use and curvilinear street network that is not very conducive for fixed-route transit. The Southern Wake Forest Microtransit zone would allow residents to use an on-demand service to get to and from destinations within southern Wake Forest, and the Wakefield neighborhood of Raleigh. Riders would be able to transfer between the microtransit service and the West Loop to connect between other destinations in the Town.

The project team developed assumptions about the operating characteristics for the microtransit zone, summarized in Table 5, however, additional analysis will be needed to develop the best operational strategy for the service. Unlike the circulator service which is based on an existing service (the WFL), the southern microtransit zone would be a new service for Wake Forest. Before launching the microtransit service, the Town will need to conduct additional planning and coordination with a third party microtransit service operator to determine the best service characteristics for southern Wake Forest.

Two sets of assumptions are made about the operating characteristics for the microtransit service: 1) a door-to-door service that picks up and drops off riders at any destinations within the zone, or 2) node-to-node service that only picks up and drops of riders at established nodes located within the zone. In a door-to-door service, riders can request microtransit vehicles pick them up at a specific location or address within the zone (e.g. at their home) and be transportation to another specific location or address within the zone (e.g. school). Riders will not have to travel long distances to access the service. The microtransit service operator can combine trips for riders traveling to the same or nearby locations to create a shared ride – one vehicle or trip taking more than one riders to the same or nearby destinations. However, shared rides are not very common because it is not very likely that riders will be traveling to the same or nearby destinations, and small 6-8 person vehicles are usually used.

In a node-to-node service, riders would have to travel longer distances to access the microtransit service at locations such as existing or new bus stops or key activity centers. The node-to-node service can help streamline the operations by making trips more predictable and increasing the likelihood of shared rides. Because of the increased likelihood of shared rides, larger vehicles are assumed for the node-to-node service. The microtransit service would have similar operating hours as the WFL – standardized hours Mondays to Saturdays.

Table 5: Southern Microtransit Zone Operating Characteristics

Characteristic	Door-to-Door Assumptions	Node-to-Node Assumptions
Days of Operation	Monday to Saturday	Monday to Saturday
Span of Hours	6:00 a.m. to 9:00 p.m. (Monday to Saturday)	6:00 a.m. to 9:00 p.m. (Monday to Saturday)
Cost to Riders	$2.00 (free for youth, seniors, people with disabilities)	Free
Stops	N/A	16 nodes
Vehicle Type	Minivan	16-seat cutaway

ROUTE ALIGNMENT AND ZONE

CIRCULATORS

The project team recommends operating the East Loop in the clockwise direction and the West Loop counterclockwise. There are fewer infrastructure improvements needed to install bus stops when travelling in the clockwise direction in the East Loop and counterclockwise operation in the West Loop avoids challenging left-turn movements.

The East and West loops would provide access to several destinations. Key destinations include:

East Loop

- Downtown Wake Forest Historic District
- Flaherty Park and Community Center*
- Joyner Park and Community Center*
- Kiwanis Park
- Retail and restaurants at E Roosevelt Avenue and Brooks Street
- Shopping Center at Gateway Commons Circle and Dr Calvin Jones Highway
- Envision Science Academy*
- United States Postal Service at S White Street and E Holding Avenue
- Wake Forest Community Library
- Wake Forest Historical Museum
- Wake Forest Reservoir*
- Wake Forest Sprayground
- Wake Forest Crossing Shopping Center
- Wake Forest High School

West Loop

- Downtown Wake Forest Historic District
- Forest Pines Elementary School
- Shopping Center at Dr Calvin Jones Highway and Ligon Mill Road*
- Kiwanis Park
- Northeast Regional Library
- North Forest Pines Elementary School
- North Wake College and Career Academy
- Shoppes at Wake Forest Shopping Mall
- Shopping Center at Forest Pines Drive and Common Oaks Drive
- Shops and Restaurants at Center S Main Street and Carter Street
- Shops at Ligon Mill Road (Dr Calvin Jones Highway to S Main Street)*
- Shops at Retail Drive
- Wakefield Commons Shopping Center
- Wake Forest Community Library
- Wake Forest Crossing Shopping Center
- Wake Forest High School
- Wake Forest Historical Museum
- Wake Forest Sprayground

* *new destinations that the WFL does not serve currently*

The new circulators will provide access to six additional key destinations compared to the WFL. Existing bus stops will serve the locations that are currently served by the WFL, however, new stops will be needed for the new destinations. The project team identified the need for 15 new potential bus stops. Before the new circulators are implemented, bus stops will need to be installed to serve these destinations, and evaluation of sidewalks, bus pads, and safe crossings is needed to determine final stop locations.

MICROTRANSIT

There are several key destinations within the Southern Wake Forest Microtransit Zone that riders would be able to access. While, the final boundaries of the zone will need to be refined before launching the service, destinations in the Southern Wake Forest Microtransit Zone include:

- Endeavor Charter School
- Goddard School of Wake Forest
- Heritage High School
- Heritage Middle School
- Northeast Regional Library
- Primrose School of Heritage Wake Forest
- Shops at Ligon Mill Road and S Main Street
- Shopping Center at Forestville Road and Rogers Road
- Shopping Center at S Main Street and Wake Drive
- Shopping Center at Rogers Road and Heritage Center Drive
- Wakefield Commons Shopping Center

The service can be operated as a door-to-door service, or a node-to-node service. For the node-to-node service, the project team has identified 16 potential nodes that are located in residential areas and near key destinations so riders can access the service from their home and access retail areas, parks, schools, and other activity areas, and transfer between the West Loops to access additional destinations throughout the Town. The nodes, in no particular order are:

1. Commons Oaks Drive and Oliver Road
2. Endeavor Charter School
3. Forest Pines Drive and John Rex Boulevard
4. Forestville Road and Rogers Road
5. Crossings at Heritage
6. Heritage High School
7. Ligon Mill Road and Lariat Ridge Drive
8. Ligon Mill Road and S Main Street
9. Ligon Mill Road Porto Fino Avenue
10. Marshall Farm Street and Heritage View Trail
11. Richland Creek Church
12. Rogers Road and Heritage Center Drive
13. Shearon Farms
14. Song Sparrow Dr
15. Stonegate
16. Wake Drive and S Main Street

Figure 15 illustrates the preferred transit service option with the East and West loops, and nodes for the microtransit zone.

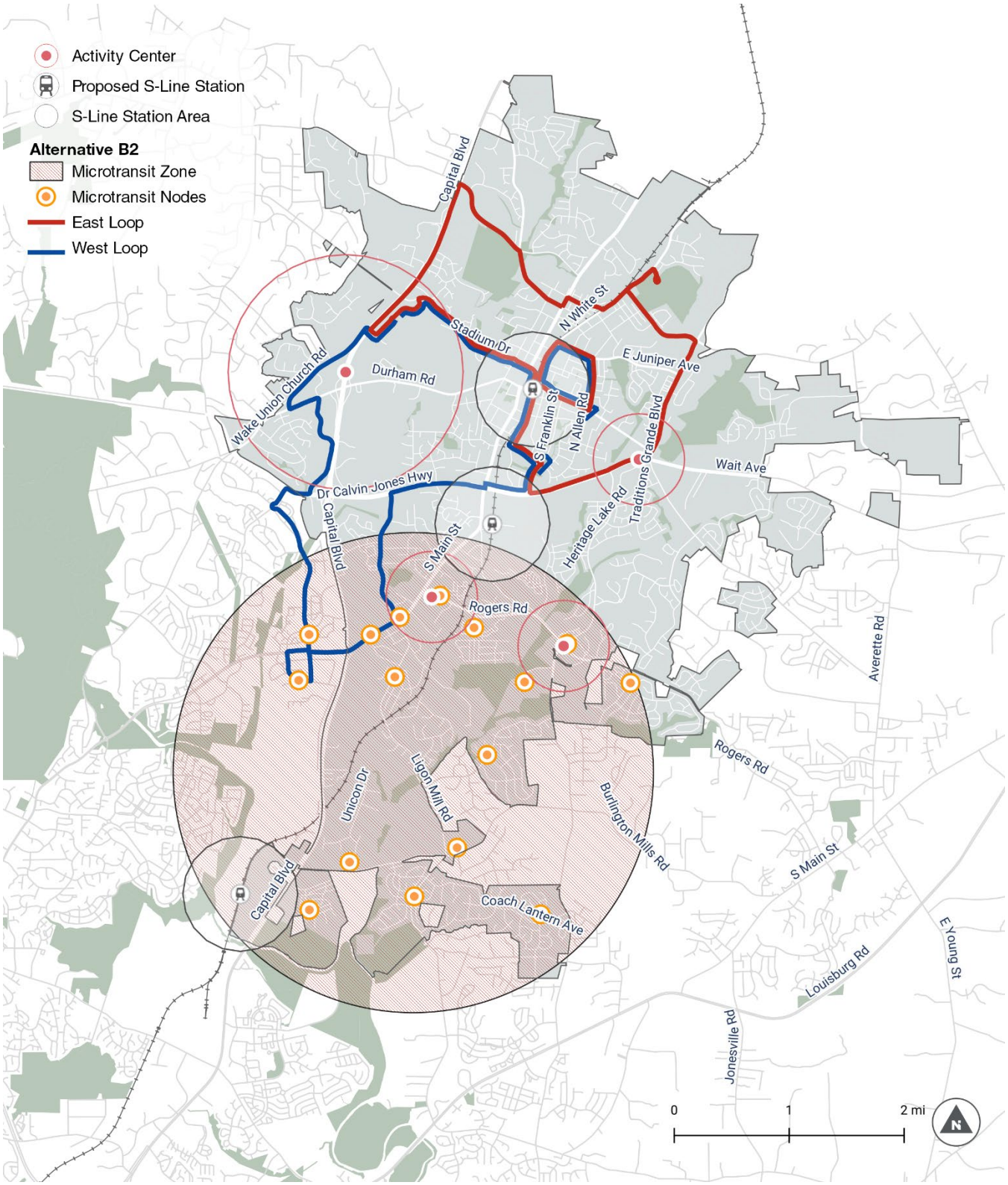


Figure 15. Preferred Option

PREFERRED OPTION FEASIBILITY

The project team developed planning-level costs to understand the level of resources that is likely needed to start-up and operate the preferred transit option. These costs are high-level costs and are the project team's opinion of likely costs based on information and assumptions made during the planning study.

PLANNING-LEVEL COSTS

CAPITAL COSTS

The capital cost for initializing the preferred transit option is primarily for the installation of new bus stops on the circulator routes and the microtransit node-to-node service. Since the routes are adjustments to the WFL, the existing bus can be used for the new routes, primarily on the West Loop. The project team identified the need for 15 new stops, however, additional analysis is needed to evaluate the specific need for each bus stop and its location. Additionally, as new developments open and expand in the future, the Town will evaluate the need for new bus stops. The planning-level cost estimated to implement the 15 bus stops is approximately $180,000. This cost assumes a general unit cost per bus stop of $12,000, however the range of costs can be between $5,000 to $19,000 per stop. The cost will depend on the needs at each specific bus stop, such as sidewalk connections, concrete pads, right-of-way, post and signage, shelters, benches, and trash receptacles.

For the microtransit service (if deployed as a node-to-node service) 10 of the 16 nodes will require a bus stop with a concrete pad and shelter to provide a comfortable place for riders to wait to access the microtransit service – the remaining six are existing WFL bus stops that have a pad and shelter. The planning-level cost estimated to implement 10 bus stops is approximately $190,000. This cost assumes a general unit cost per bus stop of $19,000 to account for the higher costs of a concrete pad, shelter, and potentially right-of-way needs.

OPERATING COSTS

The project team's opinion of the planning-level total annual operating costs for the preferred option is between $1,337,000 and $3,016,000. This is the cost to operate both circulator routes (East and West loops) and the Southern Wake Forest Microtransit. The range is dependent on a 60-minute or 30-minute frequency for the West Loop and a low or high demand for the microtransit service (a higher frequency and a higher microtransit demand is on the high-end of the cost range). The section below provides costs for several options that the Town can use to identify the best level of service based on available funding.

Circulators

The operating costs for the circulators are based on the cost to operate the WFL. **Table 6** outlines the current operating characteristics for the WFL (A and B loops) and the annual operating cost assumed by the Town of Wake Forest and GoRaleigh for FY 2024. The total cost for the WFL's Monday to Friday and Saturday service is approximately $1,002,000 ($854,000 for weekday service, and $148,000 for Saturdays). The cost is based on a unit operating cost set by GoRaleigh of $109.39 per vehicle hour. These factors are assumed as the basis to develop an opinion of planning-level operating cost for the East and West loops.

Note, approximately 17% of the WFL operates in the City of Raleigh (based on the route's length), therefore the cost to the Town of Wake Forest is 83% of the total cost – approximately $832,000.

Table 6: WFL Operating Cost (FY2024) for A and B Loops

	Monday to Friday	Saturday
Route Length (miles)	16 (one-way for each loop)	16 (one-way for each loop)
Frequency (minutes)	65 minutes	75 minutes
Revenue Hours per Day	14	12
Number of Vehicles	2 (one for each loop)	2 (one for each loop)
Vehicle Revenue Hours per Day	28	24
Total Vehicle Hours per Day [1]	30	30
Days per Year [2]	260	52
Vehicle Revenue Hours per Year	7,800	1,352
Annual Operating Cost [3]	$854,000	$148,000
Cost per Vehicle Hour	$109.39	$109.39

[1] Includes one hour of deadhead per day for each vehicle to account for travel to and from bus garage.

[2] Average weekdays and Saturdays per year.

[3] Rounded up to the nearest 1,000ths (assuming the current cost-splitting arrangement continues in a similar fashion).

Table 7 summarizes the assumptions and the planning-level annual operating costs for East and West loops. The routes have a similar travel time, therefore the costs are identical – $550,000 per year for each loop ($1,100,000 total). Like the WFL, approximately 17% of the West Loop route length operates in the City of Raleigh, therefore the project team assumes that under a similar agreement between Raleigh and Town of Wake Forest, the cost of the West Loop to the Town is 83% of the total cost – $457,000 for a total of $1,007,000 for both loops (assuming the current cost-splitting arrangement continues in a similar fashion).

Table 7: Estimated Annual Operating Cost for Circulator – 60-minute Frequency

	West Loop (Counterclockwise)	**East Loop** (Clockwise)
Route Length (miles)	12 (one-way)	13 (one-way)
Frequency (minutes)	60	60
Revenue Hours per Day [1]	15	15
Number of Vehicles	1	1
Total Hours per Day	15	15
Total Vehicle Hours per Day [2]	16	16
Days per Year [3]	312	312
Vehicle Revenue Hours per Year	4,992	4,992
Cost per Vehicle Hour [4]	$109.39	$109.39
Annual Operating Cost	**$550,000**	**$550,000**
Annual Operating Cost (minus City of Raleigh Portion – 17%)	**$457,000**	**$550,000**
Total Annual Operating Cost [5]	**$1,007,000**	

[1] 6:00 a.m. to 9:00 p.m.

[2] Includes one hour of deadhead per day for each vehicle to account for travel to and from bus garage.

[3] Average weekdays and Saturdays per year.

[4] Based on FY2024 cost per revenue hour for GoRaleigh fixed route.

[5] Assumes the cost-splitting arrangement between Raleigh and the Town of Wake Forest continues in a similar fashion.

One option discussed in the *Operating Characteristics* to improve the level of service is to increase the number of vehicles on the loops to provide a 30-minute frequency. Table 8 summarizes the costs if both loops had two vehicles each. The total cost to Wake Forest for operating both loops would be $2,013,000.

Table 8: Estimated Annual Operating Cost for Circulator – 30-minute Frequency

	West Loop (Counterclockwise)	**East Loop** (Clockwise)
Route Length (miles)	12 (one-way)	13 (one-way)
Frequency (minutes)	30	30
Revenue Hours per Day [1]	15	15
Number of Vehicles	2	2
Total Hours per Day	16	16
Total Vehicle Hours per Day [2]	32	32
Days per Year [3]	312	312
Vehicle Revenue Hours per Year	9,984	9,984
Cost per Vehicle Hour [4]	$109.39	$109.39
Annual Operating Cost	**$1,100,000**	**$1,100,000**
Annual Operating Cost (minus City of Raleigh Portion – 17%)	**$913,000**	**$1,100,000**
Total Annual Operating Cost	**$2,013,000**	

[1] 6:00 a.m. to 9:00 p.m.

[2] Includes one hour of deadhead per day for each vehicle to account for travel to and from bus garage.

[3] Average weekdays and Saturdays per year.

[4] Based on FY2024 cost per revenue hour for GoRaleigh fixed route.

Microtransit

The operating costs for the microtransit are based on comparative microtransit services in Town of Wilson, North Carolina; City of Chandler, Arizona; and Town of Morrisville, North Carolina. The services in Wilson and Chandler are run as door-to-door services, and Morrisville has a node-to-node service. Table 9 outlines the operating characteristics of the comparative services and their annual operating cost. The comparative services costs range from $65 to $103 per revenue hour. On the low-end ($65) is the Wilson door-to-door service, and the high-end is Morrisville node-to-node service. Although node-to-node services are expected to have lower operating costs due to efficiencies gain by streamlining pick-up and drop-off locations, the Morrisville service cost may be higher due to having a mix of operators – GoCary vehicles and third-party (Via) application and a larger vehicle requiring specialized maintenance and commercial driver license – a 16-seat cutaway.

For the purposes of estimating planning-level costs for the Southern Wake Forest Microtransit, the project team escalated the comparative services cost per revenue hour by 5%, therefore the range of costs used for the microtransit cost opinions were rounded up from the inflated $69 to $108 range to $70 to $110 per revenue hour.

Table 9: Comparative Microtransit Services

	Wilson, NC [1]	Chandler, AZ [1]	Morrisville, NC
Service Type	Door-to-door – Town-wide (~32 sq. miles)	Door-to-door – sub-area (~40 sq. miles)	Nodes (16)
Operating Hours	M-F, 5:30 am to 7 pm Sa, 7 am to 6 pm	M-F, 5:30 am to 9 pm	M-F, 7 am to 9 pm Sa, 8 am to 8 pm Su, 8 am to 7pm
Vehicle Type	Minivan	Minivan	16-seat cutaway
Fare	$2.50	$2.00	Free
Ridership	161,204	24,976	21,445
Operator	Via	Via	GoCary ops; Via app
Annual Revenue Hours	27,830	9,111	6,521
Annual Operating Cost	$1,820,000	$741,325	$671,652
Cost per Revenue Hour	$65	$81	$103
Cost per Revenue Hour Inflated by 5%	**$69**	**$85**	**$108**

Information about comparative microtransit systems was collected in July, 2023 from each service provide and is based on Fiscal Year 2023 data for each service.

[1] Wilson, NC and Chandler, AZ data is a based on 10 months in FY 2023 (July 2022 to April 2023).

Table 10 summarizes the assumptions and the planning-level annual operating cost for the Southern Wake Forest microtransit zone as a door-to-door service and a node-to-node service. Demand is a driving factor of microtransit operating cost. A higher demand means more riders are looking to ride the service and how well the service is meeting demand is indicated by the length of time riders must wait to get a ride. If demand is high, the service will need more vehicles operating at peak times to meet the demand to provide rides when needed with minimal wait times. Lower wait times mean a high level of service is being provided; however, the more vehicles operating at peak times means a higher microtransit operating cost.

To fully understand and estimate the likely demand for a new microtransit service, additional planning and coordination with a third party microtransit service operator is needed to model the service operations. Therefore, for the planning-level cost opinions, two levels of service scenarios (low demand and high demand) are provided for each microtransit service type, determined by the number of peak vehicles required. For the door-to-door service the annual operating cost is between $310,000 to $990,000 and $520,000 to $1,003,000 for node-to-node service.

Table 10: Southern Wake Forest Microtransit Zone Planning-Level Annual Operating Cost

	Door-to-Door Assumptions		Node-to-Node Assumptions	
	Low Demand	High Demand	Low Demand	High Demand
Revenue Hours per Week[1]	90	90	90	90
Peak Vehicles[2]	1	3	1	2
Vehicle Hours per Week	90	270	90	180
Vehicle Hours per Year	4,680	14,040	4,680	9,360
Cost per Vehicle Hour	$70	$70	$110	$110
Annual Operating Cost (rounded)	**$330,000**	**$990,000**	**$520,000**	**$1,003,000**

[1] Revenue hours per week is the same for all microtransit service assumptions because each service would operate from 6:00 a.m. to 9:00 p.m. Monday to Saturday (15 hours per day for 6 days per week).

[2] Vehicles needed for peak service determined by level of demand. More vehicles are needed to make more trips and decrease riders' wait times. More detailed modeling and analysis is needed to estimate demand and required number of vehicles.

FUNDING OPPORTUNITIES AND PARTNERSHIPS

To implement the expanded transit services, the Town will need to continue partnerships with regional transit operators and seek funding programs. Operating the transit service with a paid fare system can also allow the Town to offset some of the cost to provide the services. The project team recommends several potential funding opportunities and partnerships.

IMPLEMENTATION PARTNERSHIPS

The project team recommends that the Town of Wake Forest partner with a local transit provider, such as GoRaleigh, GoTriangle, or other, to operate the East and West loops. This is consistent with ongoing operations for the WFL (operated by GoRaleigh); therefore allowing the Town to negotiate with GoRaleigh to operate the East and West loops under similar contract terms. Cost estimates in this Plan for both circulator operating costs are based on assumptions using the existing contract.

For the microtransit service, the project team recommends the Town partner with a third party microtransit operator, such as Via, or a transportation network company such as Uber or Lyft. These third party operators provide a turnkey operation. Turnkey operation is advantageous, especially when implementing a new microtransit service, because the operator provides all aspects of the service – vehicles, IT, operations management, drivers, etc.

COMMUNITY FUNDING AREA PROGRAM (CFAP)

The Community Funding Area Program (CFAP) was created as a result of the Wake County Transit Plan to provide financial support to eligible organizations to accelerate public transportation services and programs. The Town of Wake Forest is among 11 eligible Community Funding Areas but must participate in a competitive process to receive funding for planning, capital, and/or operating expenses.

The CFAP requires all projects provide a minimum funding match of 50% of the total project costs. The matching requirement is the same for operating, capital, and planning projects. There are no restrictions on the funding source used to match CFAP resources. The Town may use federal, state, or local funding sources (local property tax, sales tax, fees, other revenues, etc.) to meet the CFAP match requirements. The Town should note that accepting funds from federal or state programs have separate application processes and reporting requirements that are in addition to the CFAP. The application process renews annually. A representative of the Town must attend an applicant training session that provides an overview of procedures and addresses issues that are relevant to the upcoming call for projects. A representative of the Town must also attend a pre-submittal application review meeting during which CAMPO staff will advise the Town on application completeness.

CFAP funds can be used for operational costs, bus stops and amenities, and projects that provide access to bus stops. Currently, $420,000 from CFAP is provided annual for the operating costs of the WFL. In any year, no single municipality may have greater than 30% of the CFAP allocation in that year, and currently the cap is $550,000. Therefore, the Town is only eligible to receive an additional $130,000 from CFAP.

LOCALLY ADMINISTERED PROJECTS PROGRAM (LAPP)

The Locally Administered Projects Program (LAPP) is a competitive capital funding program managed by CAMPO. Projects are funded using various federal funding sources and require a minimum 20% local match. CAMPO member jurisdictions including the Town are eligible to apply for these funds. Projects are scored

according to published criteria. For transit projects these include Safety & Security, Rider Experience, Connectivity, Improves Facilities, Reliability Improvements, Benefit/Cost, and Planning Consistency.

FEDERAL GRANTS FOR BUSES AND BUS FACILITIES FORMULA PROGRAM – 5339(A) AND URBANIZED AREA FORMULA GRANTS – 5307

The 5339 program provides funding to states and transit agencies through a statutory formula to replace, rehabilitate and purchases buses and equipment to construct bus-related facilities. The 5307 program provides funds for operating transit service, including bus purchases and stop improvements. These formula-based programs could be a source of funds to support eligible capital and operating expenses related to the Town of Wake Forest's planned transit service, however, coordination with an eligible recipient (i.e. the transit agency) will be necessary.

FAREBOX RECOVERY FEASIBLITY

The project team recommends a free fare for riders on the circulator, however, for the planning study an estimate of potential revenue from adding a fare to the service was developed. The project team assumed a range of potential farebox recovery rates for the service. From a low rate of 10%, medium 15%, and high 35%. This range is based on average farebox recovery rates for transit systems across the county. The national average farebox recovery in 2021 was 12.8%, a recently low rate due to impacts of the COVID-19 pandemic.[6] In 2019, the national average farebox recovery was 32.3%.[7] Table 11 summarizes the potential net annual operating cost for each of the circulator routes at low, medium, and high farebox recovery rates. If a fare is implemented on the 60-minute circulator service, the operating cost could be reduced from $1,007,000 to between $654,500 to $906,300.

Table 11: Potential Circulator Farebox Recovery

	60-minute Frequency			30-minute Frequency		
	East Loop	West Loop [1]	Total	East Loop	West Loop [1]	Total
Gross Annual Operating Cost	$550,000	$457,000	**$1,007,000**	$1,100,000	$913,000	**$2,013,000**
Low Recovery Net Annual Operating Cost	$495,000	$411,300	**$906,300**	$990,000	$821,700	**$1,811,700**
Medium Recovery Net Annual Operating Cost	$467,500	$388,450	**$855,950**	$935,000	$776,050	**$1,711,050**
High Recovery Net Annual Operating Cost	$357,500	$297,050	**$654,550**	$715,000	$593,450	**$1,308,450**

[1] Cost for West Loop to the Town of Wake Forest (minuses the City of Raleigh's portion – 17%)

[6] 2021 National Transit Summaries and Trends , https://www.transit.dot.gov/ntd/data-product/2021-national-transit-summaries-and-trends-ntst
[7] 2019 National Transit Summaries and Trends, https://www.transit.dot.gov/ntd/2019-national-transit-summaries-and-trends-ntst

A fare for the rider is assumed for the microtransit service ($2.00 per ride). Therefore, the microtransit operating costs will be offset by the revenue generated from rider fares. To estimate likely fare revenue for the service, modeling of the planned service is needed, however, the project team has made some assumptions to demonstrate potential revenue to Wake Forest for operating the service. Table 12 summarizes potential ridership levels for the microtransit and resultant farebox revenue. The 2022 ridership on the WFL is used as a basis for the potential microtransit ridership, and then factored by 50%, 100%, and 150%, for an estimate of potential low, medium, and high ridership. With these assumptions, the fare revenue for the microtransit service is between $20,200 and $60,600.

Table 12: Potential Microtransit Fare Revenue

	Low Ridership	Medium Ridership	High Ridership
WFL 2022 Ridership	20,200	20,200	20,200
Ridership Factor	50%	100%	150%
Microtransit Ridership	10,100	20,200	30,300
Microtransit Fare Revenue	**$20,200**	**$40,400**	**$60,600**

NEXT STEPS

The next steps for the Town to implement the expanded transit services are identifying potential funding for the capital and annual operating costs, entering contracts with partners to operate the services, and deploying communication strategies to broadcast to the availability of the new services to area residents, employees, and visitors.

ACTION ITEM MATRIX

Specific actions are needed to implement the expanded transit services and ensure the continued growth in quality and level of service. Table 13 outlines the actions along with the recommended timeline when they should be implemented.

Table 13: Action Item Matrix

	Action	Description	Timeline			
			Ongoing	Year 1-2	Year 3-4	Year 5
1	**Secure additional funding for preferred transit service option operations.**	Work with regional partners (CAMPO, GoRaleigh) to secure regional CFAP and LAPP funding for service. Incorporate funding into annual Town budget process.	X	X		
2	**Procure contract for microtransit service.**	Coordinate with third party operators (e.g. Via, Uber, Lyft) to enter into a contract to operate Southern Wake Forest Microtransit Zone		X		
3	**Implement new bus stops.**	Install new bus stops for the East and West loops, and the Southern Microtransit Zone if operated as a node-to-node service.		X		
4	**Develop marketing and branding for new transit services.**	Create communications and marketing plan, including messages to inform riders of changes to the WFL, and new branding for microtransit service.		X		
4	**Conduct targeted outreach and marketing.**	Make outreach to existing WFL about changes to the circulator routes. Conduct outreach to all residents within a 1/4-mile of bus stops/nodes and within the Southern Microtransit Zone.		X		
5	**Conduct community wide outreach and marketing.**	Market the service on social media, Town's website, printed collateral, and media.	X	X		
6	**Add specialized messaging to bus stops.**	Add "free" messaging to existing bus stop and add when implementing new bus stops.		X		

Action		Description	Timeline			
			Ongoing	Year 1-2	Year 3-4	Year 5
7	**Track performance metrics for extended transit services.**	Collect ridership by bus stop, boarding and alighting (circulators), and trip lengths, origin and destination trips, wait times, and number of trips (microtransit) monthly.	X			
8	**Report performance metrics for extended transit services.**	Develop and present annual reports on performance metrics.	X			
9	**Analyze ridership data for system optimization.**	Analyze bus stop ridership (circulator), and trip origin and destination (microtransit) to identify opportunity for enhanced bus stop amenities, new bus stops/nodes, adjustments to routes, and adjustments to microtransit service area.			X	

WAKE FOREST PUBLIC TRANSIT PLAN

Wake Forest PublicTransit Plan

Phase 1 Outreach Summary

Prepared for the Town of Wake Forest

by Public Participation Partners

In Coordination with Toole Design

March 2023

Introduction

Phase 1 Outreach Background

The Town of Wake Forest continues to receive requests for additional services and amenities throughout town. In response to resident requests for more services and amenities, the Town of Wake Forest is developing a Public Transit Plan. The purpose of the Public Transit Plan is to:

1) evaluate existing service
2) understand the viability of alternatives to fixed-route services
3) recommend a solution for transit expansion, including the service model type, cost of expansion, and implementation steps

To better understand how well existing services are working for the public and to consider potential alternatives, Phase 1 of this engagement process was designed to share information and invite feedback to inform the Wake Forest Transit Plan. Phase 1 engagement included a pop-up event, an open house, and a survey of current and potential riders.

This engagement invited public feedback on existing service. It also asked for interest in future service, and options for transit expansion. Phase 1 outreach for the Wake Forest Transit Plan began on December 1st of 2022 and ended on February 19th of 2023.

December 2022 Pop-Up Summary

On December 2, 2022, the project team attended the Lighting of Wake Forest holiday event. This popup aimed to provide information and gather feedback for the Wake Forest Public Transit Plan. The pop-up took place from 5:00 pm through 8:00pm on East Owen St.

To draw people to the table, staff gave out glow sticks and candy. Attendees were invited to place a sticker on a map to indicate where they would like to be able to travel to via bus. Participants could also leave written comments with any thoughts or concerns on a posted board. They could also scan a QR code to reach the project website or complete a paper survey. During the event, 19 people scanned the QR code and 11 people completed a paper survey.

The map board received 224 responses of locations where participants would like to be able to ride the bus. The breakdown of locations is provided in the chart below.

Location	Number of Stickers
Wake Forest	68
Youngsville	12
Durham	25
RDU Airport	45
Research Triangle Park	16
Raleigh (including NC State)	45
Rolesville	10
Wendell	1
North and Northwest of Wake Forest	2

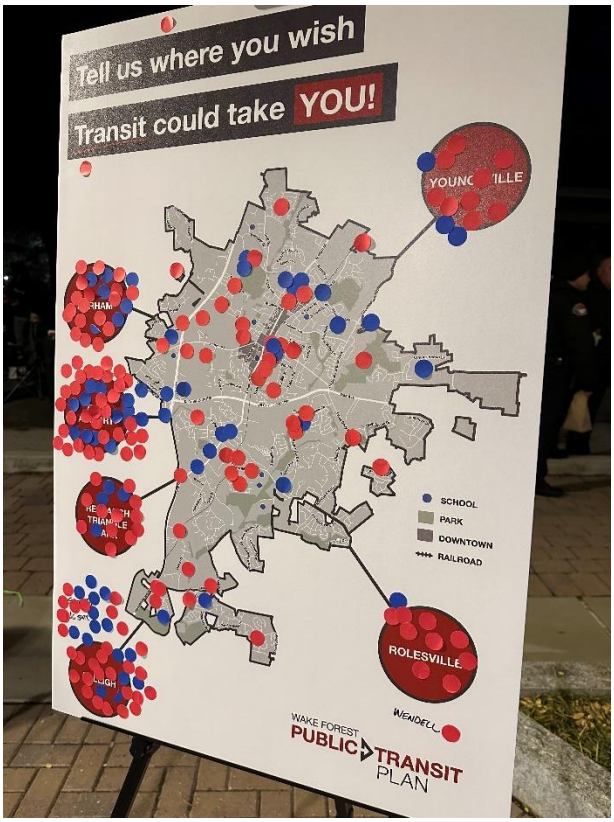
Additional locations were mentioned on the map board included:

- UNC Chapel Hill area (5 participants)
- Galaxy Fun Park
- Gateway Commons
- Wakefield
- Hobby Lobby in Raleigh
- Downtown Raleigh (2 participants)
- Downtown Durham
- Route to the airport with limited stops

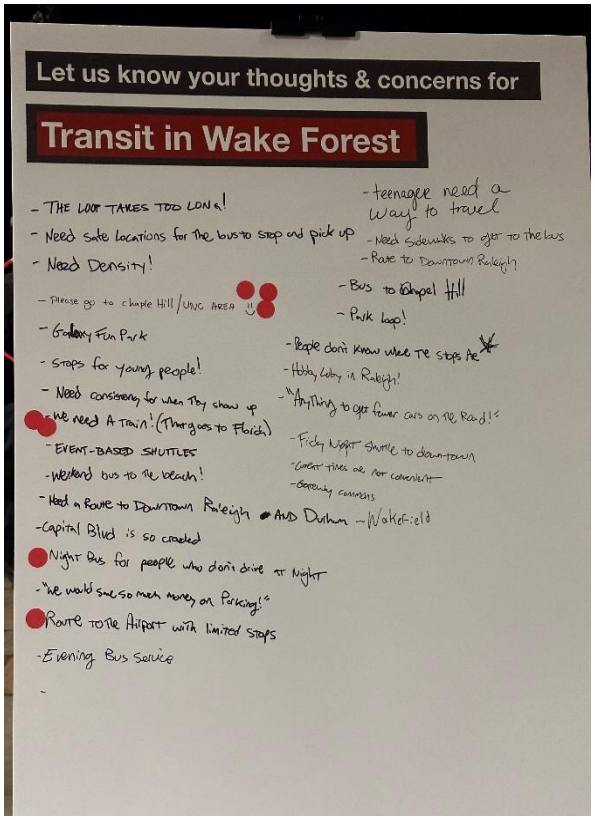
Additional comments from the comment board are provided below:

- The loop takes too long!
- Need safe locations for the bus to stop and pick up
- Need density!
- Stops for young people!
- Need consistency for when they show up
- We need a train! (That goes to Florida)
- Event-based shuttles
- Weekend bus to the beach!
- Capital Blvd is so crowded
- Night bus for people who don't drive at night (2 participants)
- We would save so much on parking!
- Evening bus service
- Teenagers need a way to travel
- Need sidewalks to get to the bus
- Park loop!
- People don't know where the stops are
- Anything to get fewer cars on the road!
- Friday night shuttle to downtown
- Current times are not convenient

MAP BOARD



COMMENT BOARD



Public Open House Overview

The Town of Wake Forest hosted two Public Open Houses on Thursday, February 2nd. The goal of these Open Houses was to provide residents and stakeholders with information on the Public Transit Plan Residents were invited to share feedback on their preferred bus routes.

Meeting Format

Each open house meeting lasted 90 minutes. There were information stations and no formal presentation. Display boards offered project information at each station.

There was a total of seven board stations at each meeting Four of the project boards were for adults and three were polling boards for children. The adult boards included:

- A System Map
- A Survey QR code
- A “Where Do You Want to Go” Map
- An Existing Conditions board

The children’s boards included questions and prompts including:

- Board 1: Have you ever ridden the bus in Wake Forest? Did you know you can ride the bus for free?
- Board 2: If you could take a bus anywhere in Wake Forest, where would you go?
- Board 3: What do you think would make riding the bus fun? If you were in charge, what would taking the bus look like?

Children received a “passport" to collect stamps at each station they attended. A prize was given to all children who visited all three children’s polling boards.

Feedback

Feedback was collected using polling boards. A scavenger hunt activity was offered to children to get feedback on their transit needs. Three polling boards were offered to give youth a chance to offer feedback on their transit needs.

Comment and Response Summary

Participants offered a wide variety of feedback. The greatest number of comments were about connectivity. Participants wanted to see additional routes to green spaces and public parks, greater efficiency, and more park and ride lots. Several commenters highlighted the needs for seniors. These comments mentioned accessibility and safety, as well as specific locations for connections. Many participants were concerned about specific safety issues. These included a need for various crosswalks, sidewalks, and lighting. Many comments were shared about the need for more consistent bus shelters and bus shelters in specific locations.

Participants also offered several comments about strategies for communicating about transit services. A complete list of questions and comments (both adults’ and children’s’) can be found in Appendices A and B.

Survey Summary

Purpose of the Survey

Wake Forest released a community survey to learn more about the public transit preferences of residents. The feedback will be used to inform how the Town addresses public transit service needs. The community survey was made available to the public from December 1st, 2022, until February 19th, 2023. The survey was available in an online format and a paper form made available at the December 2022 popup event. The online survey was provided in English and Spanish. A total of 11 respondents filled out the paper survey.

The survey was advertised through multiple outlets. These included via Wake Forest email, social media, the project website, and a flyer at the popup meeting. The following summary includes the responses for both the paper and online survey.

There were 687 unique participants who answered at least one question on the survey. The majority of respondents took the survey online (98.4 percent), while 11 respondents filled out a paper copy. Most respondents learned about the survey through email (35 percent), social media

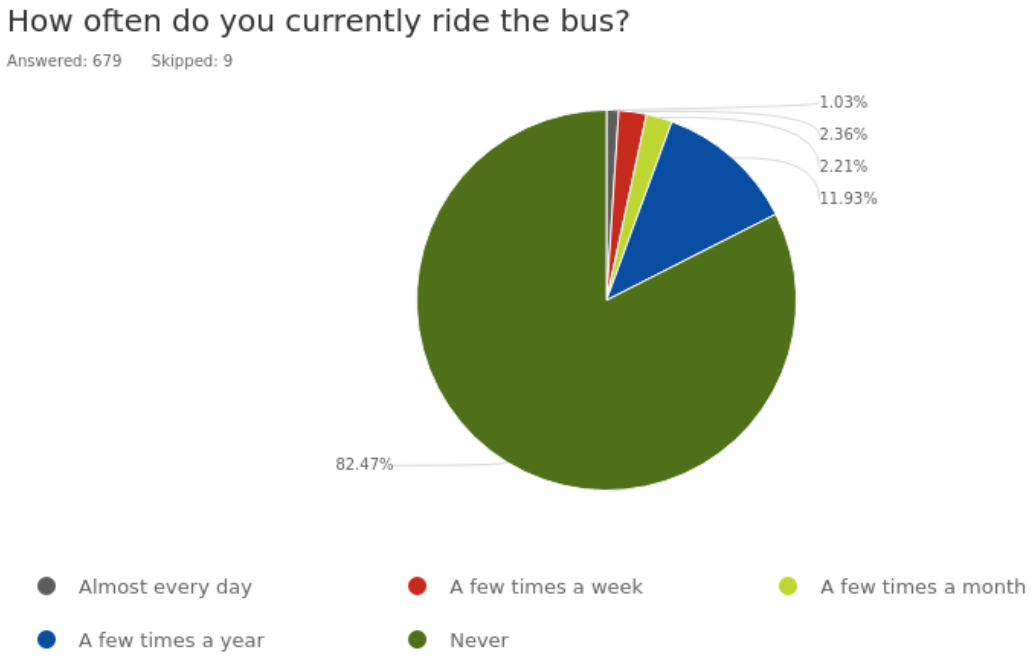
(35 percent), or through the mail (16 percent) and most reported living in Wake Forest (95 percent).

To learn more about who participated, the survey included several optional demographic questions. These questions had response rates ranging between 62 percent (income) and 85 percent (language proficiency). The percentages reported below are based on the number who provided responses, not the total number of survey participants. As such, summaries describe results for *question* respondents, not survey respondents.

To explore the preferences among those who regularly ride the bus, survey results for respondents who take the bus at least a few times per month are also reported here. These survey participants are referred to as frequent riders.

The following summary includes responses for both the paper and the online survey.

Bus Usage Frequency

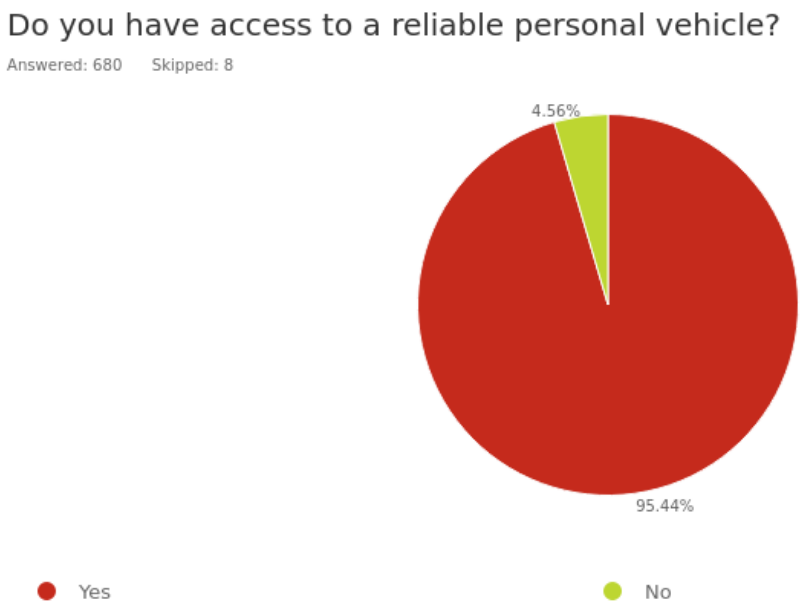


Choices	Response percent	Response count
Almost every day	1.03%	7
A few times a week	2.36%	16
A few times a month	2.21%	15
A few times a year	11.93%	81
Never	82.47%	560

Of respondents, 82.4 percent indicated that they never ride the bus, 11.9 percent indicated that they ride a few times each year. Just over 5 percent indicated that they ride the bus with a minimum frequency of once per month, with 1 percent of these riding the bus almost every day. Survey responses for those who ride the bus at least a few times per month are also reported here. These survey participants are referred to as “frequent riders”. Information from frequent riders provides information on those who use the bus most frequently.

Frequent riders were more likely to be women (66 percent), more likely to be individuals with a disability (26 percent), and likely to report an annual household income of less than $47,000 per year.

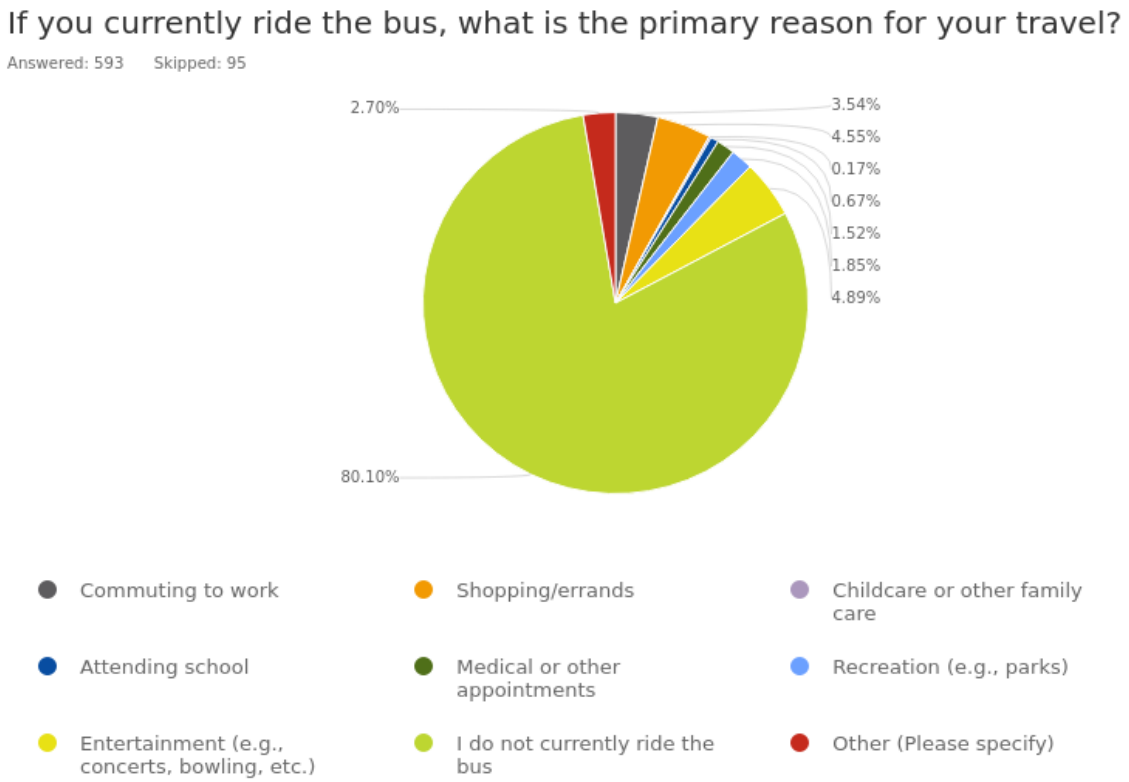
Personal Vehicle Access



Choices	Response percent	Response count
Yes	95.44%	649
No	4.56%	31

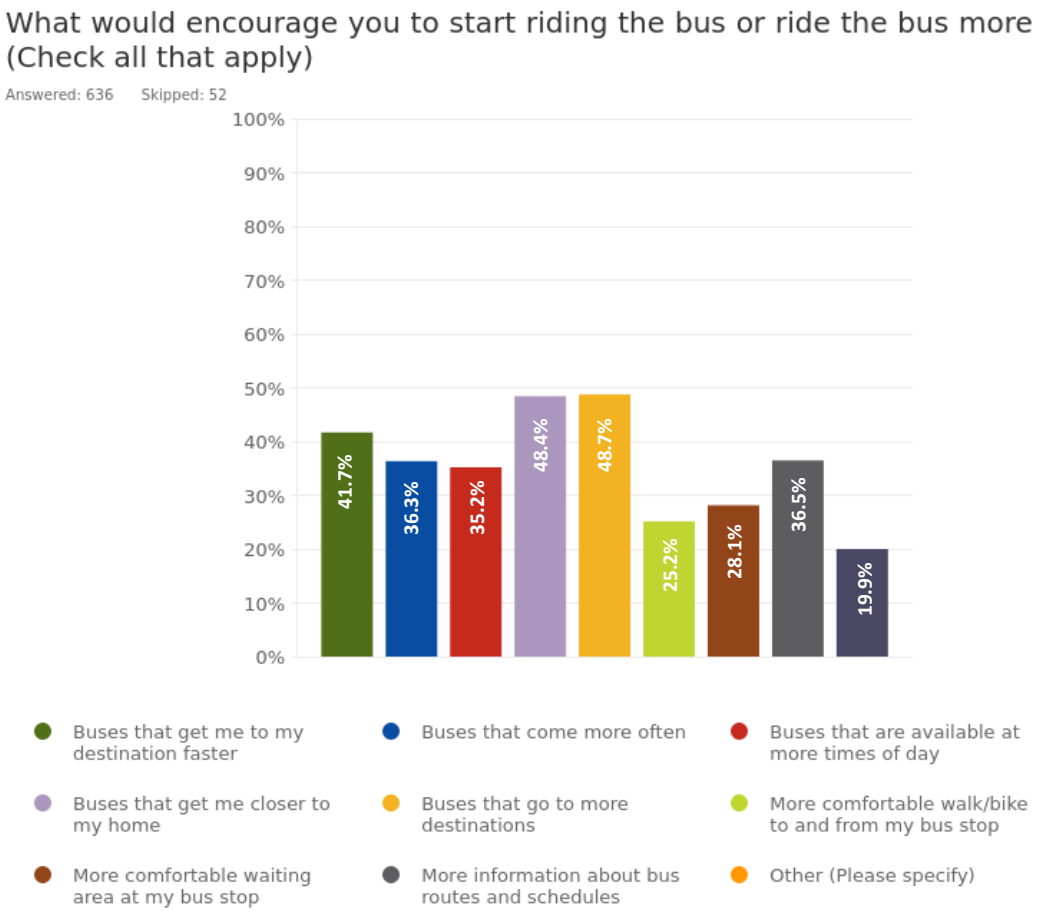
The majority of riders have access to a personal vehicle, with over 95 percent indicating ownership of a reliable vehicle. Frequent riders were less likely to have access to a reliable vehicle (61%).

Primary Reason for Travel



Of those who ride the bus, the top three reasons for travel include entertainment, shopping, and commuting to work. Nearly 5 percent indicated using it for entertainment, followed by 4.5 percent indicating primarily using it for shopping, and 3.5 percent using the bus to travel to or from work. Frequent riders were more likely to rely on public transit to get to work (40%), run errands (40%), and attend school (8%) than the sample at large.

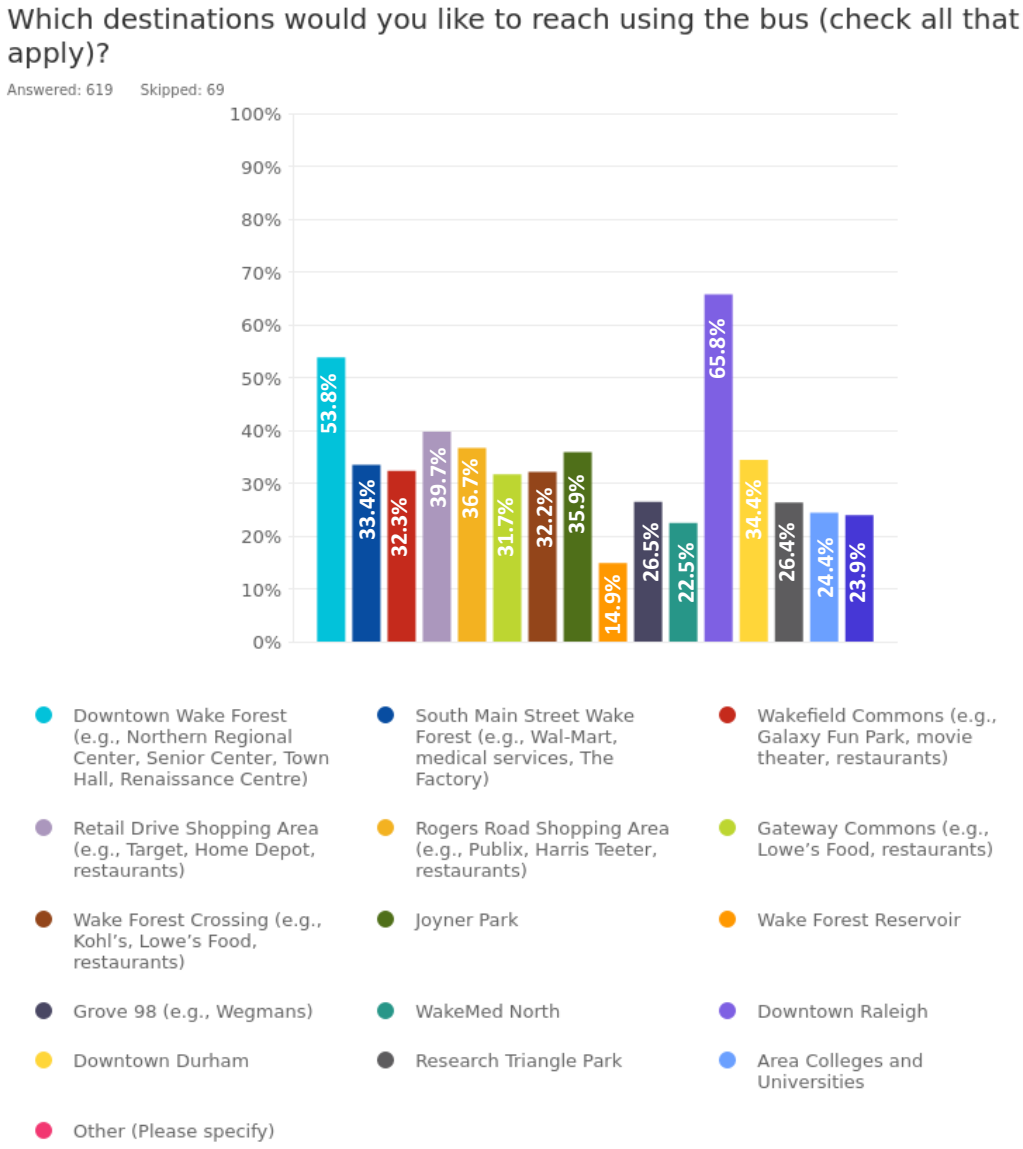
Factors to Increase Motivation for using the Bus



When asked what could entice them to ride the bus at all or ride the bus more often than they currently do, the most important factors relate to connectivity. Specifically, respondents said that they would like buses to get them closer to their homes (48%) and go to more destinations (49%). Other respondents were concerned with service, wanting buses that get them to their destinations faster (42%), that come more often (37%), and that are available at more times of the day (36%). Thirty-seven percent (37%) would consider taking the bus or taking it more often if they had more information about bus routes and bus schedules. Many other reasons were given for not riding the bus more often, with most of them indicating that there is no incentive that would encourage them to ride the bus.

Bus service and safety were higher priorities for frequent riders. At least half of these riders wanted buses to be available more times of the day (58%), buses that run more often (50%), and safer bus stops (50%).

Preferred Bus Destinations

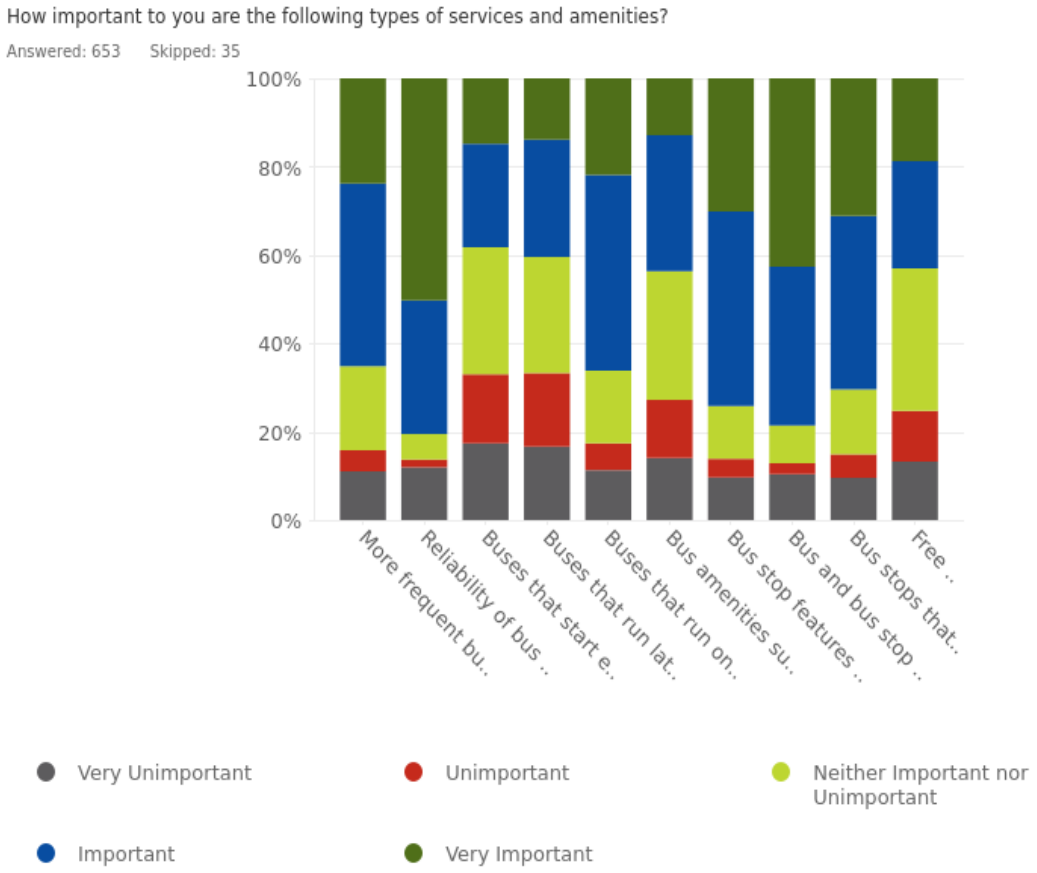


Respondents listed preferences for many different bus destinations, with the top destinations chosen being Downtown Raleigh (65.8 percent) and Downtown Wake Forest with 53.8 percent. Approximately one-third of respondents said that they would like to be able to reach South Main Street Wake Forest (34%), Wakefield Commons (33%), the Rogers Road Shopping Area (37%), Gateway Commons (32%), Wake Forest Crossing (325), Joyner Park (36%), and Downtown Durham (34%) via bus. The most common destination offered as a suggestion by respondents was Raleigh-Durham Airport (RDU).

Neighborhood Bus Access

The survey asked respondents to indicate which neighborhoods they would like to see the Wake Forest bus travel to. The most frequently named communities were: Heritage/Heritage South (n=24), Traditions (n=17), Old Mill Stream (n=10), Holding Village (n=9), and Northampton (n=8).

Prioritization of Services and Amenities



When asked to rank the importance of bus services and amenities, most respondents prioritized reliable bus schedules (81 percent), bus and bus stop safety (79 percent), and bus stops that connect to pedestrian and bike facilities (71 percent). Less important to respondents were amenities like free bus fare (25 percent), charging stations and Wi-Fi (27 percent), buses that run until midnight (34 percent), buses that run before 7 AM (33 percent).

Bus schedule reliability (90%) and safety on the bus and while waiting for the bus (86%) were also priorities among frequent riders. However, they were more likely to rate bus stop features like benches and shelters as important (89%) than the sample at large (74%).

Survey Demographics

Gender Identification of Respondents

A slight majority of question respondents identified as women (58 percent), while 37 percent identified as women and less than 1 percent as non-binary. Five percent (5 percent) indicated that they preferred to self-identify.

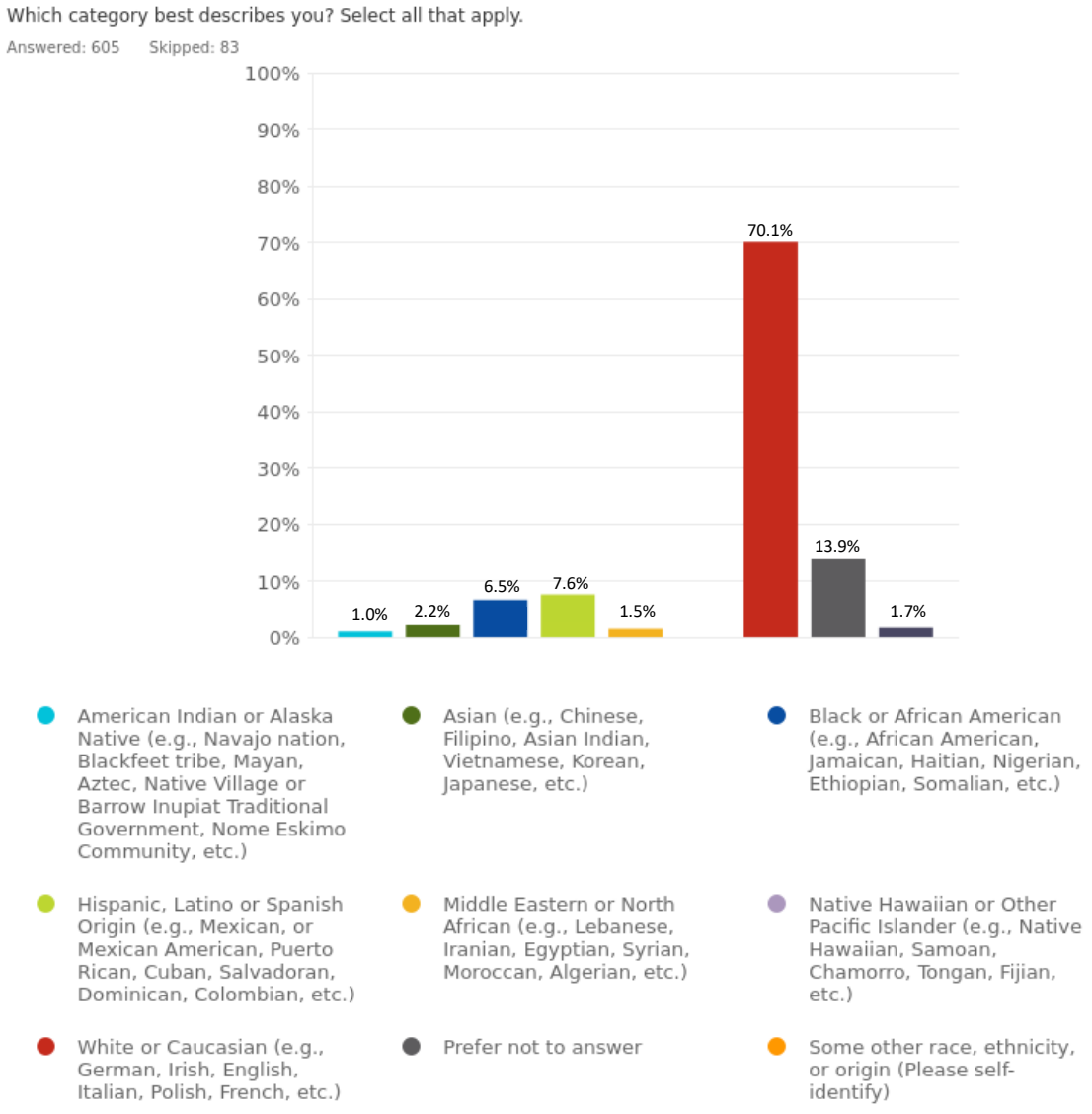
Age of Respondents

The largest proportion of respondents (63 percent) report being between 35 and 64 years old. Twenty percent (20 percent) are aged 65 or older and fourteen percent (14 percent) are younger than 35. Those under 24 years old (3 percent) and those 75 or older (5 percent) are the least represented in the survey.

People with Disabilities

Asked if they had a disability, 10.2 percent indicated that they had a disability, 6.1 percent indicated that they did not wish to answer the question, and 83.7 percent indicated that they did not have a disability.

Racial Demographics



To measure the racial composition of participants, the survey included a question prompting individuals to define themselves racially and ethnically using as many categories as desired. The

two most common identities among respondents who provided a response were white or Caucasian (70 percent), Hispanic or Latino (8 percent), and Black or African American (7 percent). Fewer respondents identified as Asian or Pacific Islander (2 percent), Middle Eastern or North African (2 percent), Native American or Alaskan Native (1 percent), or some other identity category (2 percent). Zero respondents (0 percent) identified as Native Hawaiian or Other Pacific Islander. Fourteen percent (14 percent) opted out of providing their racial identity.

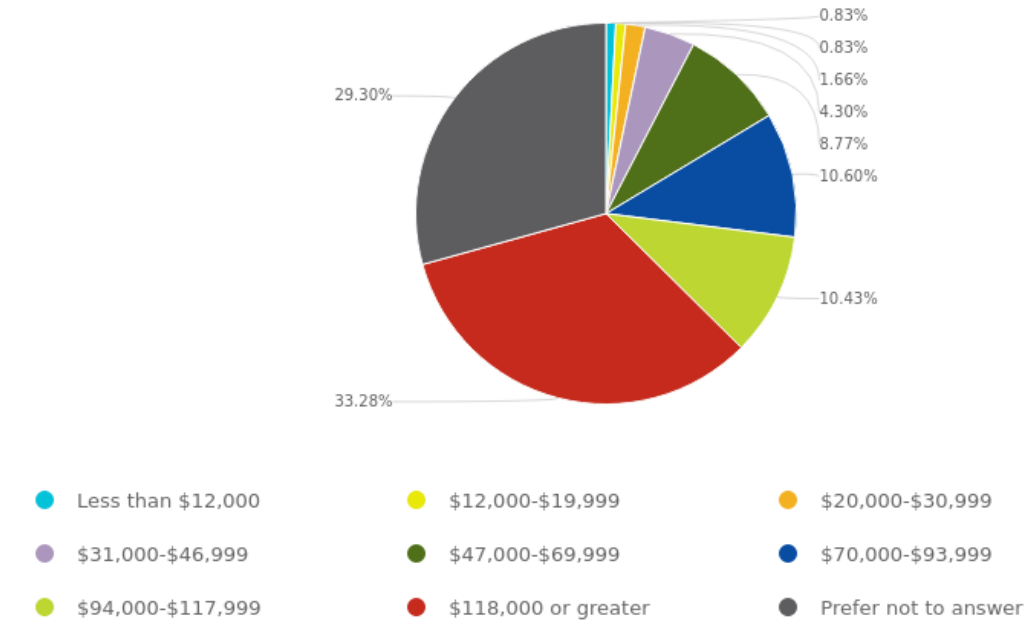
Nearly all question respondents indicated that they speak English very well (92 percent) or well (4 percent). Few respondents said that they speak English 'okay' (.5 percent), very little (.2 percent), or not at all (.2 percent).

The survey also inquired as to which language respondents speak at home most of the time. The vast majority primarily speak English (n=416). Others speak Spanish (n=8), Portuguese (n=2), Arabic (n=2), Cantonese (n=1), Chinese (n=1), Russian (n=1), Italian (n=1), Hindi (n=1), Japanese (n=1), Yiddish (n=1), Yoruba (n=1), and Slovak (n=1).

Household Income of Survey Participants

What is your approximate annual household income?

Answered: 604 Skipped: 84



Choices	Response percent	Response count
Less than $12,000	0.83%	5
$12,000-$19,999	0.83%	5
$20,000-$30,999	1.66%	10
$31,000-$46,999	4.30%	26
$47,000-$69,999	8.77%	53
$70,000-$93,999	10.60%	64
$94,000-$117,999	10.43%	63
$118,000 or greater	33.28%	201
Prefer not to answer	29.30%	177

When asked for their approximate annual household income, 33.3 percent indicated a household income of $118,000 or greater and 29.3 percent indicated that they did not wish to answer the

question. Just higher than 20 percent of additional respondents indicated a household income between $70,000 and $117,999 per year. The remaining 7.6 percent indicated a household income of less than $70,000 per year.

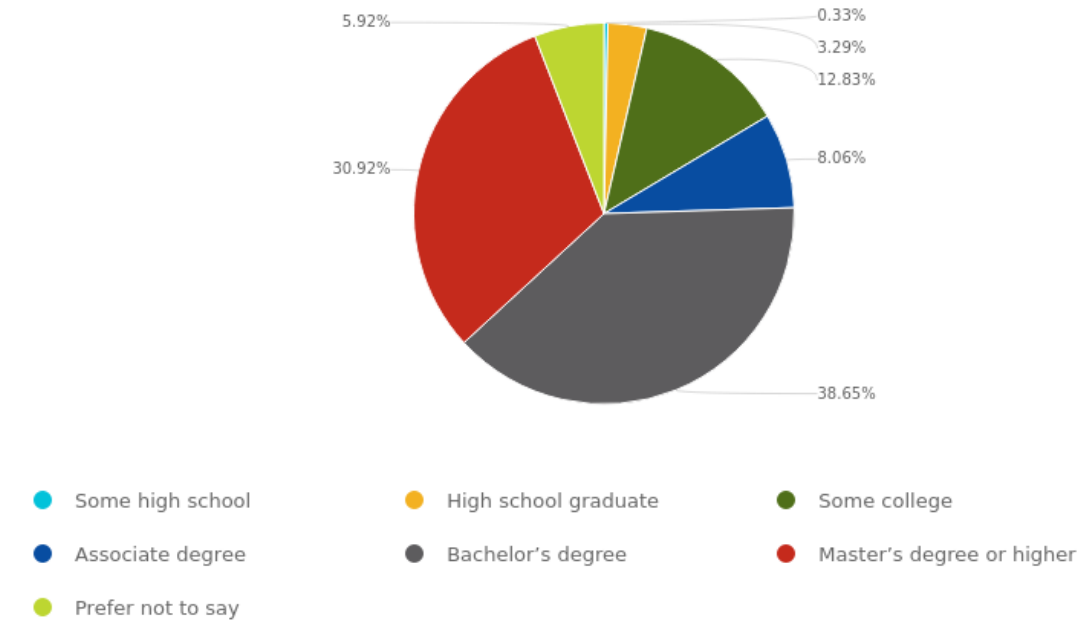
Homeownership Among Respondents

While most survey participants own their homes (85.2 percent), 6.8 percent rent their homes, and 8.1 percent preferred not to answer the question.

Educational Attainment of Respondents

Select your highest level of education attainment:

Answered: 608 Skipped: 80



Choices	Response percent	Response count
Some high school	0.33%	2
High school graduate	3.29%	20
Some college	12.83%	78
Associate degree	8.06%	49
Bachelor's degree	38.65%	235
Master's degree or higher	30.92%	188
Prefer not to say	5.92%	36

Most participants (90.5 percent) have attained at least some college education. Other participants indicated being a high school graduate (3.3 percent), having some high school education (.33 percent), or preferring not to say (5.9 percent).

Recommendations for Future Outreach

Efforts were made during this outreach to engage as many residents as possible. To continue to engage effectively and to increase future participation, additional efforts will need to be made.

The highest percentage of LEP individuals (2.3 percent) in this area speak Spanish. Outreach to Spanish-speaking populations was ineffective. Less than 1 percent of respondents indicated speaking “very little” or “no” English. To ensure that LEP populations are proportionately represented and included in future engagement, all public-facing materials should continue to be shared in English and Spanish at an 8th grade reading level standard or lower. Efforts should also be taken to distribute surveys via Spanish-language media channels.

Phase 1 engagement was effective in reaching a representative sample for most demographic categories, however, disproportionately fewer African Americans conducted the survey than other groups. The population of this group makes up 16.3 percent of area residents, but only made up 6.5 percent of survey respondents. Future outreach should increase targeted engagement through minority media outlets and community partners who work with these populations.

Phase 1 engagement was more effective in reaching riders and potential future riders with a household income of higher than $47,000 per year. To ensure representative feedback, future outreach should consider ways to reach individuals more effectively with a household income of lower than $47,000 per year.

Phase 1 engagement was most effective in reaching those ages 35 and older. Future engagement should consider ways of engaging residents younger than age 35. Those under 24 years old (3 percent) and those 75 or older (5 percent) are the least represented in the survey. Upcoming engagement should particularly focus on reaching those under than 24 years old and older than 75.

Appendix A - Open House Thoughts and Concerns (Mid-Day & Evening Sessions)

Communication Strategy Recommendations

- Facebook/social media campaigns to let people know bus in WF is free + links to route maps etc.
- Advertise bus info via homeowner's associations to inform the community. Let everyone know it's free!
- Social media – Let people know more about para transit services & how to access
- Sell advertising spaces on buses & use funds for sidewalk improvements + greenway improvements
- The WF lop is very good in general. Crossing high volume roads can be an issue. Maybe try to target surveying people in Sr. complexes, apts., and working service type jobs

Connectivity, Access, and Transit Time

- Connectivity to green ways
- Transit to Walnut Creek Amphitheatre for Concerts
- Transit to Durham/RTP for work hours
- Commuter rail. More efficient bus service
- I'd like to take a bus to north Hills, the State Fair, and RBC
- In Wake Forest the Hwy 98 by-pass should have bus access between the current bus route
- Maybe have the loop bus stop closer to Walmart front door
- Light rail services Wake Forest to Cary/Durham/Raleigh
- Move the stop at Chick-fil-a to in front of Goodberries
- Park + ride lots. Move bus stops. Keep seniors in mind i.e., distance between stops
- More Park n ide lots
- We need some buses – 2 or 3 – to travel to Raleigh in the middle of the day so we don't have to spend the whole day in Raleigh
- Lightrail to Raleigh. Trolly service
- The bus location near Wake Med needs periodic stops
- Travel 98 Calvin Jones Hwy
- Bus line down Calvin Jones (98) to connect multifamily developments.
- Buses to churches on Durham Road
- More transportation near Crabtree on Glenwood at CarMax in Raleigh
- Joyner Park
- Joyner Park bus service needed
- Would like a bus to go to Joyner Park – Right now people who do not have a car have no access to this beautiful park and community center
- Hwy 98 & Cap Blvd pedestrian crossing to NW College + Career Academy (under Hwy 1)
- It would be wonderful to have a bus go to TTC – maybe around noon!! Lots of us "oldsters" would like to go there but not at 7:30 AM
- Would like to see a bus go to *Stadium Dr to the Smith Field, Ross and Marshall's (Capital Outlet)
- Need a bus Rogers Rd & S. Franklin St.

- Would like for a bus to come to the neighborhood on South Franklin St.
- Bus Hailing in downtown area
- Connectivity to multi-modal transit center – bus/express bus/commuter rail/ride share
- More efficient roadways to accommodate the population growth – we are turning into "Cary"
- Make developers improve roads before they build new housing
- Wake Forest buses need to start running earlier for many service industry workers to take advantage of
- The arrival times of WRX buses are too close to the top of the hour to allow many workers to get to work on time. Offsetting routes even 15-20 min earlier could fix that
- Bus or train to RDU
- Bi-hourly bus on Friday and Saturday evenings between Wake Forest + downtown Raleigh ex. 6pm-12am
- Light Rail to/from W.F. + downtown Raleigh + RDU
- Idea if having WF loop get H.S. Students to H.S. (including charter schools) if they live in neighborhoods by route
- Later operation during Friday Nights on White
- Walmart
- The intersection of Wake Forest with Raleigh buses needs to have more connecting/better transfers to make bus transit viable for daily commute to workers not in downtown
- Neighborhood Routes
- I would love a larger range + timetable for buses so it can be an alternative to driving. Currently, the time + range of bus travel doesn't make it a good alternative for many
- Run WRX on Saturdays for people to go to a mall or downtown
- Similar to GoAccess -> micro transit or on call free transport to specific locations. Riders could apply and meet max income standard. Essentially expand GoAccess idea past just work and doc appointments to support groups, community events, etc.
- Tyler Run, Holding Ridge, South Main Street
- Triangle Mall
- Relocate the park &ride lot or place a stop next to it
- More routes and effective bus services to GoRaleigh and Durham
- More connections to everywhere

Safety and Accessibility

- Need a sidewalk on Huntington Spring Senior Bldg., S. Franklin St 1887
- Sidewalks everywhere hbd***
- Complete sidewalks on Rogers x Main & Heritage Lake
- Keep seniors in mind – will need more buses
- Crosswalk signals around the Seminary
- Stops at parks and schools
- Sidewalk on Durham Road
- Covered sheltered bus stops (check about Eagle Scout projects)
- Include pedestrian crossings in new development
- Include bus cut ins in new development
- Include concrete parking pads or busways – Bus tear up asphalt
- Sidewalks on NE side of town

- Sidewalks. If you can't walk safely to a bus stop, why use it?
- Ped. bridge over Capital
- Friday Night on White shuttle to neighborhoods to avoid drunk driving

Amenities

- Increase the number of bus shelters
- Add a save space to be dropped off on Retail Drive and 98 Hwy. No platform/shelter
- Bus Shelters. Reliability
- More bus shelters placed near already existing outdoor lighting
- Bike rack at select bus stops on main arterials
- App for bus schedule real time
- Lighting especially in historically African American neighborhoods
- Please use the QR code card for transit fee, much more efficient
- Make sure bus stops cover both sides of major roads/intersections so people aren't discouraged by dangerous crossings
- Solar powered lights in bus shelters

Questions

- Do you think people will give up their cars and take public transit?
- Is this the most cost-effective way to provide transportation to a small group of people?
- Smaller buses for WF loop until enough passengers to warrant current large size buses

Miscellaneous

- So excited about the light rail. Will be so good for economic situation of many WF + other towns residents
- More frequent stops! More buses = more riders!
- I never knew which bus goes which way – They both have "A." I always ask the driver – 1 goes clockwise + 1 goes counterclockwise
- Maintain and build more roads to keep up with large increase in building. Do not be another Northern Va.
- It is good for people to get where they need to go without worrying about car payment and insurance that they can't afford. This is sooo needed!
- All around Heritage
- Have transit oriented zoned areas be developed by developers who target actual bus riders
- Joyner Park
- Transit is doing a good job at their job
- More bus stops
- Just get out of the house
- Music
- Ride the bus to school
- Color
- Going to School
- Fun
- Sing, friends, blue

Appendix B - Children's Reponses "If you could take a bus anywhere in Wake Forest, where would you want to go"?

- Galaxy Fun Park
- Sprayground
- Wendy
- McDonalds
- Disneyland
- Raleigh
- Target
- Downtown
- Dominos
- Poughkeepsie
- School
- Raleigh
- Dog Park
- Walmart
- Joyner Park and nearby commercial area
- Jurassic Park
- Joyner Park
- Food Lion
- Health + human services/Library
- Pizzeria

WAKE FOREST
PUBLIC TRANSIT
PLAN

Wake Forest Public Transit Plan

Rider Survey Summary Report

Prepared for the Town of Wake Forest

by Public Participation Partners

In Coordination with Toole Design

April 2023

Purpose of the Survey

This survey differed from the Online Community Survey distributed during Phase 1 of the engagement process. While the Online Community Survey engaged the broader community, the rider survey was designed primarily for riders who already use the fixed route system or the demand-response system in the Town of Wake Forest. The purpose of the Wake Forest Transit Plan Rider Survey was to better understand how existing riders use transit services and how services can be improved.

Survey Administration

The survey went live via the Zoho Survey engagement platform on March 12, 2023 and was open for survey respondents through April 6, 2023. Links to the survey were distributed via a QR code on signs at bus stops, on flyers, and on business cards.

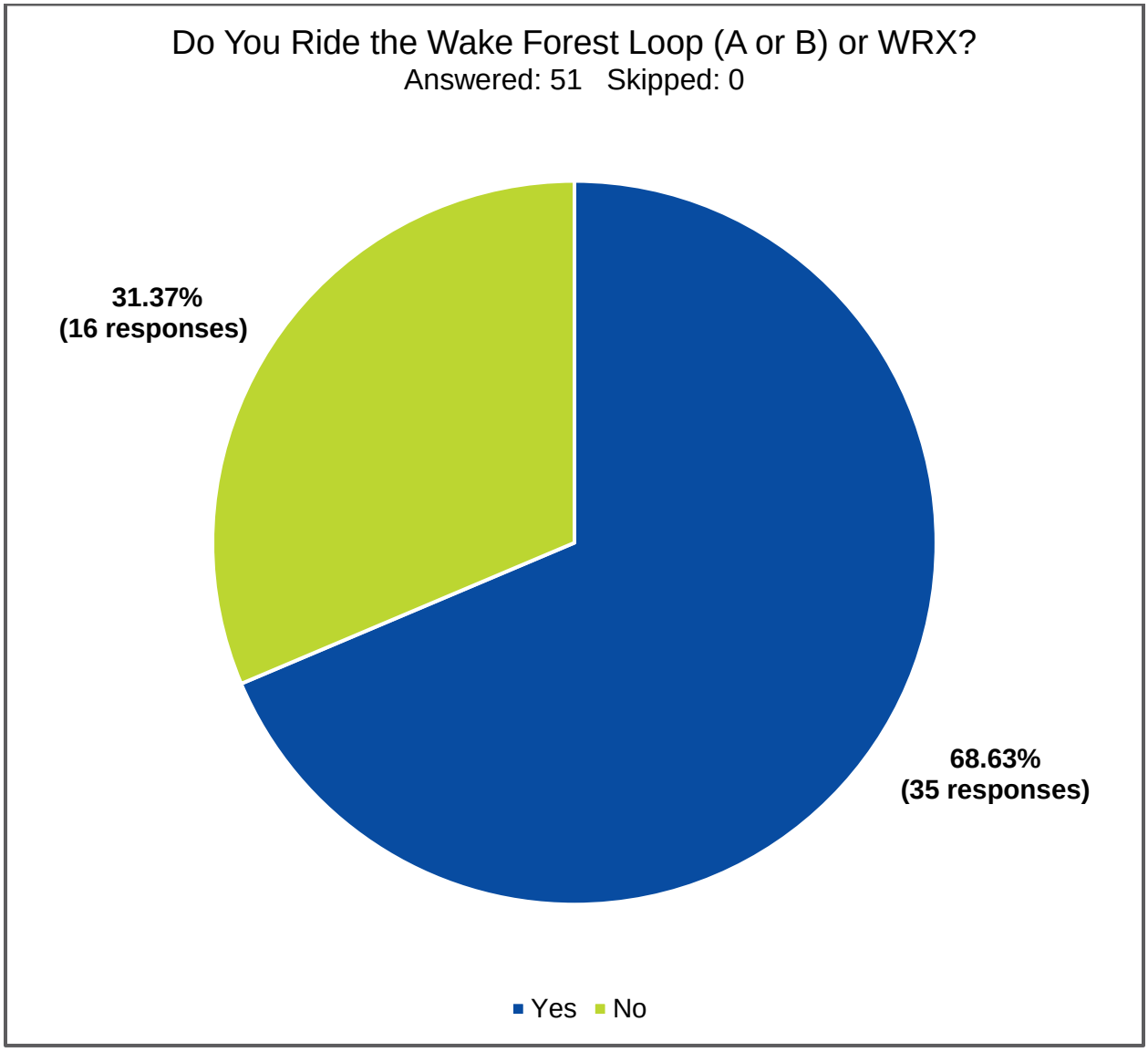
Survey Participants

There were 51 unique participants who answered at least one question on the survey. The survey included a set of voluntary demographic questions, which had response rates ranging between 38 percent (language spoken at home) and 54 percent (age and language proficiency). The percentages reported below are based on the number who provided demographic information, not the total number of survey participants. As such, summaries describe results for ***question*** respondents, not survey respondents.

General Survey Results

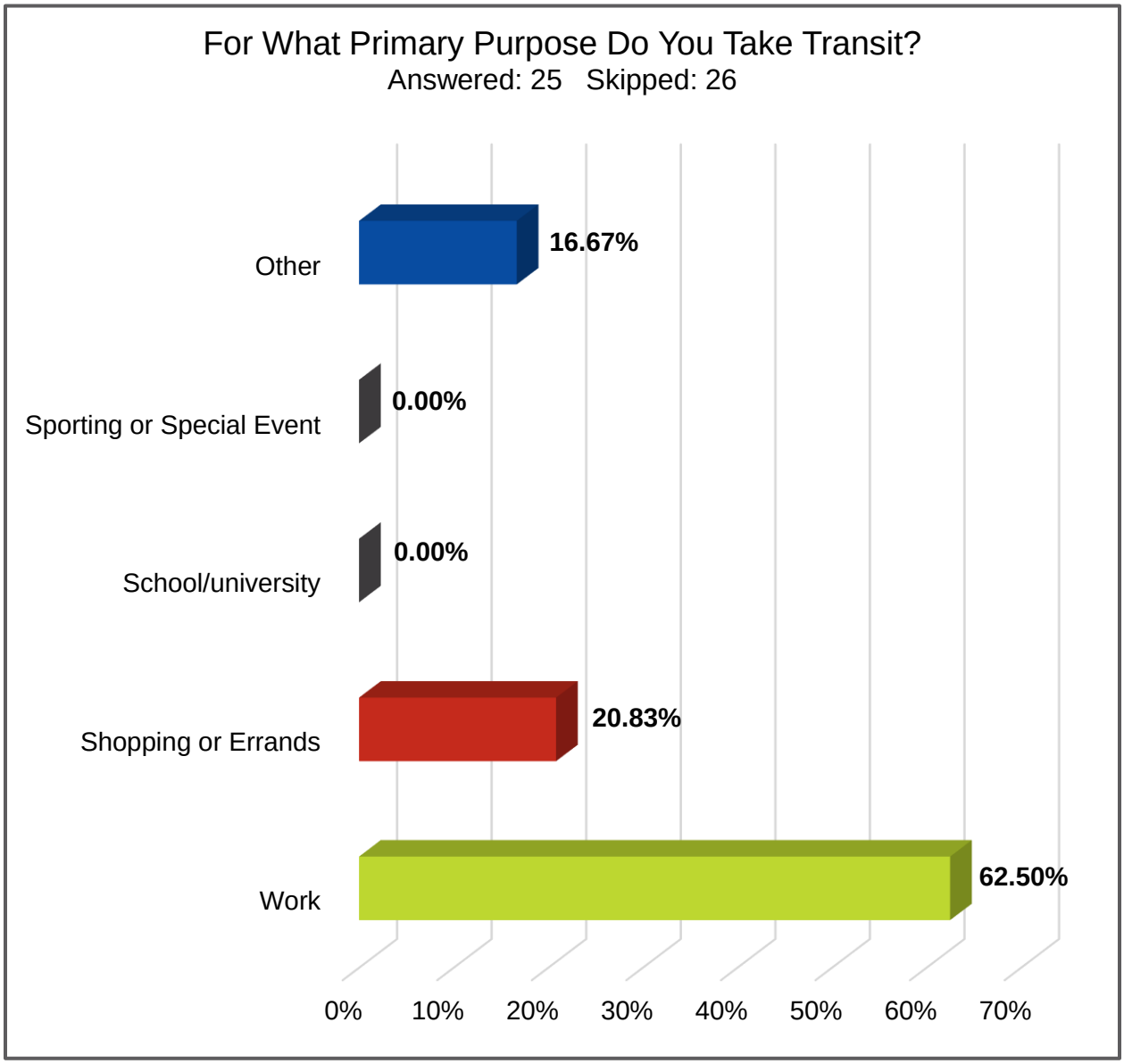
The rider survey was developed to better understand how existing riders use services and how services might be improved. Nine questions were asked to help inform how the Town addresses public transit needs.

Wake Forest Transit Use



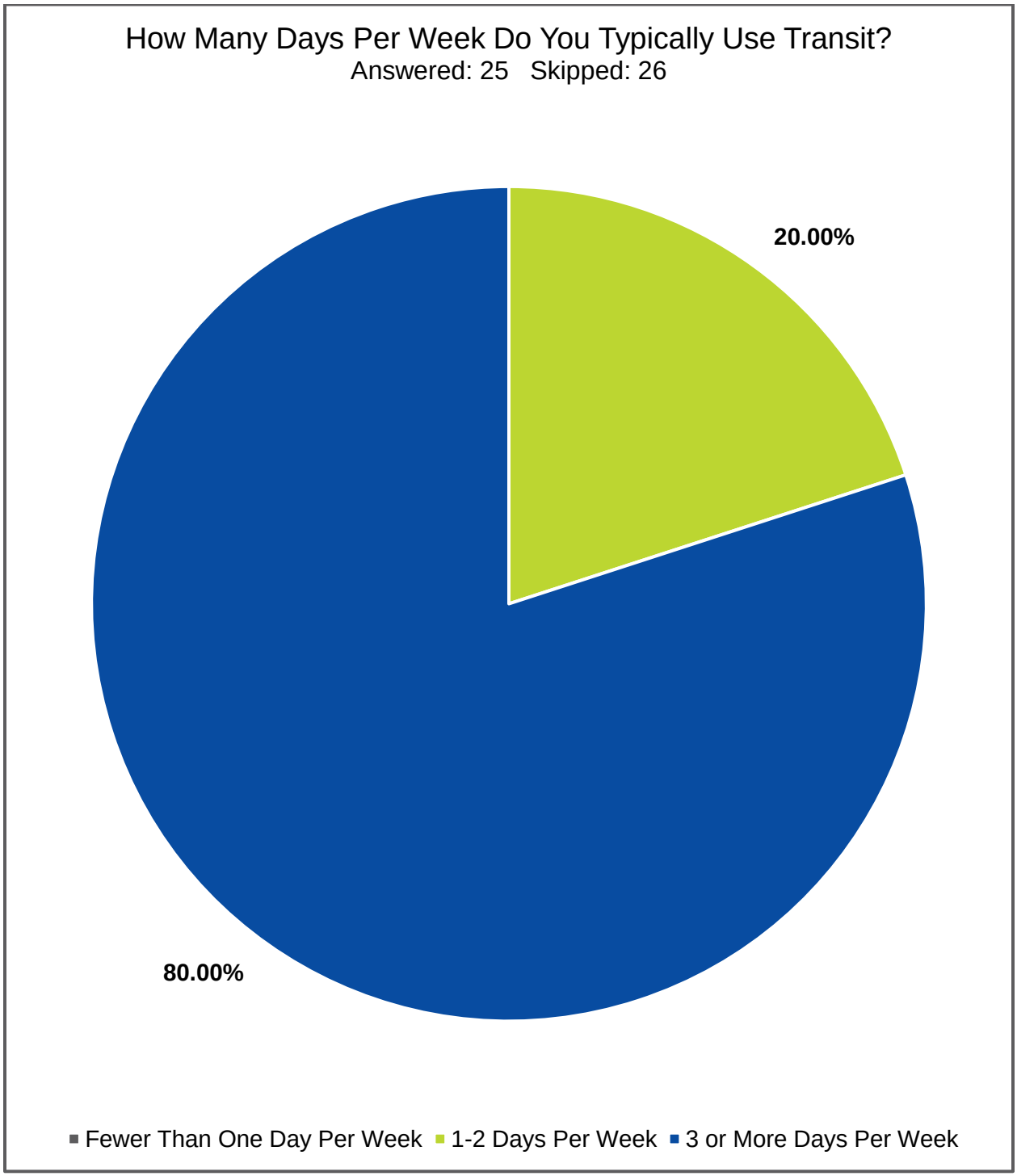
Nearly 69%, (68.6%) of survey respondents ride the Wake Forest A Loop, B Loop, or the WRX, while 31.4% say that they do not ride any of those routes.

Public Transit Destinations



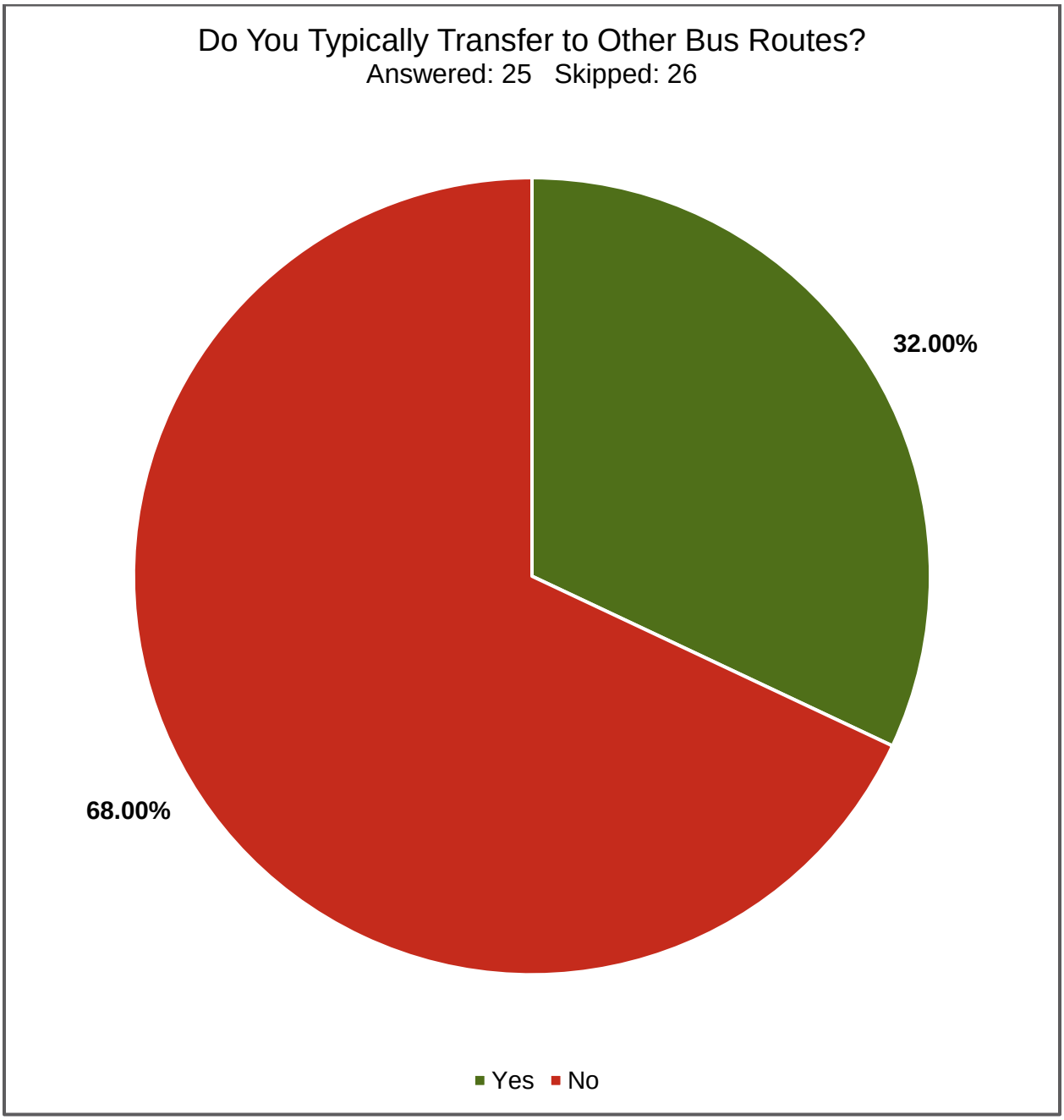
The majority of respondents, 62.5%, use public transit to get to work, while 20.8% use it to go shopping or run other errands. None of the respondents indicated that transit was used for going to school or special events. Other reasons for riding the bus included getting to the gym and just riding around at 16.7%.

Public Transit Frequency



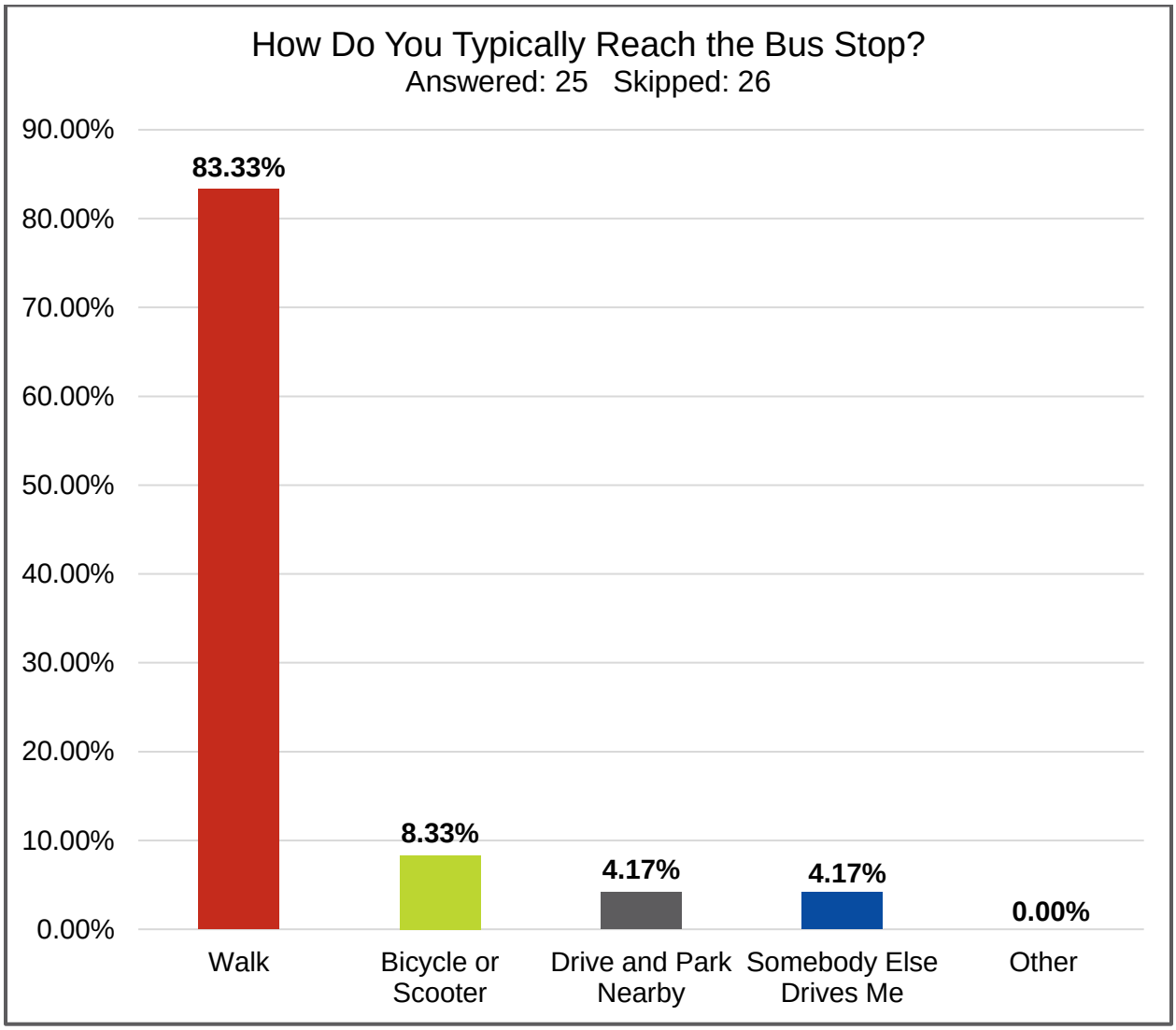
Eighty percent (80%) of respondents who use public transit do so at least three days per week, while 20% ride one or two days per week. There were no respondents that indicated they use public transit less than one day per week.

Transit Transfers



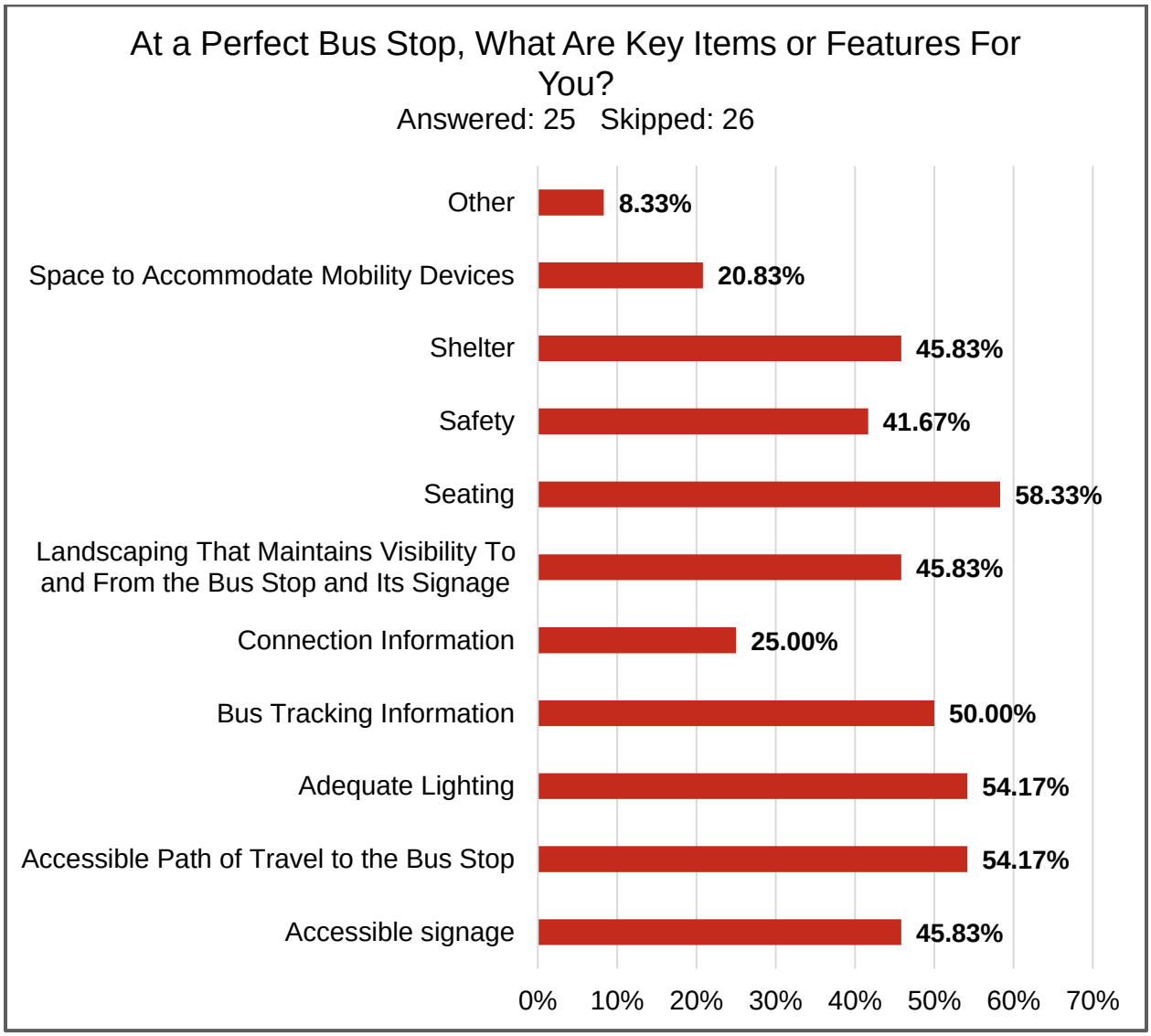
Sixty-eight percent (68%) of respondents indicated that they do not transfer to routes other than their own. Thirty-two percent of respondents indicated that they do transfer routes. Of the 32%, four respondents indicated that they transfer in order to ride a combination of the Wake Forest A Loop, B Loop, and WRX. Four respondents transfer to other bus routes, including the 300 and the 25L.

Trip to Bus Stop



Most respondents, 83.3% indicated that they walk to their bus stop. Fewer respondents indicated they use a bicycle or scooter at 8.3%, 4.2% drive and park nearby, or get dropped off by another driver.

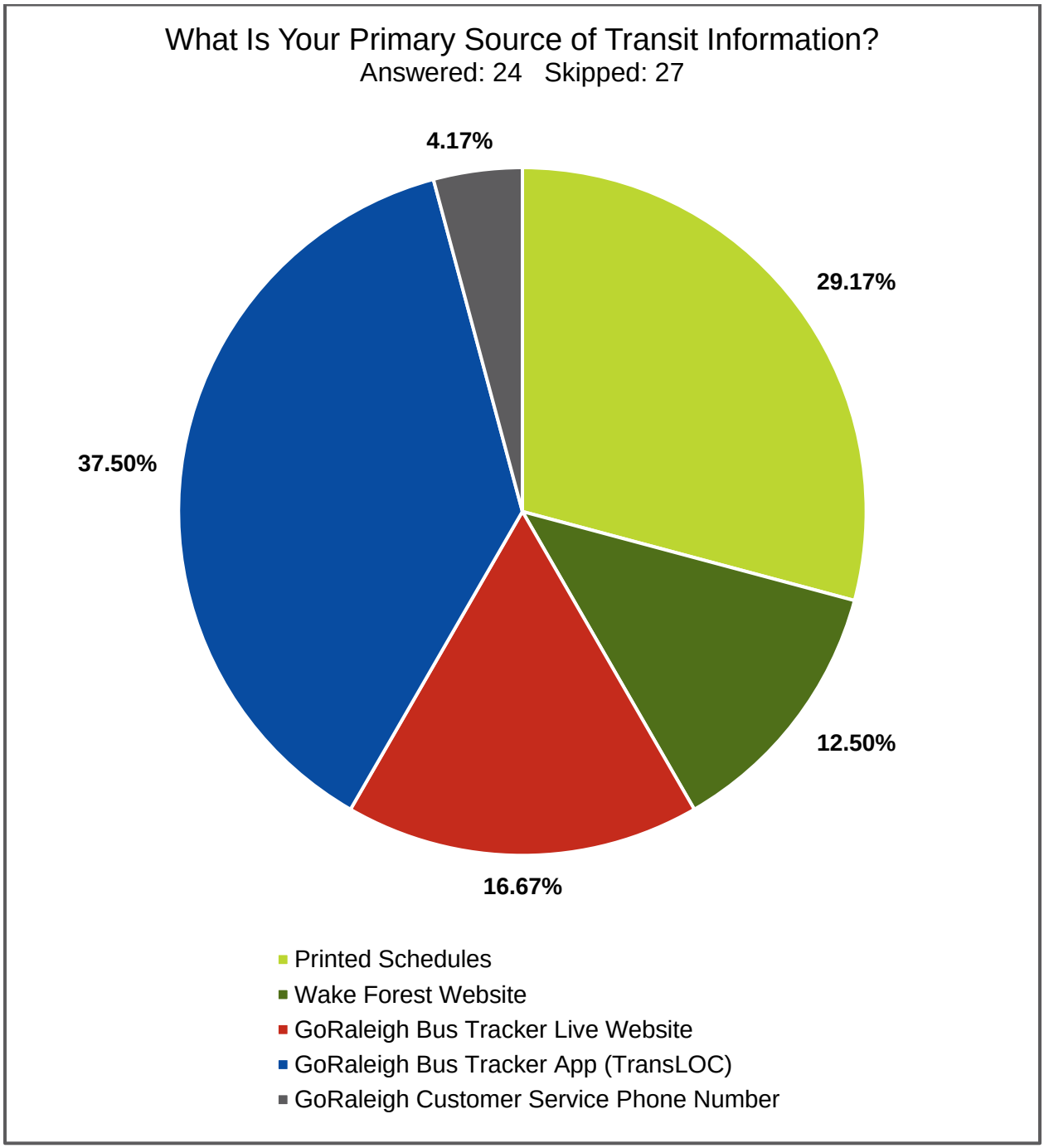
Preferred Bus Stop Amenities



Respondents were asked what key features their ideal bus stop would have. Twenty-five percent (25%) or less respondents preferred amenities such as connection information, accommodation for mobility devices and others. The most notably desired amenities are listed below.

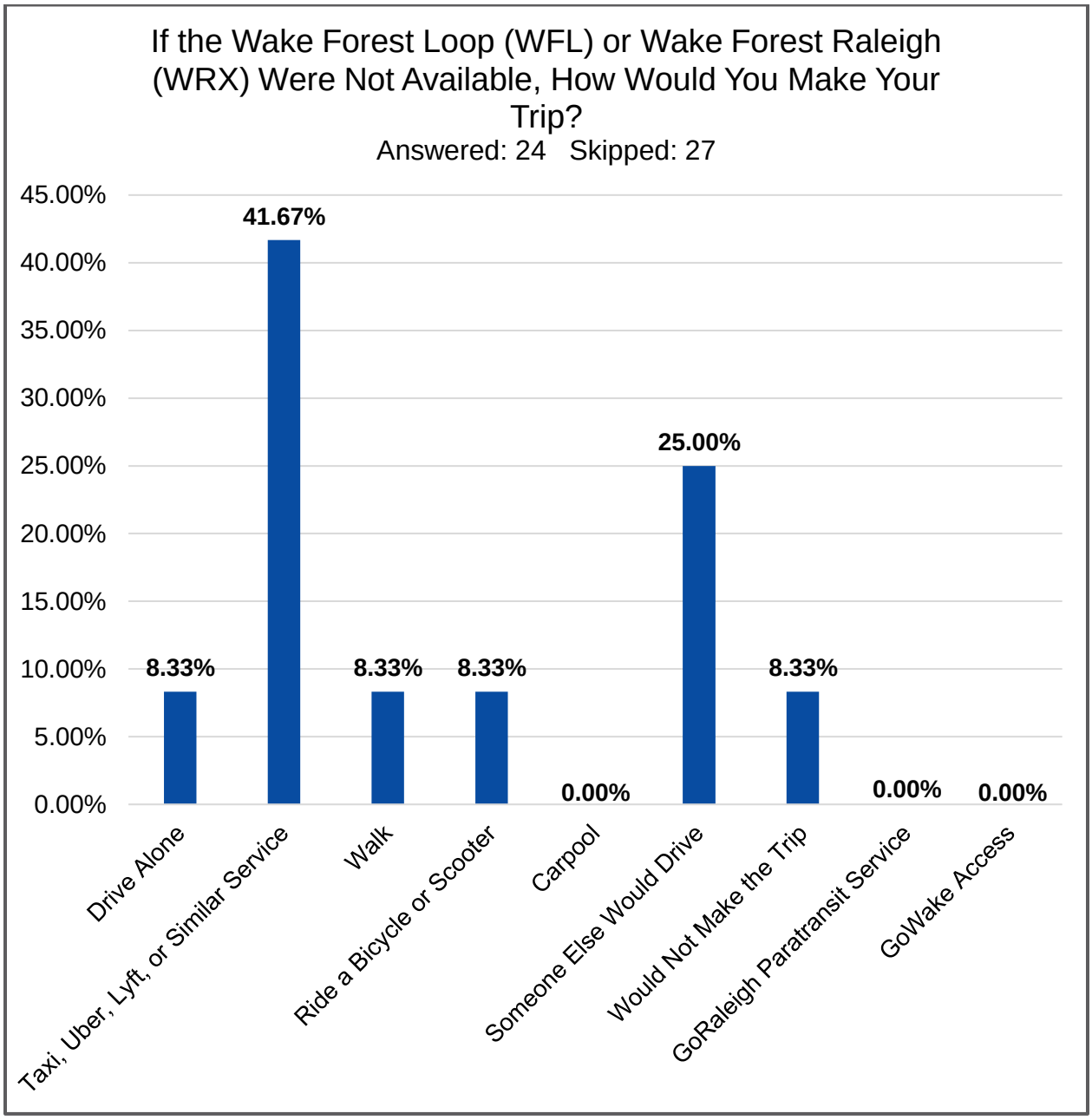
- 58.3% indicated seating
- 54.2% indicated accessible paths to the bus stop and adequate lights
- 50% indicated information to track buses
- 45.8% indicated accessible signage, bus stop shelters, and landscaping maintenance
- 41.7% indicated safety

Transit Information Sources



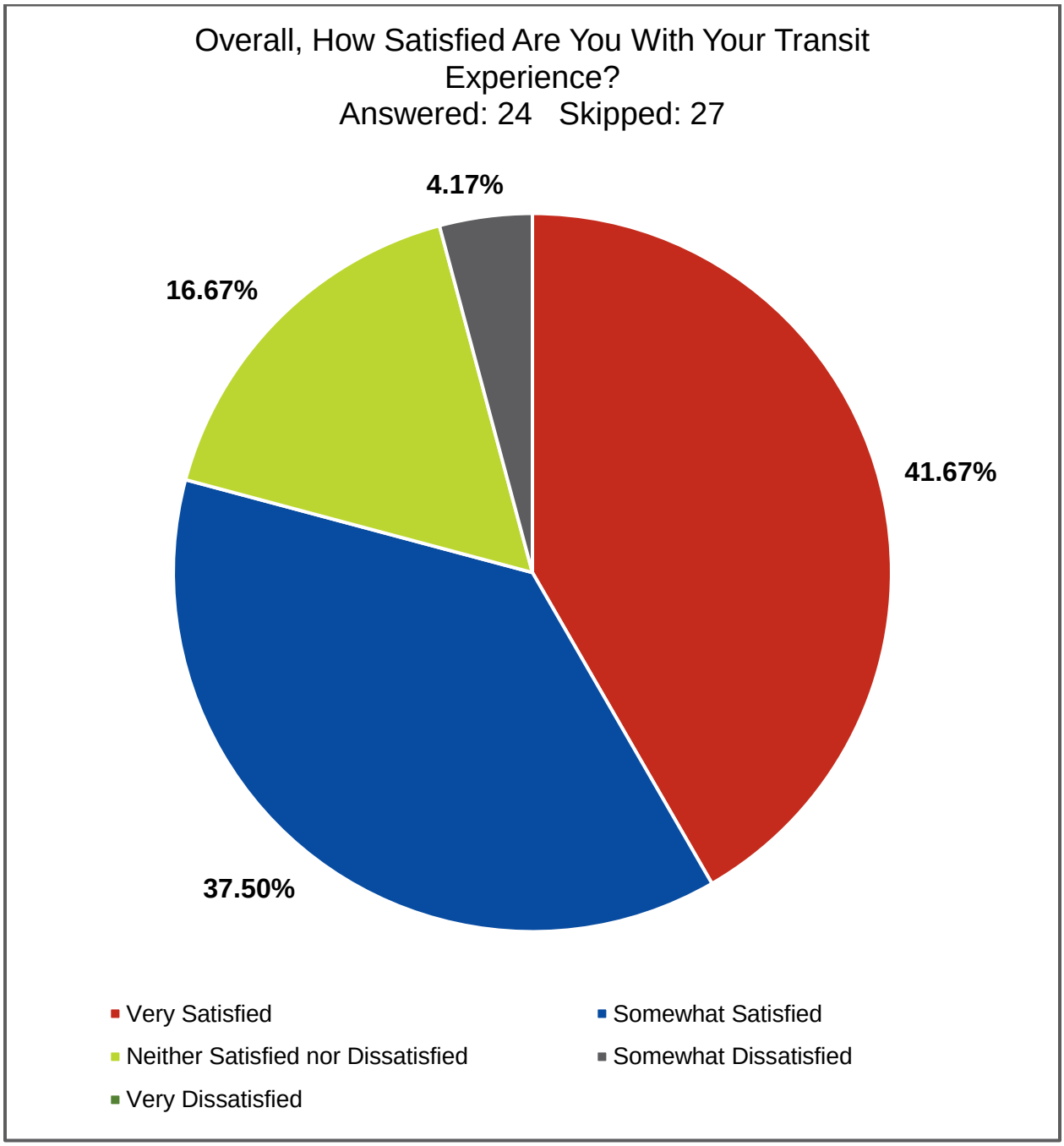
Respondents indicated that The GoRaleigh Bus Tracker App, 37.5%, and printed schedules, 29.2% were the most cited sources of transit information. Respondents were less likely to use the GoRaleigh Bus Tracker Live website, 16.7% or the Wake Forest website, 12.5%. Four percent (4%) of respondents use The GoRaleigh customer service phone line.

Transit Alternatives



When asked how they would get to their destinations if the Wake Forest Loop or Wake Forest-Raleigh (WRX) were not available, 41.7% of respondents indicated that they would most likely take a taxi or use a rideshare service. Twenty-five percent (25%) indicated that someone else would drop them off at their destination. Others indicated that they would drive, walk, or take a bike/scooter, 8.3%. Two respondents stated they would not make the trip if Wake Forest public transit were unavailable. Zero respondents would carpool, use paratransit, or take GoWake Access.

Satisfaction with Transit Experience

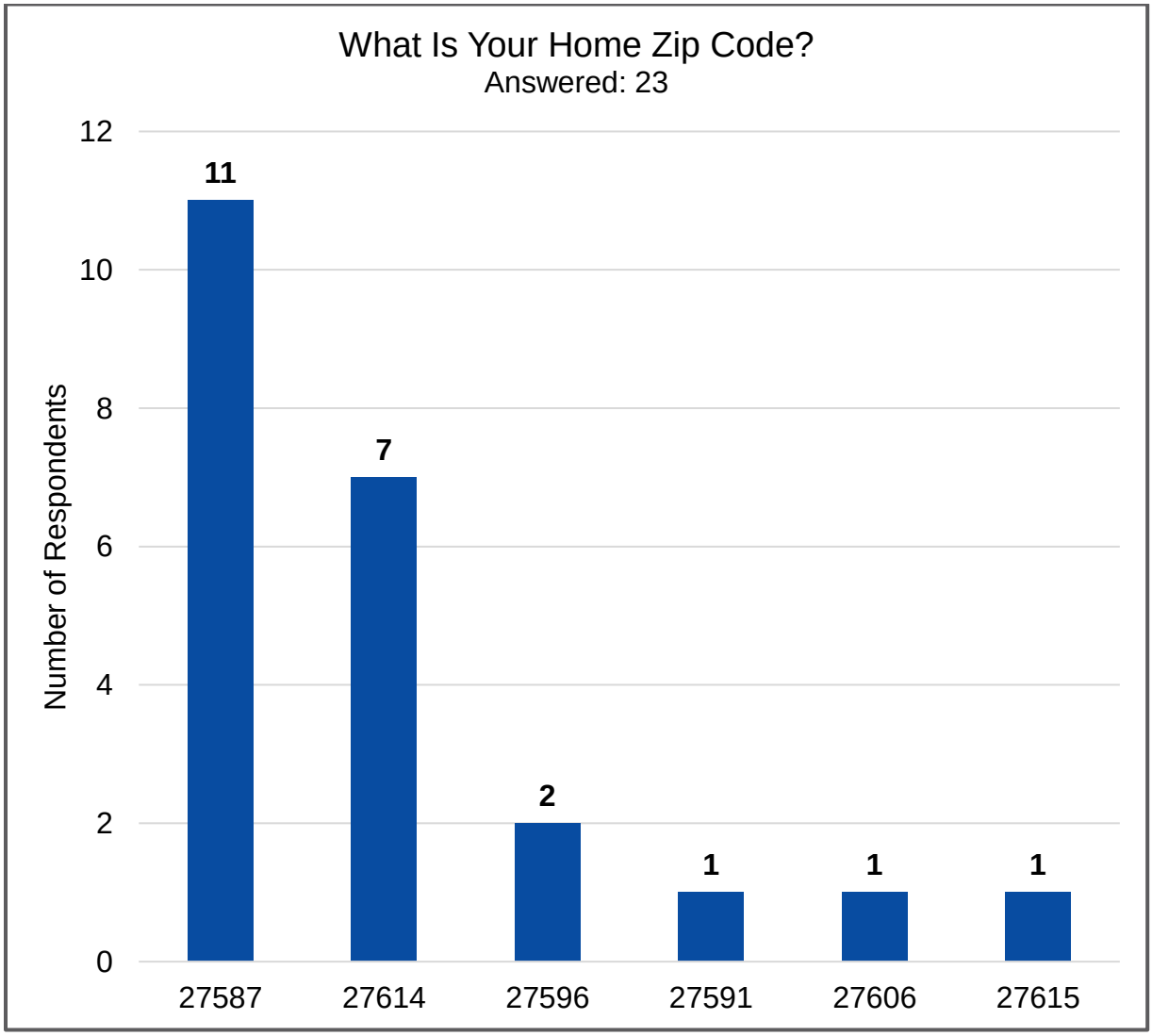


Most respondents, 41.7% are very satisfied with their transit experience, with 37.5% being somewhat satisfied. Nearly 16.7% of respondents said that they were neither satisfied nor dissatisfied. Approximately 4.2% of respondents stated they are somewhat dissatisfied with their transit experience. Notably, zero respondents expressed being very dissatisfied.

Voluntary Demographic Question Analysis

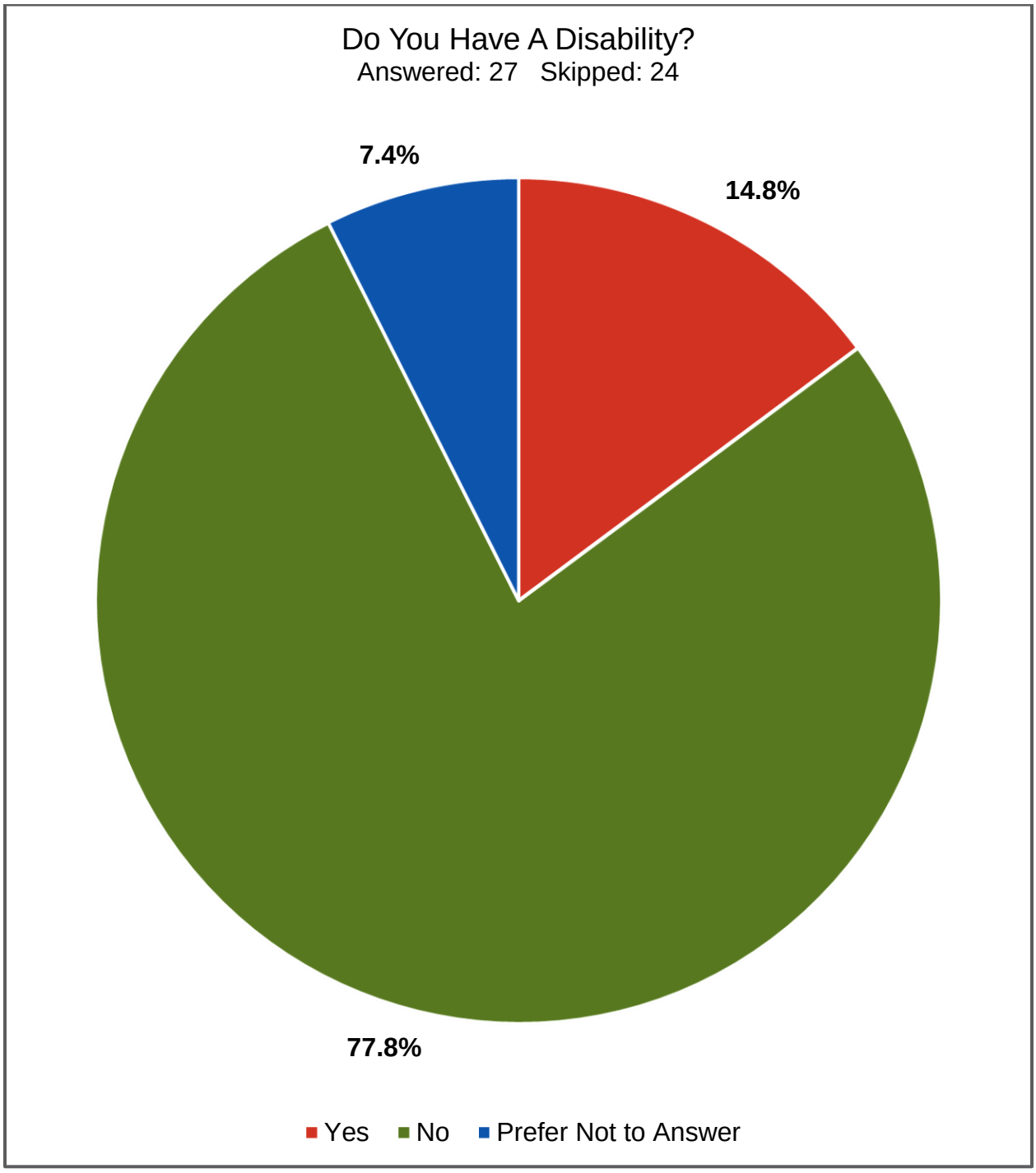
To learn more about who participated, the survey included several optional demographic questions. The broader goals of the Wake Forest Transit Plan engagement process were to engage 1 percent (1%) of residents in the study area, to match demographic representation in the surveys within 5 percent (5%) of relevant demographic categories.

Zip Codes



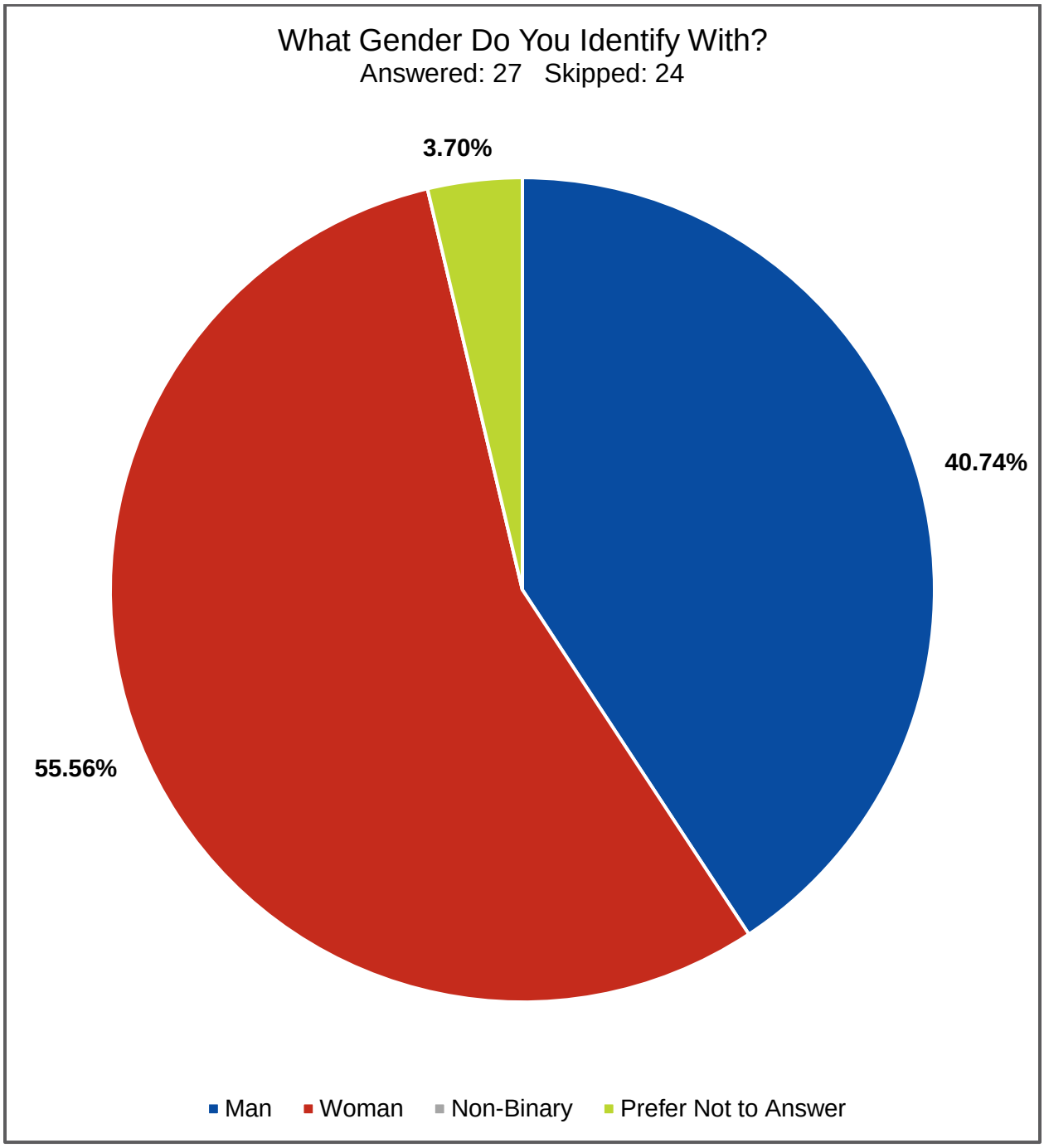
While less than half of survey respondents indicated their zip code, 11 of the of the 23 respondents who answered this question resided in a single zip code, 27587. This was followed by 7 residents who resided in 27614. Additional residents resided in the 27596, 27591, 27606, and 27615 zip codes.

Disability



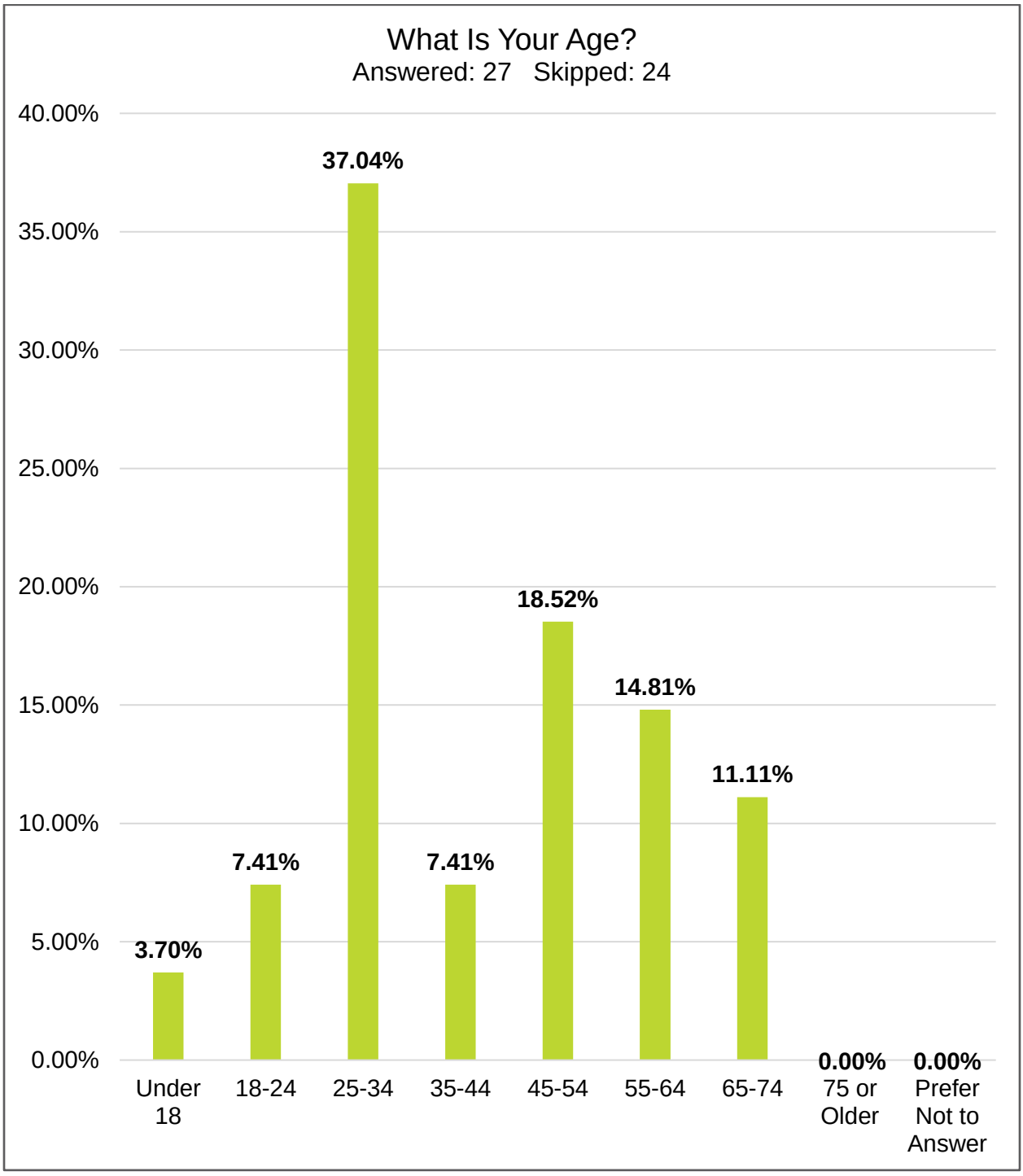
Nearly 15 percent (14.8%) of question respondents reported having a disability, while 77.8% stated they do not have a disability and 7.4% indicated that they preferred not to answer the question.

Gender Identity



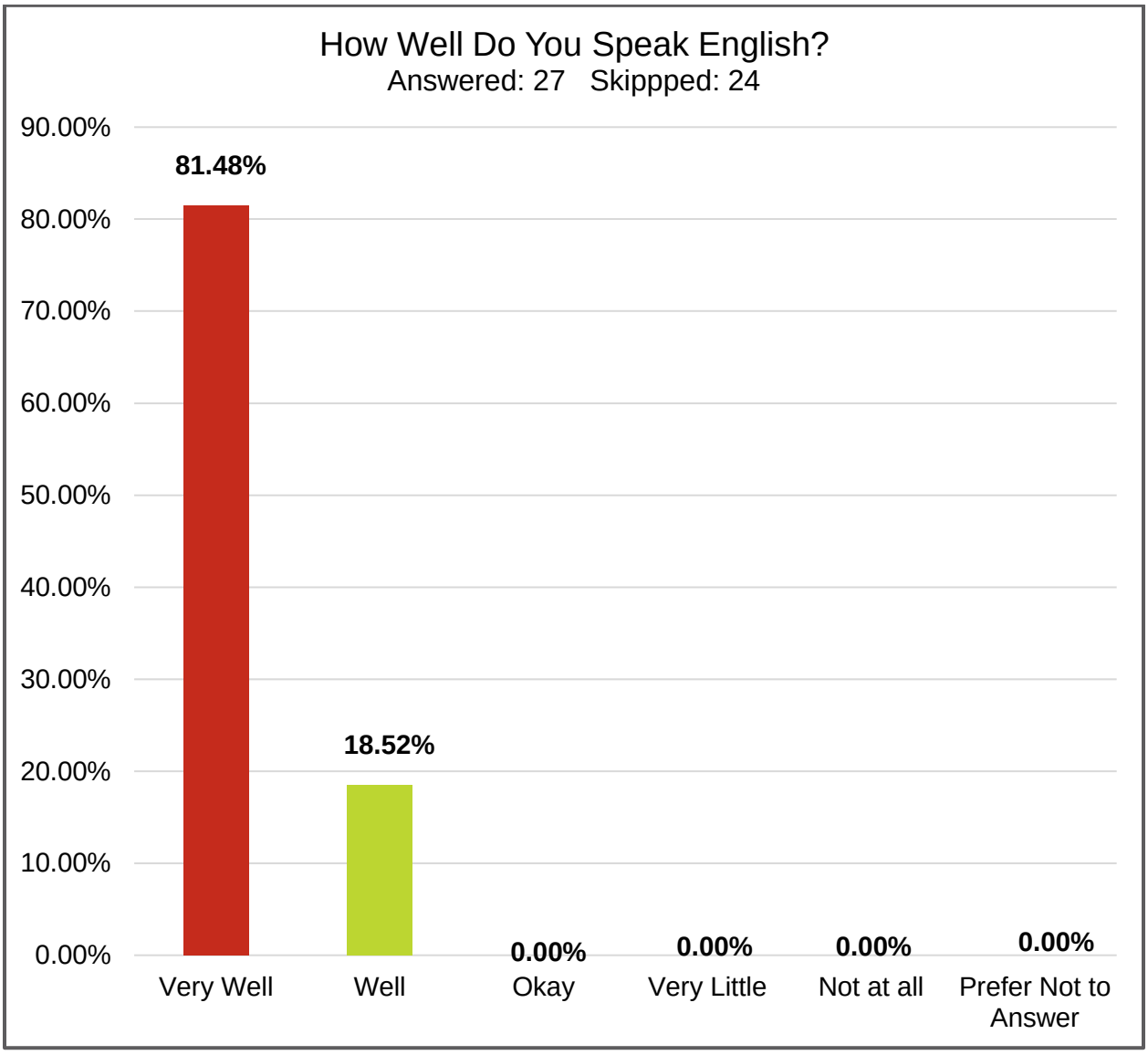
A slight majority of question respondents identified as women at 55.6%, while 40.7% identified as men and 3.7% chose not to offer their gender identity. Although it was provided as an option, non-binary was not selected as the preferred identity among any survey respondents.

Age



The largest proportion of question respondents, 37.0%, are aged between 25 and 34 years. Eleven percent (11.1%) report being younger than 25 years old or between 65 and 74 years old. Nearly 19 percent (18.5%) are between 45 and 54 years old and 14.8% are between 55 and 64 years old. Zero respondents indicated that they were 75 years or older.

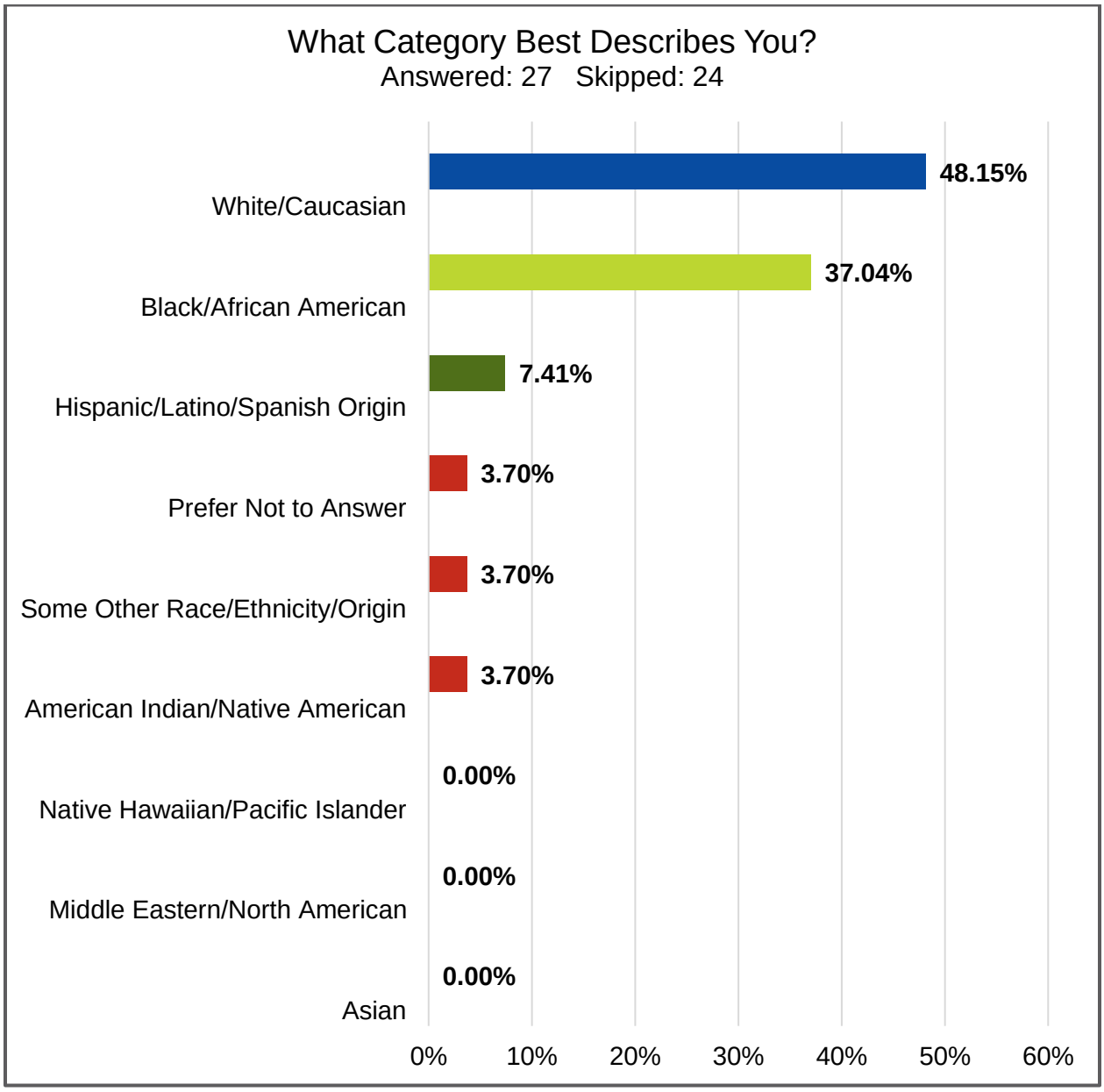
Language Proficiency and Preference



All question respondents indicated that they speak English either very well (81.5%) or well (18.5%). Zero respondents stated that they speak English 'okay,' very little, or not at all.

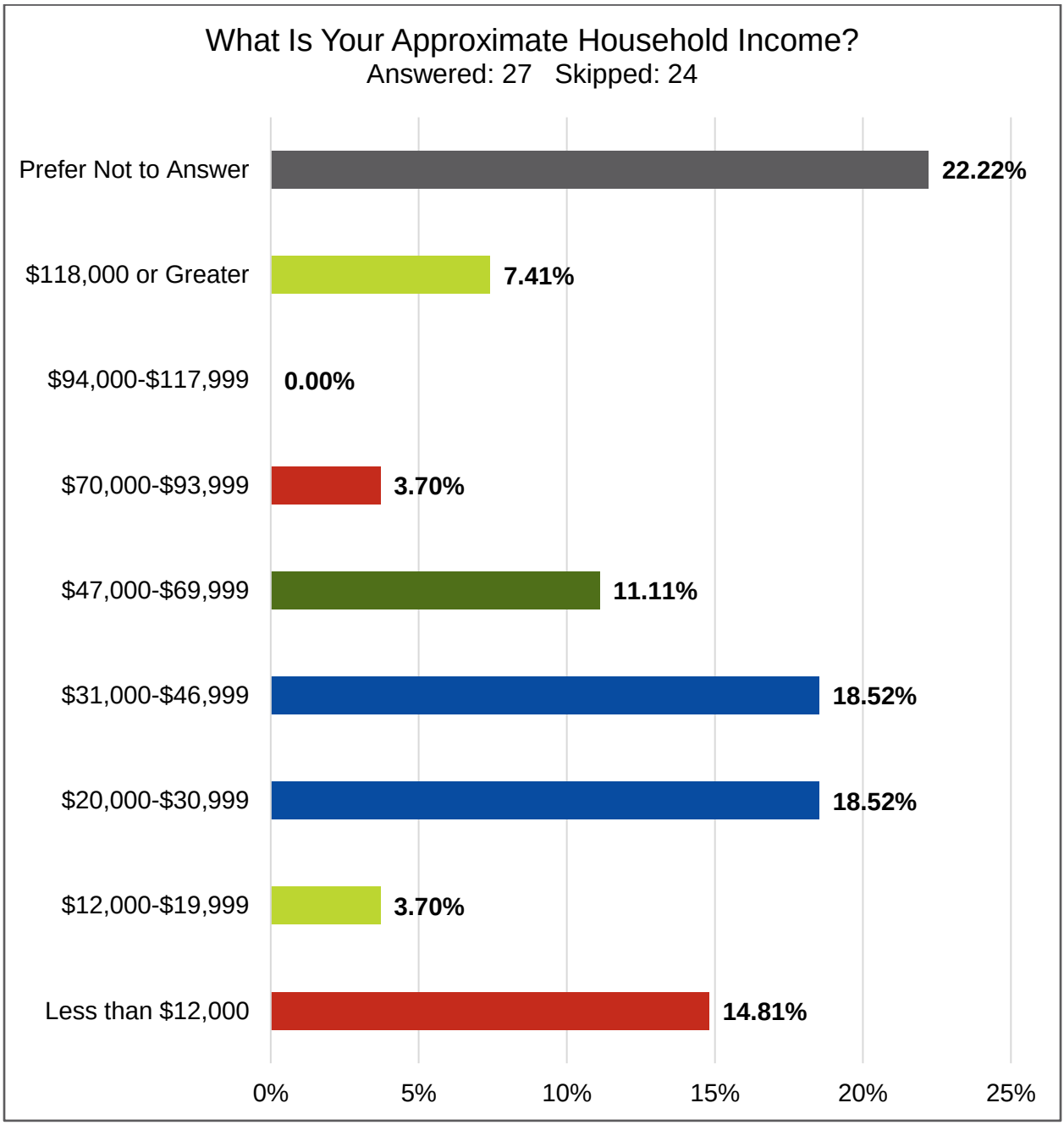
Of respondents offering what language they primarily speak at home the majority speak English (89.4%). Two respondents stated that their preferred language at home is Spanish.

Racial/Ethnic Identity



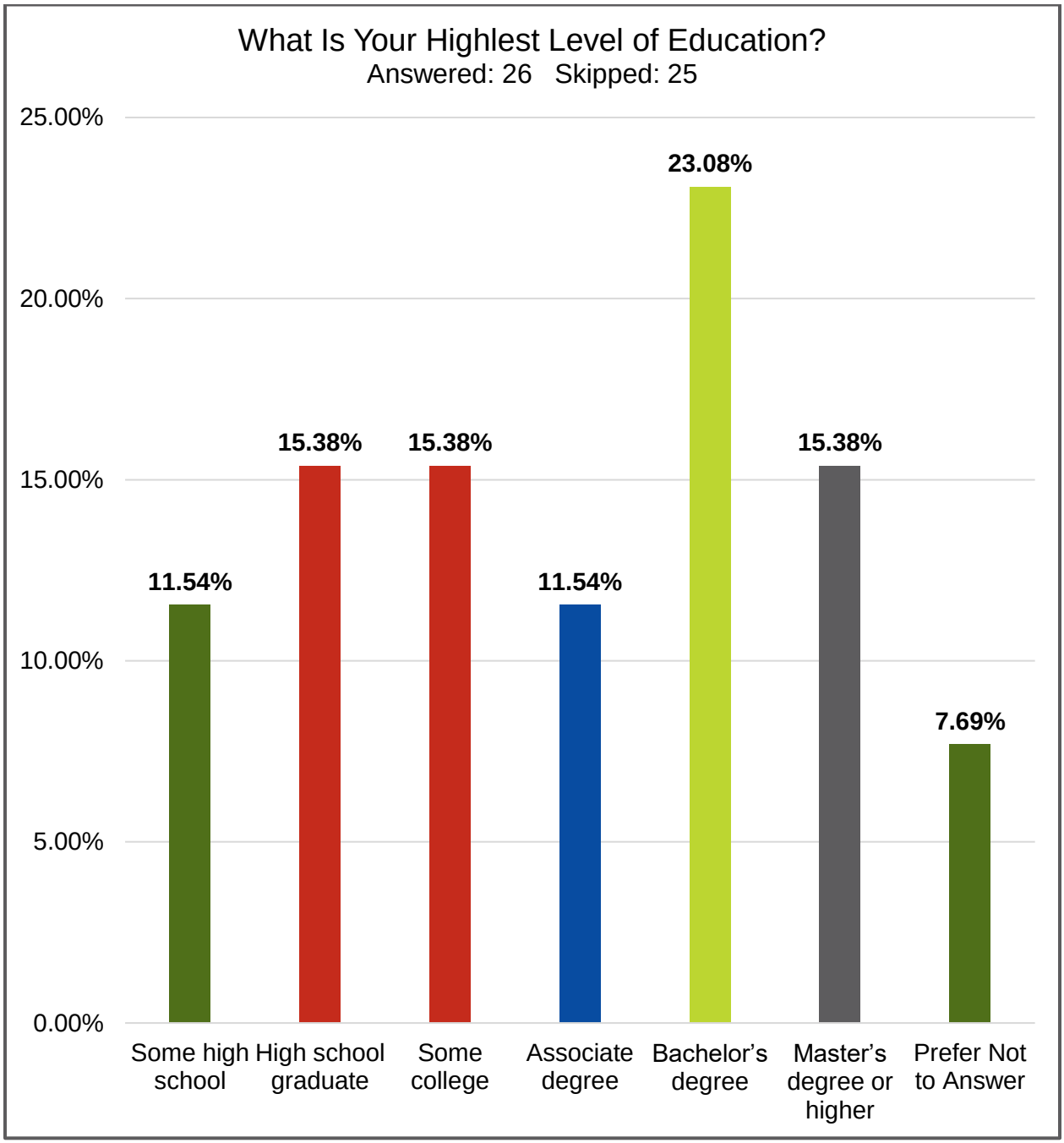
Most question respondents racially identify as white/Caucasian, 48.2% and/or Black/African American (37.0%). Slightly over 7% (7.4%) identify as Hispanic, Latino, or of Spanish origin. Few or no persons identifying as American Indian/Alaskan Native (n=1), Asian (n=0), Middle Eastern (n=0), or Native Hawaiian/Pacific Islander (n=0) were represented in the survey sample. Over 3% (3.7%) opted out of providing their racial identity.

Household Income



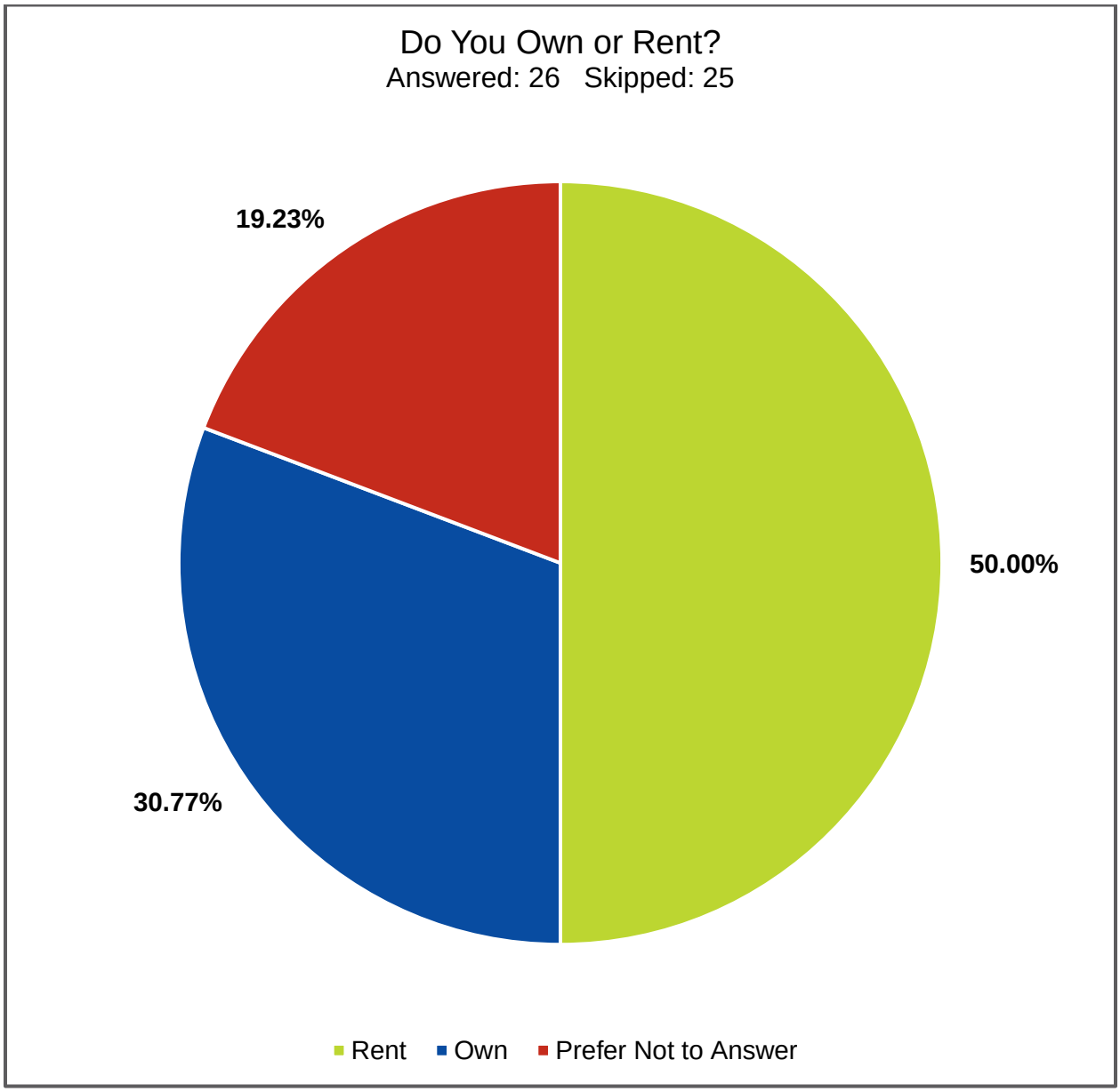
Nearly 19% (18.5%) of question respondents reported a household income between $20,000 and $30,999 per year. The same percentage (18.5%) of respondents reported a household income between $31,000 and $46,999 per year. Nearly 4 percent (3.7%) reported earning $12,000 and $19,999, as well as, $70,000 and $93,999. Less than 11 percent (11.1%) earn between $47,000 and $69,999, and 7.4% earn $118,000 or more in annual income. Slightly over 22 percent (22.2%) of respondents declined to offer their income information.

Education



Slightly over 23% (23.1%) of questions respondents had at least a bachelor's degree, with 15.4% having a master's degree or higher. Twelve percent (11.5%) have an associate's degree, 15.4% completed some college, 15.4% have a high school diploma, and 11.5% report completing some high school. Two respondents declined to report their educational attainment.

Own or Rent



Fifty percent (50%) of survey respondents are renters. Nearly 31% (30.8%) of respondents are homeowners. Nineteen percent (19.2%) did not provide their residential status.

Recommendations for Future Outreach

This survey met demographic representation goals for populations living below the poverty level and minority populations. A total of 5% of the population of Wake Forest lives below the poverty level. Among survey respondents, 19% indicated an annual household income of less than $20,000 per year. Minorities make up 28.3% of the population of Wake Forest. Over 40% of survey respondents identified as a member of a racial minority. This survey met demographic representation goals for populations living below the poverty level and minority populations.

Regarding Limited English Proficiency populations, although 2.3% of the population of Wake Forest speak Spanish as a primary language, the survey almost exclusively reached English-speaking populations, with 81.5% of respondents speaking English very well and 18.5% speaking English well.

Future outreach should consider increasing advertising to Spanish-language media, ensuring access to survey materials in Spanish, and translating advertising materials (flyers, business cards, and other materials) into Spanish. Additionally, Wake Forest could consider partnering with community organizations to increase feedback from community members who primarily speak Spanish.

Lastly, the project team may wish to increase advertising in the least represented zip codes.

Exhibit 2 – Amendments

1. Page 3: Add appendices to the table of contents.
2. Page 11: Update footnote #5 to https://online.flippingbook.com/view/370447640/.
3. Page 12: Change the color of the S-Line Station Area symbol to a solid black line to match the map symbology.
4. Page 13: Strike the "s" from the Pop-up Events label.
5. Page 14: Change "below" to "on page 16" in "Results from the survey are summarized below and in Appendix A."
6. Page 14: Add a hyperlink to the page 16 text added in amendment above.
7. Page 14: Add hyperlink to Appendix A.
8. Page 14: Add hyperlink to Appendix B.
9. Page 15: Change "samples" to "sample".
10. Page 16: Add hyperlink to Appendix A.
11. Page 17: Change 24% to 25% in the Figure 9 description.
12. Page 17: Bold the 9 in Figure 9 under the image.
13. Page 17: Add hyperlink for Figure 9.
14. Page 17: Add hyperlink to Appendix B.
15. Page 18: Under the Serve Northeast Wake Forest heading, strike the comma between "plan" and "and".
16. Page 29: After (e.g. at their home) change "and be transportation" to "and be transported"
17. Page 29: Change "– one vehicle or trip taking more than one riders to the same or nearby destinations" to "– one vehicle or trip taking more than one rider to the same or nearby destination".
18. Page 20: Change "However, shared rides are not very common because it is not very likely that riders will be traveling to the same or nearby destinations" to "However, shared rides are not very common because it is not very likely that riders will be traveling to the same or nearby destination".
19. Page 20: Remove hatched black line illustrating Rolesville ETJ/corporate boundary.
20. Page 21: Remove hatched black line illustrating Rolesville ETJ/corporate boundary.
21. Page 22: Remove hatched black line illustrating Rolesville ETJ/corporate boundary.
22. Page 24: Remove hatched black line illustrating Rolesville ETJ/corporate boundary.
23. Page 29: In the 1st paragraph under Microtransit, strike the comma after Wake Forest in the second sentence.
24. Page 25: Strike "for presented" from the note below Table 1.
25. Page 30: Under the West Loop bullet points, strike "Center" from the "Shops and Restaurants at Center S Main Street and Carter Street"
26. Page 31: In the second paragraph, remove the extra space between "the" and "West".
27. Page 35: Add a space between the first paragraph and the Table 7 label.
28. Page 35: Add hyperlink for Table 7.
29. Page 35: Add a space after the 3 for footnote #3 in Table 7.
30. Page 35: For footnote #5, strike "the Town of".
31. Page 36: Add a space after the 3 for footnote #3 in Table 8.
32. Page 37: Change "Town of Wilson" to "City of Wilson".

33. Page 37: Strike the comma between July and 2023 in the note below Table 9.
34. Page 38: In the first paragraph, remove the extra space between "… to get a ride." and "If demand is high…".
35. Page 39: In the last paragraph under Community Funding Area Program (CFAP), change "annual" to "annually".
36. Page 40: In the first footnote under Table 11, change "minuses" to "minus".
37. Add page numbering consistent with the document format for the appendices (A-1, A-2, etc. and B-1, B-2, etc.)
38. Add header for Appendix A (Phase 1 Outreach Summary).
39. Add header for Appendix B (Rider Survey Summary Report).

ORDINANCE 2023-XXX

ORDINANCE OF THE BOARD OF COMMISSIONERS OF THE TOWN OF WAKE FOREST TO ADOPT THE PUBLIC TRANSIT PLAN (CPA-23-02)

WHEREAS, the Town of Wake Forest began offering a fare free bus service in 2008; and

WHEREAS, the Wake Forest Loop offers Wake Forest residents access to commercial and shopping opportunities, medical facilities, and public services; and

WHEREAS, the Town is also served by the Wake Forest-Raleigh Express (WRX), a commuter service route from GoTriangle; and

WHEREAS, the Town received American Rescue Plan Act (ARPA) funding to expand public transit; and

WHEREAS, the purpose of this plan was to explore ways to expand transit to serve growing parts of the Town and connect to key activity centers; and

WHEREAS, expanded transit services are necessary in Wake Forest to provide residents, employees, and visitors additional mobility options beyond that of an automobile: and

WHEREAS, the Town conducted a popup event, four open houses, and two online surveys to gather public input; and

WHEREAS, the Planning Board held a public comment session on August 21, 2023 and the Board of Commissioners held a public hearing on October 3, 2023; and

WHEREAS, a print ad was published in a paper of general circulation for the public comment session and public hearing pursuant with G.S. § 160D-602 and the Unified Development Ordinance; and

WHEREAS, the Planning Board at their August 21, 2023 meeting voted unanimously to recommend approval of the Public Transit Plan; and

NOW, THEREFORE, BE IT ORDAINED by the Board of Commissioners of the Town of Wake Forest:

> Section 1. Adopts the Wake Forest Public Transit Plan (Exhibit 1) and Plan revisions (Exhibit 2).

Section 2. Deems the Wake Forest Public Transit Plan effective immediately upon adoption.

Adopted and effective this 3rd day of October 2023.

_____

Vivian A. Jones
Mayor

ATTEST:

_____

Theresa Savary
Town Clerk

APPROVED AS TO FORM:

_____

Hassan Kingsberry
Town Attorney

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-206-
Submitted by: Courtney Tanner
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Consideration of Draft Wake Forest Public Transit Plan (CPA-23-02)

Recommendation:

Item Summary:

ATTACHMENTS

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-219-
Submitted by: Emma Linn
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Presentation of LEGISLATIVE CASE RZ-23-05, 2117 Averette Road, a rezoning map amendment filed by Douglas and Sarah Machado to rezone 2.822 acres located at 2117 Averette Road, being Wake County Tax PIN 1851-90-8235, from Wake County's Residential-30 (R-30) to General Residential 5 (GR5).

Recommendation:

Item Summary:

ATTACHMENTS

- BOC Agenda Summary RZ-23-05.pdf
- RZ-23-05 Staff Report.pdf
- Attachment A - Neighborhood Meeting Information.pdf
- Attachment B - Application.pdf
- Attachment C - Maps.pdf
- Attachment D - Planning Board Recommendation.pdf

Agenda Item: Presentation of LEGISLATIVE CASE RZ-23-05, 2117 Averette Road, a rezoning map amendment filed by Douglas and Sarah Machado to rezone 2.822 acres located at 2117 Averette Road, being Wake County Tax PIN 1851-90-8235, from Wake County's Residential-30 (R-30) to General Residential 5 (GR5).

Summary: A public comment session was held at the September 12, 2023, Planning Board meeting. The Planning Board voted 5-0 to find the request consistent with the Community Plan and in the public interest and recommended approval of the zoning map amendment (rezoning) request.

Attachments: See Staff Report.

TOWN of WAKE FOREST

Staff Report
Case RZ-23-05: 2117 Averette Road Rezoning

Meeting Date	October 3, 2023
Requested Actions	Consideration of the following items related to the Zoning Map Amendment request for 2117 Averette Road: 1. Act on Plan Consistency Statement 2. Rezone 2.822 acres on the Town of Wake Forest Zoning Map from Wake County Residential 30 (R-30) to General Residential 5 (GR5).
Case Manager	Emma Linn, Planner II - Long Range Planning
Planning Board Recommendation	Recommended approval of the zoning map amendment request by a vote of 5-0. See Attachment D for the Planning Board Recommendation.

PUBLIC MEETINGS

Neighborhood Meeting	Public Comment Session	Public Hearing
July 12, 2023 *(See Attachment A)*	September 12, 2023	October 17, 2023

CASE INFORMATION

Applicant	Douglas and Sarah Machado 2117 Averette Rd Wake Forest, NC 27587
Property Owners	Douglas and Sarah Machado 2117 Averette Rd Wake Forest, NC 27587
Location	Directly to the north of Rosedale Subdivision Phase 4 and south of Copper Beech Lane.
Addresses	2117 Averette Road
Wake County Tax PIN	1851908235
Acreage	2.822

Zoning	Existing: Wake County R-30 Proposed: General Residential 5 (GR5)
Land Use	Existing: Dwelling - Single-Family Proposed: Dwelling - Single-Family
Corporate Limits	This application is outside the Town's corporate limits and within the Town's Long Range Urban Service Area. An annexation petition has been filed.
Community Plan Designation	Mixed Residential

See Attachment B for a copy of the application and Attachment C for Aerial, Zoning, and Land Use Maps. See Community Plan page 40 for a description of Mixed Residential.

SURROUNDING LAND USES AND ZONING

	Land Use	Zoning
North	Dwelling – Single-Family (non-subdivision parcels)	Wake County R-30
South	Dwelling – Townhome (Rosedale Subdivision)	Planned Unit Development (PUD)
East	Dwelling – Single Family (Rosedale Subdivision and non-subdivision parcels) and Vacant	Wake County R-30 and PUD
West	Dwelling-Townhome (Rosedale Subdivision)	Planned Unit Development (PUD)

The proposed land use is generally **compatible** with surrounding land uses.

The proposed zoning is generally **compatible** with surrounding zoning.

See Attachment C for associated maps.

COMPREHENSIVE PLAN CONSISTENCY

Community Plan (2022)	The proposed zoning map amendment request is generally consistent with the adopted 2022 Community Plan.
Comprehensive Transportation Plan (2021)	The Comprehensive Transportation Plan is not applicable to the proposed zoning map amendment request.

Historic Preservation Plan (2022)	The Historic Preservation Plan is not applicable to the zoning map amendment request.
Northeast Neighborhood Plan (2021)	The Northeast Neighborhood Plan is not applicable to the zoning map amendment request.
Park, Recreation, and Cultural Resources Master Plan (2015)	The Parks, Recreation, and Cultural Recourses Master Plan is not applicable to the zoning map amendment request.
Public Art Vision Plan (2009)	The Public Art Vision Plan is not applicable to the zoning map amendment request.
Renaissance Plan (2017)	The Renaissance Plan is not applicable to the zoning map amendment request.

There is no detailed Plan Consistency Analysis since the Land Use Map is the only applicable section of the Community Plan.

STAFF RECOMMENDATION

The zoning map amendment request is generally **Consistent** with the relevant policies in the Comprehensive Plan, and **Approval** of the zoning map amendment request is reasonable and in the public interest.

ATTACHMENTS

Attachment A: Neighborhood Meeting Information
Attachment B: Application
Attachment C: Maps
Attachment D: Planning Board Recommendation

Douglas Machado
Sarah Machado
2117 Averette Rd
Wake Forest, NC 27587

June 30, 2023

RE: Neighborhood Meeting Notice

Dear Neighboring Property Owner:

Douglas Machado and Sarah Machado are hosting a neighborhood meeting for property owners within close proximity to the site to discuss a rezoning proposal.

Meeting Date:	Wednesday, July 12, 2023
Meeting Time:	6:00pm-6:30pm
Meeting Location:	Gatehouse Tavern, 960 Gateway Commons Cir, Wake Forest, NC 27587
Project Name:	2117 Averette Rd Rezoning
Project Location:	2117 Averette Rd, Wake Forest, NC 27587
Application Type:	Map Amendment (Rezoning)
Size of Project:	2.83 acres
PIN:	1851908235

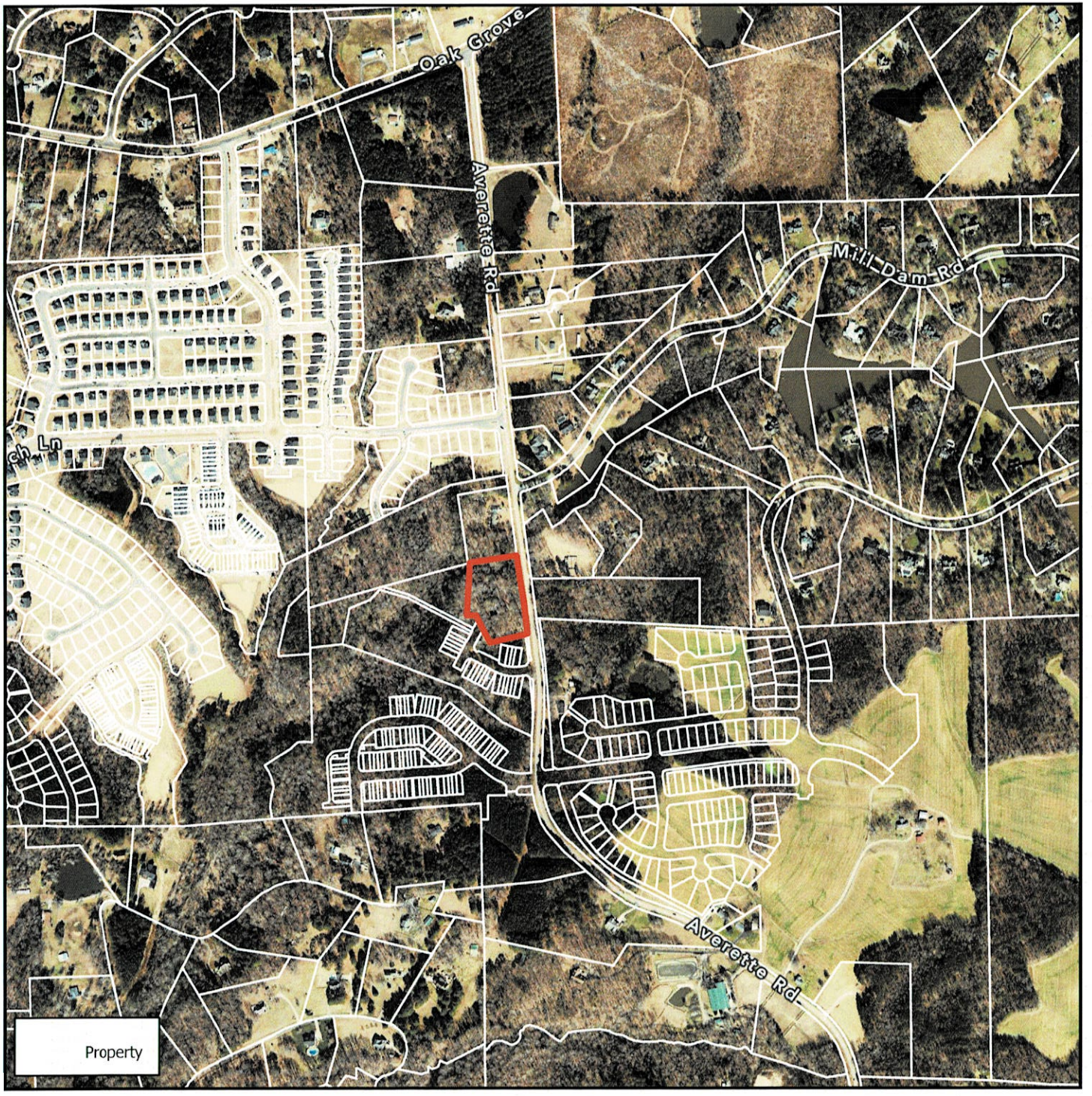
Project Description: Douglas Anthony Machado and Sarah Renee Machado are proposing to rezone 2.83 acres located at 2117 Averette Rd from Wake County's Residential-30 (R-30) zone to Wake Forest's General Residential 5 (GR5) zone.

If you have any questions regarding this matter, please feel free to contact me directly at (941) 928-7889 or srmachado37@gmail.com

Sincerely,

Sarah Machado

Enclosures:	subject area map
Cc:	Town of Wake Forest Planning Department



2117 Averette Rd
Rezoning - Subject Area

REID: 0110658
PIN: 1851908235
PIN Extension: 000
Land Value: $88260
Building Value: $249743
Total Value Assessed: $338003
Deed Acres: 2.83
Total Sale Price: $600000
Sale Date: 4/12/2023
Year Built: 1980
Heated Area: 3002
Type and Use: SINGLFAM
Design Style: Conventional
Planning Jurisdiction: WC
Township: Wake Forest
Owner: MACHADO, DOUGLAS ANTHONY
MACHADO, SARAH RENEE
Mailing Address 1: 2117 AVERETTE RD
Mailing Address 2: WAKE FOREST NC
27587-8230
Deed Book: 019307
Deed Page: 01187
Deed Date: 4/12/2023
Land Class: Residential Less Than 10 Acres
Map Name: 1851 04
Billing Class: Individual
Property Description: PROP ARTHUR IVEY &
ANGELA IVEY BM1991 -932
Site Address: 2117 AVERETTE RD
Street Name: AVERETTE RD
Old Parcel Number: 207-00000-0039
Units: 2
Total Structures: 2
Total Units: 2

N

0 400 800 1600 ft

1 inch equals 800 feet

Disclaimer
*iMaps makes every effort to produce and publish the most current and accurate information possible. However, the maps are produced for information purposes, and are **NOT** surveys. No warranties, expressed or implied ,are provided for the data therein, its use,or its interpretation.*

Douglas Machado
Sarah Machado
2117 Averette Rd
Wake Forest, NC 27587

June 30, 2023

RE: Neighborhood Meeting Notice

To Whom it May Concern:

Per UDO Section 15.3.5, a Neighborhood Meeting Notice letter has been sent to all property owners within 500 feet of subject area 2117 Averette Rd via first class mail postmarked 6/30/23.

If you have any questions regarding this matter, please feel free to contact me directly at (941) 928-7889 or srmachado37@gmail.com

Sincerely,



Sarah Machado

Enclosures:

- Neighborhood Meeting Notice
- Subject Area Map
- iMaps screenshot of subject area and properties within 500 ft of it
- List of property owners within 500 feet of subject area to which the Neighborhood Meeting Notice was mailed

Meeting Minutes for Neighborhood Meeting

Meeting Date: Wednesday, July 12, 2023
Meeting Time: 6:00pm-6:30pm
Meeting Location: Gatehouse Tavern, 960 Gateway Commons Cir, Wake Forest, NC 27587

Facilitator: Sarah Machado

Attendees Present:

Douglas Machado	941-840-3033
Sarah Machado	941-928-7889

Meeting Purpose: 2117 Averette Rd Rezoning

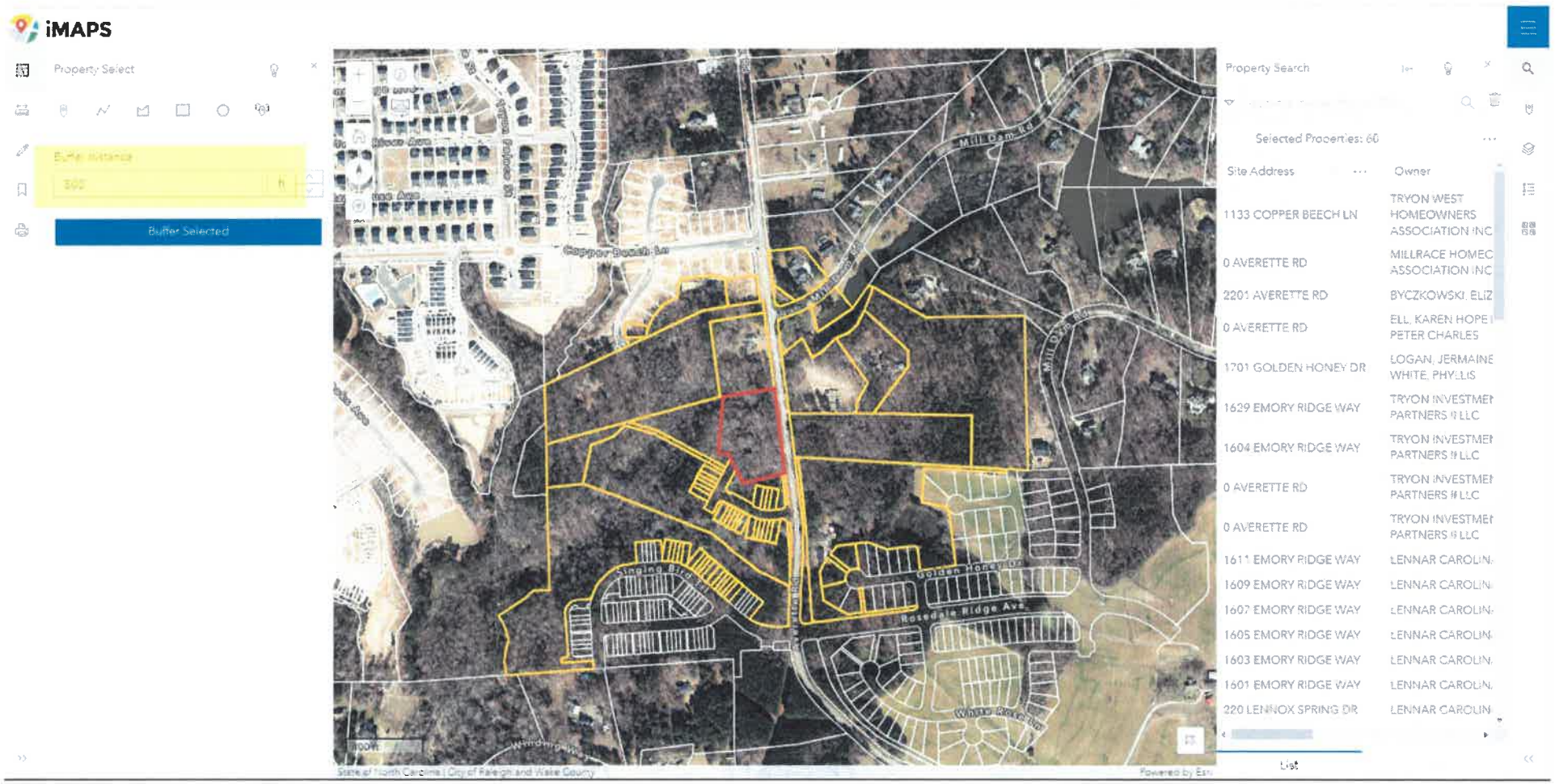
Discussion: Explained proposed project to rezone 2.83 acres located at 2117 Averette Rd from Wake County's Residential-30 (R-30) zone to Wake Forest's General Residential 5 (GR5) zone.

Conclusion: No surrounding property owners were present and therefore no concerns or objections were raised.

Property Owners within 500 feet of subject area 2117 Averette Rd per iMaps on 6/30/23

PIN_NUM	OWNER	ADDR1	ADDR2	ADDR3	SITE_ADDRESS	ZIPNUM
1851907998	TRYON WEST HOMEOWNERS ASSOCIATION INC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1133 COPPER BEECH LN	27587
1861001771	MILLRACE HOMEOWNERS ASSOCIATION INC	PO BOX 1914	WAKE FOREST NC 27588-1914		0 AVERETTE RD	27587
1851904622	BYCZKOWSKI, ELIZABETH	2201 AVERETTE RD	WAKE FOREST NC 27587-8232		2201 AVERETTE RD	27587
1861005214	ELL, KAREN HOPE ELL, PETER CHARLES	680 SPRINGLAKE DR	FRANKLIN TN 37064-4747		0 AVERETTE RD	27587
1860092554	LOGAN, JERMAINE D WHITE, PHYLLIS	1701 GOLDEN HONEY DR	WAKE FOREST NC 27587-3754		1701 GOLDEN HONEY DR	
1851904083	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1629 EMORY RIDGE WAY	27587
1851909040	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1604 EMORY RIDGE WAY	27587
1860090927	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		0 AVERETTE RD	27587
1860090741	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		0 AVERETTE RD	27587
1850998800	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1611 EMORY RIDGE WAY	27587
1850997871	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1609 EMORY RIDGE WAY	27587
1850997852	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1607 EMORY RIDGE WAY	27587
1850997833	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1605 EMORY RIDGE WAY	27587
1850997814	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1603 EMORY RIDGE WAY	27587
1850996895	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1601 EMORY RIDGE WAY	27587
1850995985	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	220 LENNOX SPRING DR	27587
1850995997	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	218 LENNOX SPRING DR	27587
1850996909	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	216 LENNOX SPRING DR	27587
1851906011	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	214 LENNOX SPRING DR	27587
1851906045	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	210 LENNOX SPRING DR	27587
1851906023	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	212 LENNOX SPRING DR	27587
1850999766	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1625 EMORY RIDGE WAY	27587
1850999736	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1623 EMORY RIDGE WAY	27587
1850999716	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1621 EMORY RIDGE WAY	27587
1850998796	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1619 EMORY RIDGE WAY	27587
1850998777	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1617 EMORY RIDGE WAY	27587
1850998747	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1615 EMORY RIDGE WAY	27587
1850994665	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1655 SINGING BIRD TRL	27587
1850994684	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1657 SINGING BIRD TRL	27587
1850995614	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1659 SINGING BIRD TRL	27587
1850995661	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1663 SINGING BIRD TRL	27587
1850995680	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1665 SINGING BIRD TRL	27587
1850996508	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1667 SINGING BIRD TRL	27587
1850996517	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1669 SINGING BIRD TRL	27587
1850996535	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1671 SINGING BIRD TRL	27587
1850996563	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1675 SINGING BIRD TRL	27587
1850997500	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1679 SINGING BIRD TRL	27587
1850997428	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1681 SINGING BIRD TRL	27587
1850997437	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1683 SINGING BIRD TRL	27587
1850997455	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1685 SINGING BIRD TRL	27587
1850991525	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1705 SINGING BIRD TRL	27587
1851900221	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		0 SINGING BIRD TRL	27587
1861011026	WYANT, LANDON GLENN WYANT, YIJING TENG	5205 MILL DAM RD	WAKE FOREST NC 27587-6366		5205 MILL DAM RD	27587

1861002502	YOUNG, GILBERT ALAN YOUNG, SHANNON P	2124 AVERETTE RD	WAKE FOREST NC 27587-8229		5509 FOREVER YOUNG DR	27587
1861009515	YOUNG, GILBERT ALAN YOUNG, SHANNON P	2124 AVERETTE RD	WAKE FOREST NC 27587-8229		5533 FOREVER YOUNG DR	27587
1861004672	YOUNG, GILBERT ALAN YOUNG, SHANNON P	2124 AVERETTE RD	WAKE FOREST NC 27587-8229		5521 FOREVER YOUNG DR	27587
1860094853	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1908 AVERETTE RD	27587
1860091519	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		0 AVERETTE RD	
1851908235	**MACHADO, DOUGLAS ANTHONY MACHADO, SARAH RENEE**	**2117 AVERETTE RD**	**WAKE FOREST NC 27587-8230**		**2117 AVERETTE RD**	**27587**
1860093633	NULL, MICHAEL NULL, COURTNEY	1705 GOLDEN HONEY DR	WAKE FOREST NC 27587-3754		1705 GOLDEN HONEY DR	27587
1851902757	MORGAN, ELENA COLON DE MEDINA, EDITH SANCHEZ	716 PRECIPICE WAY	WAKE FOREST NC 27587-2501		716 PRECIPICE WAY	27587
1851907677	BERCIK, FRANK J	504 W HOLDING AVE	WAKE FOREST NC 27587-2845		2133 AVERETTE RD	27587
1850998983	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1616 EMORY RIDGE WAY	27587
1850999912	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1618 EMORY RIDGE WAY	27587
1850999932	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1620 EMORY RIDGE WAY	27587
1850999962	LENNAR CAROLINAS LLC	ROBERT SMART	1100 PERIMETER PARK DR STE 112	MORRISVILLE NC 27560-9119	1622 EMORY RIDGE WAY	27587
1850994645	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1653 SINGING BIRD TRL	27587
1850996581	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1677 SINGING BIRD TRL	27587
1850994615	TRYON INVESTMENT PARTNERS II LLC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		1651 SINGING BIRD TRL	27587
1851905921	TRYON WEST HOMEOWNERS ASSOCIATION INC	8311 BANDFORD WAY STE 7	RALEIGH NC 27615-2761		712 PRECIPICE WAY	27587


iMAPS
Property Select
Buffer Distance
Buffer Selected
Mill Dam Rd
Copper Beech Ln
Golden Honey Dr
Rosedale Ridge Ave
Singing Bird Ln
White Rose Ln
Property Search
Selected Properties: 60
Site Address
Owner
1133 COPPER BEECH LN
TRYON WEST HOMEOWNERS ASSOCIATION INC
0 AVERETTE RD
MILLRACE HOMEC ASSOCIATION INC
2201 AVERETTE RD
BYCZKOWSKI, ELIZ
0 AVERETTE RD
ELL, KAREN HOPE PETER CHARLES
1701 GOLDEN HONEY DR
LOGAN, JERMAINE WHITE, PHYLLIS
1629 EMORY RIDGE WAY
TRYON INVESTMEI PARTNERS II LLC
1604 EMORY RIDGE WAY
TRYON INVESTMEI PARTNERS II LLC
0 AVERETTE RD
TRYON INVESTMEI PARTNERS II LLC
0 AVERETTE RD
TRYON INVESTMEI PARTNERS II LLC
1611 EMORY RIDGE WAY
LENNAR CAROLIN
1609 EMORY RIDGE WAY
LENNAR CAROLIN
1607 EMORY RIDGE WAY
LENNAR CAROLIN
1605 EMORY RIDGE WAY
LENNAR CAROLIN
1603 EMORY RIDGE WAY
LENNAR CAROLIN
1601 EMORY RIDGE WAY
LENNAR CAROLIN
220 LENNOX SPRING DR
LENNAR CAROLIN
List
State of North Carolina | City of Raleigh and Wake County
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Map Amendment (Rezoning) Application

(Map Amendment (Rezoning) - Planning Board Workflow)

Town of Wake Forest, NC
301 S. Brooks St.
Wake Forest, NC 27587-2932
TEL (919) 435-9510 | FAX (919) 435-9539

Project Overview #1010808

Project Title: 2117 Averette Rd Rezoning
Application Type: Map Amendment (Rezoning)
Workflow: Map Amendment (Rezoning) - Planning Board
Jurisdiction: Town of Wake Forest (Wake County)
State: NC
County: Wake

Checklist - Map Amendment (Rezoning)

A submittal checklist is available to view additional documents which are required to submitted with this application. After answering the application questions, you will be asked to upload the required documents.

VIEW MAP AMENDMENT (REZONING) SUBMITTAL CHECKLIST

Missing items will result in the application being declined and returned to the applicant to resubmit. A revised and complete application including all missing items must be received or the application will be not be deemed complete and routed for review.

Please confirm you have reviewed the associated submitted checklist for this permit and confirm you will submit all documents required on the submittal checklist: Yes

Pre-Application Meeting

Has a pre-application conference been held?: Yes

*Note: This type of project requires a pre-application conference be completed prior to official submittal. If this has not been completed, please return to the home screen and select **Pre-Application Conference** from the application type drop down list in order to schedule your required meeting.*

Pre-Application Conference Date: 03/20/2023
Staff Member Met With: Patrick Reidy
IDT Project Number: Rz-23-05

Address & Basic Site Information

Please Note:
In some cases, a parcel address may not verify. In the event that our system is unable to verify the address you enter, please submit the project as an *Unverified Parcel* and provide zoning and land use information as requested below. For verified addresses, the zoning and land use information will be added to the application automatically (you do not need to provide it below).

Project Address or PIN:
- 2117 Averette Rd (1851908235)
- 2117 B Averette Rd (1851908235)

Tax PIN:
- 1851908235
- 1851908235

Acreage: 2.879
Name of Existing Development/Subdivision (if applicable--for reference only):

For unverified addresses/parcels only, please provide below 1) the current use of the parcel, 2) the zoning district(s) it is in, and 3) any overlay districts that apply. Reference the zoning map and the overlay districts map on the town's website.

Current Use & Zoning (required only if address/parcel is unverified):

*Note: Projects falling outside the limits of the Town or ETJ will be required to submit an annexation petition in conjunction with their project submittal. In this case, please return to the home screen and select **Annexation Petition** from the application type drop down.*

GIS Site Information (Automatically Generated - Not Available for Unverified Addresses)

Parcel Area: GIS Acreage
- 2117 Averette Rd: 2.83
- 2117 B Averette Rd: 2.83

Current Use:

Wake Forest (WF):
Base District:
Planning and Zoning:
In SH1-O Overlay:

In SH2-O Overlay:

In TND Overlay:

In HL-O Overlay:

In National Register of Historic Places:

In Water Supply Watershed Protection Overlay:

In SF Overlay:

In MVCP-O Overlay:

In Flood Hazard Area: Floodplain Zones

- 2117 Averette Rd: AE
- 2117 B Averette Rd: AE

Additional Zoning Information

Currently a Conditional District?: No

Currently a Conditional Use?: No

Is there an existing Special Use Permit for the Property?: No

Related Town of Wake Forest Case Numbers: RZ-23-05

Project Contacts

Please enter all project contacts related to your application.

This is an important step to ensure all members of the applicant team receive email notifications associated with the project which may include comments, requested revisions, scheduled meetings or hearings, and final decisions. This also informs Town staff of the team members assigned role with the project.

Project Contact - Applicant
Douglas and Sarah Machado

2117 Averette Road
Wake Forest, NC 27587
P: (Phone)9419287889
srmachado37@gmail.com

Project Contact - Property Owner
Douglas and Sarah Machado

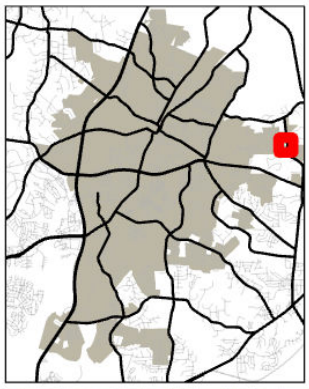
2117 Averette Road
Wake Forest, NC 27587
P: (Phone)9419287889
srmachado37@gmail.com

Map Amendment: Rezoning

Proposed Zoning: GR5, General Residential 5

Description of Request:
Requesting rezoning and annexation in order to apply for city water and sewer

Justification of Consistency with Comprehensive Plan:
Requesting rezoning and annexation in order to apply for city water and sewer



Aerials

TOWN of WAKE FOREST

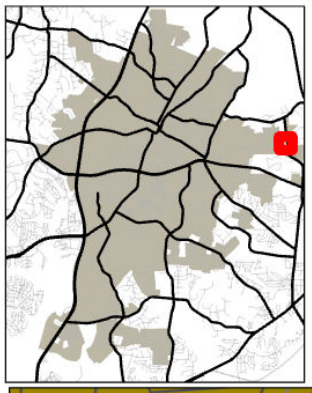
RZ-23-05
2117 Averette Rd
PIN: 1851908235

8/21/2023



Please note that this map is intended for illustrative purposes only. For specific inquiries regarding zoning boundaries, contact the Town Wake Forest Planning Department at 919-435-9510.

0 500 US Feet

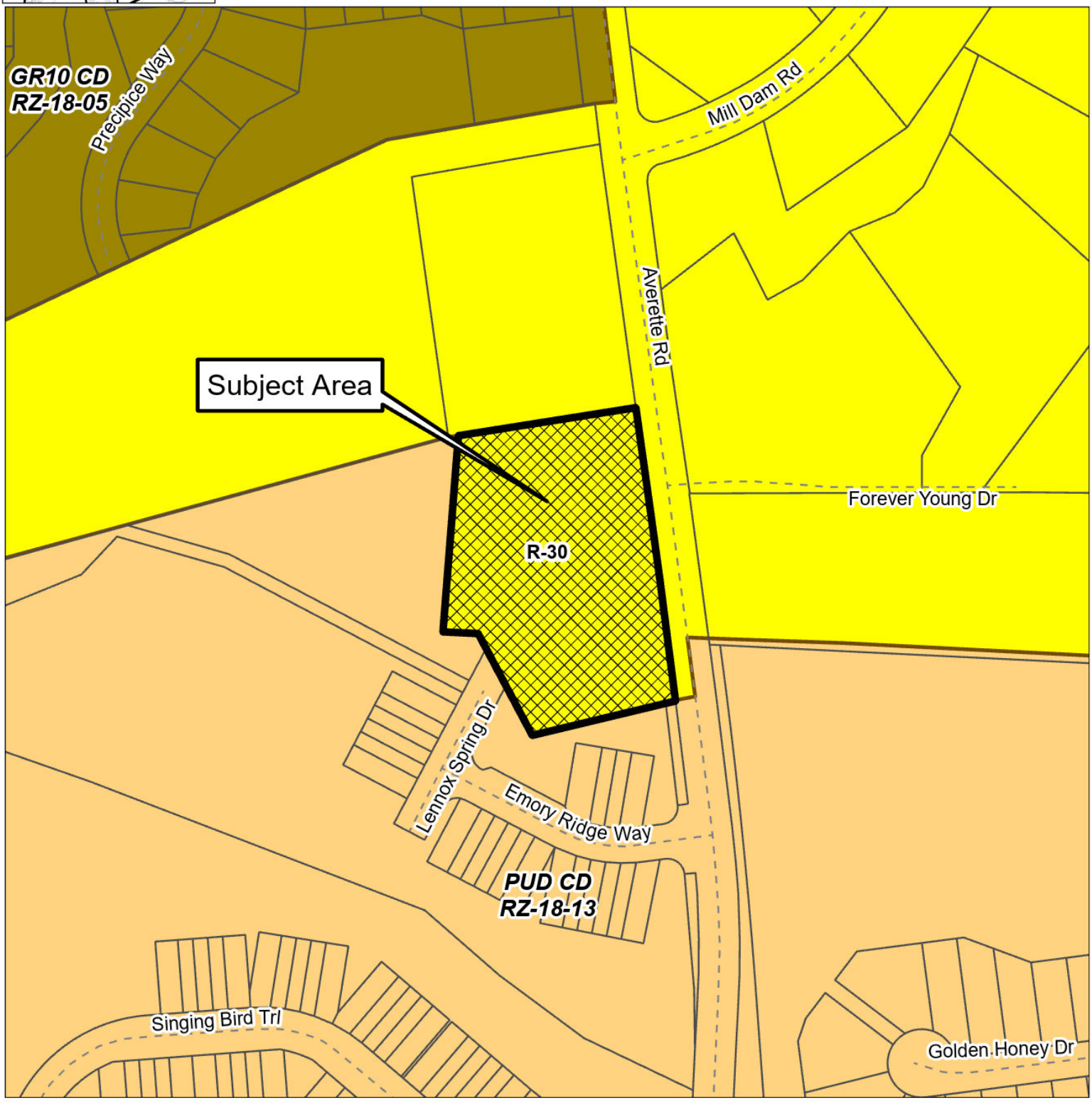


Current Zoning

TOWN of WAKE FOREST

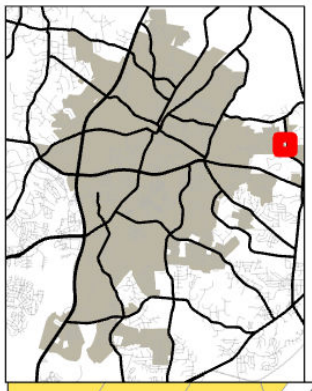
RZ-23-05
2117 Averette Rd
PIN: 1851908235

8/21/2023



Please note that this map is intended for illustrative purposes only. For specific inquiries regarding zoning boundaries, contact the Town Wake Forest Planning Department at 919-435-9510.

0 500 Feet

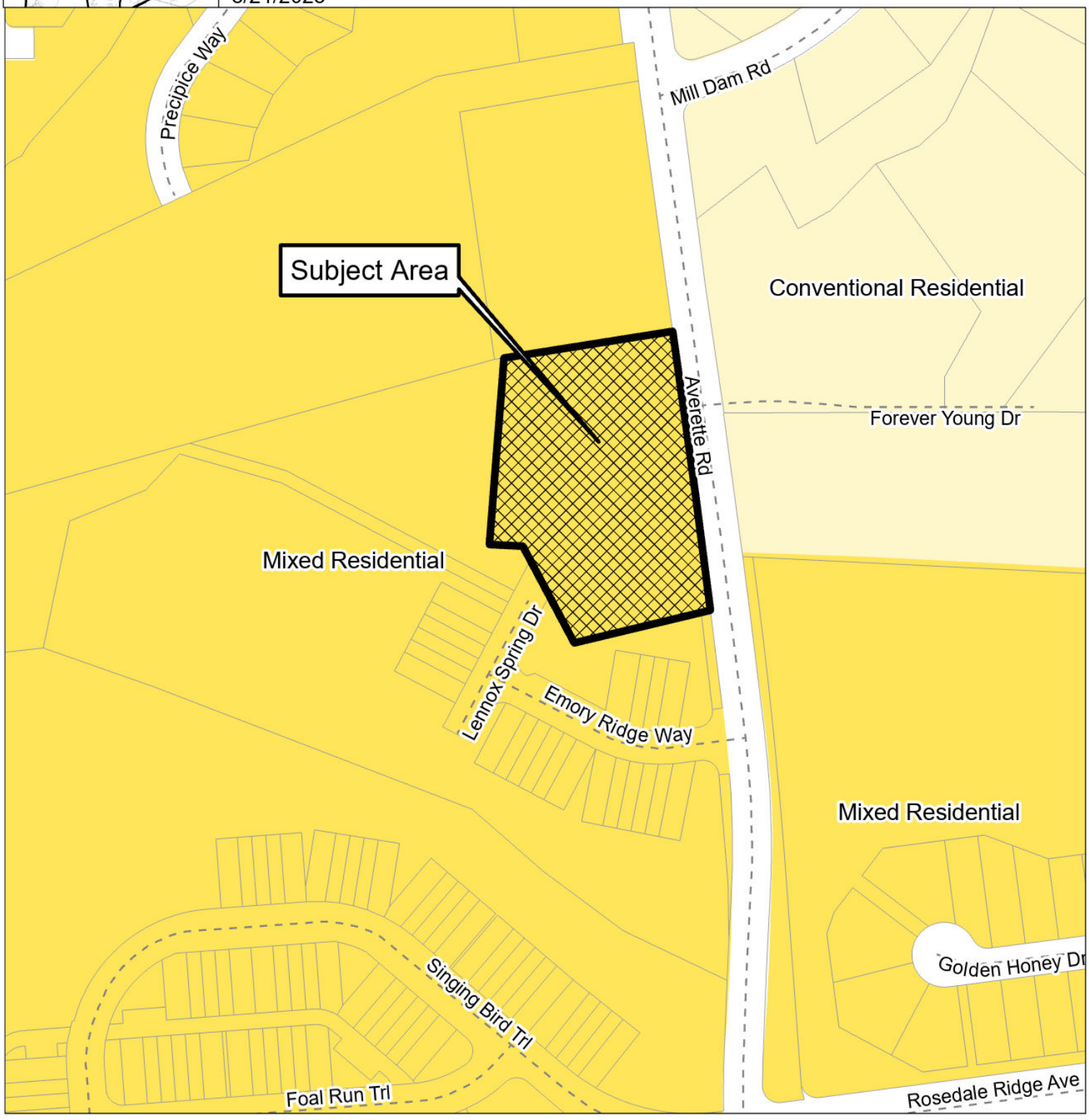


Land Use Plan

TOWN of WAKE FOREST

RZ-23-05
2117 Averette Rd
PIN: 1851908235

8/21/2023



Please note that this map is intended for illustrative purposes only. For specific inquiries regarding zoning boundaries, contact the Town Wake Forest Planning Department at 919-435-9510.

0 500 Feet

TOWN *of*
WAKE FOREST

Report Requirements:

Per NCGS 160D-604, all proposed amendments to the zoning ordinance or zoning map shall have a written report provided from the Planning Board to the Board of Commissioners within 30 days of referral of the amendment to the Planning Board, or the Board of Commissioners may proceed in its consideration of the amendment without the Planning Board report. Furthermore, in no case is the Board of Commissioners bound by the recommendations, if any, of the Planning Board.

Per NCGS 160D-604, the Planning Board shall advise and comment on whether the proposed zoning amendment is consistent with all applicable officially adopted plans, and provide a written recommendation to the Board of Commissioners that addresses plan consistency and other matters as deemed appropriate by the Planning Board, but a comment by the Planning Board that a proposed amendment is inconsistent with the officially adopted plans shall not preclude consideration or approval of the proposed amendment by the Board of Commissioners.

GENERAL INFORMATION

Applicant:	Douglas and Sarah Machado
Owner:	Douglas and Sarah Machado
Requested Action:	Rezone 2.822 acres on the Town of Wake Forest Zoning Map from Wake County's Residential-30 (R-30) to General Residential 5 (GR5)
Existing Zoning:	Wake County's Residential-30 (R-30)
Location:	2117 Averette Road
Size:	2.822 acres
Tax PINs:	1851908235
Existing Land Use:	Dwelling – Single-Family

Applicable Officially Adopted Plans:

The request is generally Consistent with the relevant policies in the Comprehensive Plan, and Approval of the zoning map request is reasonable and in the public interest. The request is consistent with the Land Use Map in the Community Plan.

This report reflects the recommendation of the Planning Board, this the 12th day of September 2023.

Introduced by Planning Board member: Michael Hickey

Seconded by Planning Board member: Sheila Bishop

Attest:

Karin Kuropas, Planning Board Chair

Courtney Tanner, Planning Director

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-220-
Submitted by: Emma Linn
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Presentation of LEGISLATIVE CASE RZ-20-05-01, Fuller Capital Boulevard Property, a rezoning map amendment filed by Red Line Engineering to rezone 29.367 acres located at 4925 Unicon Drive, 4975 Unicon Drive, and 10200 Capital Blvd (portion), being Wake County Tax PINs 1739-51-8319, 1739-61-2717, 1739-51-4482 (portion) from Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) to Light Industrial Conditional District (LI-CD).

Recommendation:

Item Summary:

ATTACHMENTS

- BOC Agenda Summary RZ-20-05-01.pdf
- RZ-20-05-01 Staff Report.pdf
- Attachment A - Neighborhood Meeting Information.pdf
- Attachment B - Application.pdf
- Attachment C - Maps.pdf
- Attachment D - Ordinance RZ-20-05.pdf
- Attachment E - Planning Board Recommendation.pdf

Agenda Item: Presentation of LEGISLATIVE CASE RZ-20-05-01,Fuller Capital Boulevard Property, a rezoning map amendment filed by Red Line Engineering to rezone 29.367 acres located at 4925 Unicon Drive, 4975 Unicon Drive, and 10200 Capital Blvd (portion), being Wake County Tax PINs 1739-51-8319, 1739-61-2717, 1739-51-4482 (portion) from Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) to Light Industrial Conditional District (LI-CD).

Summary: A public comment session was held at the September 12, 2023, Planning Board meeting. The Planning Board voted 5-0 to find the request consistent with the Community Plan and in the public interest and recommended approval of the zoning map amendment (rezoning) request.

Attachments: See Staff Report.

TOWN of WAKE FOREST

Staff Report
Case RZ-20-05-01: Fuller Capital Boulevard Property Rezoning Amendment

Meeting Date	October 3, 2023
Requested Actions	Consideration of the following items related to the Conditional Zoning request for Fuller Capital Boulevard Property: 1. Act on Plan Consistency Statement 2. Rezone 29.367 acres on the Town of Wake Forest Zoning Map from Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) to Light Industrial Conditional District (LI-CD).
Case Manager	Emma Linn, Planner II - Long Range Planning
Planning Board Recommendation	Recommended approval of the zoning map amendment request by a vote of 5-0. See Attachment E for the Planning Board Recommendation.

PUBLIC MEETINGS

Neighborhood Meeting	Public Comment Session	Public Hearing
June 29, 2023 *(See Attachment A)*	September 12, 2023	October 17, 2023

CASE INFORMATION

Applicant	Timothy Lance Red Line Engineering 123 Raleigh Street Fuquay-Varina, NC 27526
Property Owners	5000 Stroller Ridge Drive LLC 701 Finger Lakes Drive Wake Forest, NC 27587
	Young Group Holdings LLC 2808 Connector Drive Wake Forest, NC 27587
	Patricia Williams Brothers 10200 Capital Boulevard Wake Forest, NC 27587

Location	North of Unicon Drive and Leighton Ridge Drive intersection
Addresses	4925 Unicon Dive, 4975 Unicon Drive, 10200 Capital Boulevard (portion)
Wake County Tax PIN(s)	1739518319, 1739612717, and 1739514482 (portion)
Acreage	29.367 acres
Zoning	Existing: Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) Proposed: Light Industrial Conditional District (LI-CD)
Land Use	Existing: Vacant Proposed: Industrial
Corporate Limits	This application is outside the Town's corporate limits and within the Town's extraterritorial planning jurisdiction (ETJ). An annexation petition has not been filed at this time but will be required prior to construction drawing approval.
Community Plan Designation	Light Industrial

See Attachment B for a copy of the application and Attachment C for Aerial, Zoning, and Land Use Maps. See Community Plan *Page 46 in a description of Light Industrial.*

SURROUNDING LAND USES AND ZONING

	Land Use	Zoning
North	Light Industrial and Heavy Industrial	Light Industrial (LI) and Heavy Industrial (HI)
South	Vehicle Services – Major Repair/Body Work and Light Industrial	Conditional Use Light Industrial (CU-LI), Highway Business (HB)
East	Heavy Industrial	Heavy Industrial (HI)
West	Dwelling – Single-Family (non-subdivision parcel)	Rural Holding District (RD), Highway Business (HB), Capital Boulevard

The proposed land use is generally **compatible** with surrounding land uses.

The proposed zoning is generally **compatible** with surrounding zoning.

See Attachment C for associated maps.

ZONING CASE HISTORY

The zoning map amendment is a modification to the previous rezoning case RZ-20-05 (Ordinance 2020-16) adding approximately 1 acre. The additional 1 acre is to provide supplemental buffering from the adjacent residential property. RZ-20-05 rezoned 4925 and 4975 Unicon Drive, approximately 28.13 acres to Light Industrial Conditional District (LI-CD). 10200 Capital Boulevard was zoned Rural Holding District (RD) in 2013 when the UDO was adopted. *See Attachment D for Ordinance 2020-16.*

COMPREHENSIVE PLAN CONSISTENCY

Community Plan (2022)	The proposed zoning map amendment request is generally consistent with the adopted 2022 Community Plan.
Comprehensive Transportation Plan (2019)	The Comprehensive Transportation Plan is not applicable to the zoning map amendment request.
Historic Preservation Plan (2021)	The Historic Preservation Plan is not applicable to the zoning map amendment request.
Northeast Neighborhood Plan (2021)	The Northeast Neighborhood Plan is not applicable to the zoning map amendment request.
Park, Recreation, and Cultural Resources Master Plan (2015)	The Parks, Recreation, and Cultural Recourses Master Plan is not applicable to the zoning map amendment request.
Public Art Vision Plan (2009)	The Public Art Vision Plan is not applicable to the zoning map amendment request.
Renaissance Plan (2017)	The Renaissance Plan is not applicable to the zoning map amendment request.

There is no detailed Plan Consistency Analysis since the Land Use Map is the only applicable section of the Community Plan.

STAFF RECOMMENDATION

The zoning map amendment request is generally **Consistent** with the relevant policies in the Comprehensive Plan, and **Approval** of the zoning map amendment request is reasonable and in the public interest.

ATTACHMENTS

Attachment A: Neighborhood Meeting Information
Attachment B: Application
Attachment C: Maps
Attachment D: RZ-20-05 Ordinance
Attachment E: Planning Board Recommendation

June 15th, 2023

Moffat Properties, LLC
701 Finger Lakes Drive
Wake Forest, North Carolina 27587

Re: 4925 Unicon Drive Rezoning Application

Dear Neighbor:

Please be advised that a formal application has been submitted to the Town of Wake Forest seeking approval for rezoning for the property located at 4925 Unicon Drive, Wake Forest, NC 27587. This parcel is currently split-zoned. 1.00 acre of the parcel is zoned RD (Rural Holding District), 15.38 acres of the parcel is zoned LI-CD (Light Industrial Conditional District), with a total area of approximately 16.38 acres.

As the owner of the property, we are requesting the Town of Wake Forest to approve this rezoning application to amend the zoning of the 1.00 acre. This will make the zoning consistent with the remainder of the site, which is zoned LI-CD. Currently, we do not have a masterplan for the development of this property.

In compliance with the Town of Wake Forest Rezoning Process, a Neighborhood Information Meeting will be held to provide you an opportunity to become familiar with the property and our rezoning request and to create an opportunity for you to provide valuable feedback as our neighbors. The Neighborhood Information Meeting will be held at **7:00pm on Thursday, June 29th, 2020**, at the Holiday Inn Express, near the site.

Holiday Inn Express
11400 Common Oaks Drive
Raleigh, North Carolina 27614

If you have any questions of comments regarding the meeting, please feel free to contact me at (919) 261-7781 or at cmoffat@moffatproperties.com . Thank you in advance for your participation in this very important meeting.

Warm Regards,

Craig T. Moffat
Member
Moffat Properties, LLC

NEIGHBORHOOD MEETING SIGN-IN SHEET

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Mtg Start 7:00pm
End 8:00 pm

Meeting Address: Holiday Inn Express (11400 Common Oaks Drive, Raleigh, North Carolina 27614)

Date of meeting: June 29th, 2023 Time of meeting: 7:00 pm

Property Owner(s) name(s): 5000 Stroller Ridge Drive, LLC & Young Group Holdings, LLC

Applicant(s): 5000 Stroller Ridge Drive, LLC (c/o Craig Moffat, Member)

Please print your name below, state your address and/or affiliation with a neighborhood group, and provide your phone number and email address. Providing your name below does not represent support or opposition to the project; it is for documentation purposes only. For virtual meetings, applicants must include all known participants and request the information below.

	NAME/ORGANIZATION	ADDRESS	PHONE #	EMAIL	SEND PLANS & UPDATES
1.	Gary McCabe/RLE	123 Raleigh St Fuquay-Varina NC 27526	(919) 779 6851	gary.mccabe@rlenc.com	
2.	Timothy Lance/RLE	"	"	tim.lance@rlenc.com	
3.	PARKER HUDSON	701 FINGER LAKES DR.	(252)-714-8789	PHudson@moffatproperties.com	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					

Use additional sheets, if necessary.

SUMMARY OF DISCUSSION FROM THE NEIGHBORHOOD MEETING

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Property Owner(s) name(s): 5000 Stroller Ridge Drive, LLC & Young Group Holdings, LLC

Applicant(s): 5000 Stroller Ridge Drive, LLC (c/o Craig Moffat, Member)

Contact information (email/phone): cmoffat@moffatproperties.com

Meeting Address: Holiday Inn Express (11400 Common Oaks Drive, Raleigh, North Carolina 27614)

Date of meeting: June 29th, 2023 Time of meeting: 7:00 pm - 8:00 pm

Please summarize the questions/comments and your responses from the Neighborhood Meeting or emails/phone calls received in the spaces below (attach additional sheets, if necessary). Please state if/how the project has been modified in response to any concerns. The response should not be "Noted" or "No Response". There has to be documentation of what consideration the neighbor's concern was given and justification for why no change was deemed warranted.

Question/Concern #1:

No neighboring parcel owners were in attendance.

Applicant's Response:

Question/Concern #2:

Applicant's Response:

Question/Concern #3:

Applicant's Response:

Question/Concern #4:

Applicant's Response:

Haddock Properties III LLC
c/o Caliber Bodyworks of North Carolina
548 Glenville School Rd
Glenville, NC 28736

ETS Property, LLC
3227 Wellington Ct
Raleigh, NC 27615

Capcitcur Properties, LLC
2607 Leighton Ridge Dr
Wake Forest, NC 27587

Mark & Karen White
115 Oak Grove Church Rd
Youngsville, NC 27596

Carolina Sunrock Corp.
PO Box 25
Butner, NC 27509

Family Trust
u/w Walter R Lane
2522 E Woodlyn Way
Greensboro, NC 27407

Flexx, LLC
PO Box 250
Middlesex, NC 27557

Toy Storage, LLC
417 S Main St
Rolesville, NC 27571

Starr Road, LLC
2125 Rolling Rock Rd
Wake Forest, NC 27587

SMBC Leasing and Finance, Inc.
277 Park Ave
New York, NY 10172

Trident Realty LLC c/o Scott Moore
2627 Leighton Ridge Dr, Suite #100
Wake Forest, NC 27587

Puryear Investments, LLC
5844 Lease Ln
Raleigh, NC 27617

Robert William & Nancy Fan Lenfestey
2717 Leighton Ridge Dr
Wake Forest, NC 27587

PS NC I LP Ltd Partnership
701 Western Ave
Glendale, CA 91201

JMS Properties of Durham, LLC
c/o Stephen Lewis
8536 Windsong Valley Dr
Wake Forest, NC 8536

Nora Properties, LLC
2624 Leighton Ridge Dr, Suite #108
Wake Forest, NC 27587

Paws At Play Of Wake Forest, Inc
779 Fleming Rd
Youngsville, NC 27596

Jajd Holdings, LLC
222 N Bickett Blvd
Louisburg, NC 27549

M-Kal Enterprises, LLC
2616 Leighton Ridge Dr
Wake Forest, NC 27587

Northpoint Business Condominiums
Real Estate Trust
Patrick L Fleming, Jr Trustee
PO Box 3299
Wilson, NC 27895

L2 Partners, LLC
5208 Parker Manor Ct
Raleigh, NC 27614

Meen, LLC
2624 Leighton Ridge Dr, Suite #140
Wake Forest, NC 27587

Keith R & Mary Locker
6021 Glenthorne Dr
Raleigh, NC 27613

Vantagecpi, LLC
2624 Leighton Ridge Dr, Suite #116
Wake Forest, NC 27587

South End LLC
88 Intracoastal Overlook
Hampstead, NC 28443

Patricia Williams Brothers
10200 Capital Blvd
Wake Forest, NC 27587

Young Group Holdings, LLC
2808 Connector Dr
Wake Forest, NC 27587

Buth Na Bodhaige, Inc
148 Lafayette St, Floor #5
New York, NY 10013

Turner Real Estate Holdings, LLC
5805 Lease Ln
Raleigh, NC 27617

Argos Ready Mix (Carolinas) Corp
3015 Windward Plz, Suite #300
Alpharetta, GA 30005

Town of Wake Forest
301 Brooks St
Wake Forest, NC 27587

RSE Properties, LLC
7412 Churchill Dr
Wake Forest, NC 27587

South Forest Service Center Condo
PO Box 1125
Wake Forest, NC 27588

Map Amendment (Rezoning) Application

(Map Amendment (Rezoning) - Planning Board Workflow)

Town of Wake Forest, NC
301 S. Brooks St.
Wake Forest, NC 27587-2932
TEL (919) 435-9510 | FAX (919) 435-9539

Project Overview #1003407

Project Title: 4925 Unicon Drive Rezoning
Application Type: Map Amendment (Rezoning)
Workflow: Map Amendment (Rezoning) - Planning Board
Jurisdiction: Town of Wake Forest (Wake County)
State: NC
County: Wake

Checklist - Map Amendment (Rezoning)

A submittal checklist is available to view additional documents which are required to submitted with this application. After answering the application questions, you will be asked to upload the required documents.

VIEW MAP AMENDMENT (REZONING) SUBMITTAL CHECKLIST

Missing items will result in the application being declined and returned to the applicant to resubmit. A revised and complete application including all missing items must be received or the application will be not be deemed complete and routed for review.

Please confirm you have reviewed the associated submitted checklist for this permit and confirm you will submit all documents required on the submittal checklist: Yes

Pre-Application Meeting

Has a pre-application conference been held?: Yes

*Note: This type of project requires a pre-application conference be completed prior to official submittal. If this has not been completed, please return to the home screen and select **Pre-Application Conference** from the application type drop down list in order to schedule your required meeting.*

Pre-Application Conference Date: 03/20/2023
Staff Member Met With: Tim Richards, Michelle Michael, & Timothy Beasley
Pre-application Conference Project Number:

Address & Basic Site Information

Please Note:
In some cases, a parcel address may not verify. In the event that our system is unable to verify the address you enter, please submit the project as an *Unverified Parcel* and provide zoning and land use information as requested below. For verified addresses, the zoning and land use information will be added to the application automatically (you do not need to provide it below).

Project Address or PIN:
- 4925 Unicon Dr (1739518319)
- 4975 Unicon Dr (1739612717)
- 4975 Unicon Dr (1739612717)

Tax PIN:
- 1739518319
- 1739612717
- 1739612717

Acreage: 1.00
Name of Existing Development/Subdivision (if applicable--for reference only):

For unverified addresses/parcels only, please provide below 1) the current use of the parcel, 2) the zoning district(s) it is in, and 3) any overlay districts that apply. Reference the zoning map and the overlay districts map on the town's website.

Current Use & Zoning (required only if address/parcel is unverified):

*Note: Projects falling outside the limits of the Town or ETJ will be required to submit an annexation petition in conjunction with their project submittal. In this case, please return to the home screen and select **Annexation Petition** from the application type drop down.*

GIS Site Information (Automatically Generated - Not Available for Unverified Addresses)

Parcel Area: GIS Acreage
- 4925 Unicon Dr: 15.38
- 4975 Unicon Dr: 12.75
- 4975 Unicon Dr: 12.75

Current Use: Land Use Development
- 4925 Unicon Dr: Industrial
- 4975 Unicon Dr: Industrial
- 4975 Unicon Dr: Industrial

Wake Forest (WF):

Planning and Zoning: Jurisdiction
- 4925 Unicon Dr: WAKE FOREST
- 4975 Unicon Dr: WAKE FOREST
- 4975 Unicon Dr: WAKE FOREST

Base District: Zoning
- 4925 Unicon Dr: LI CD
- 4975 Unicon Dr: LI CD
- 4975 Unicon Dr: LI CD

In SH1-O Overlay: Special Highway Overlay - US 1
- 4925 Unicon Dr: yes
- 4975 Unicon Dr: yes
- 4975 Unicon Dr: yes

In SH2-O Overlay:

In Water Supply Watershed Protection Overlay:

In TND Overlay:

In SF Overlay:

In HL-O Overlay:

In MVCP-O Overlay:

In National Register of Historic Places:

In Flood Hazard Area:

Additional Zoning Information

Currently a Conditional District?: Yes

Currently a Conditional Use?: No

Is there an existing Special Use Permit for the Property?: No

Case Number of related site plan (if applicable):

Case Numbers of other related approvals: RZ-20-05

Project Contacts

Please enter <u>all</u> project contacts related to your application.

This is an important step to ensure all members of the applicant team receive email notifications associated with the project which may include comments, requested revisions, scheduled meetings or hearings, and final decisions. This also informs Town staff of the team members assigned role with the project.

Project Contact - Applicant
Timothy Lance, E.I.
Red Line Engineering, P.C.
123 Raleigh Street
Fuquay-Varina, NC 27526
P: (Phone)9197996851

Project Contact - Property Owner
Craig Moffat
Moffat Pipe Inc.
4901 Unicon Drive
Wake Forest, NC 27587
P: (Phone)9196697469
cmoffat@moffatproperties.com

Map Amendment: Rezoning

Proposed Zoning: LI, Light Industrial

Description of Request:
This application is for the rezoning of 1.00 acre of 4925 Unicon Drive, recently recombined from 10200 Capital Boulevard. This portion of the parcel is currently zoned RD (Rural Holding District) and is proposed to be rezoned to LI-CD (Light Industrial Conditional District), to match the existing zoning of 4925 Unicon Dr.

Justification of Consistency with Comprehensive Plan:
The rezoning will match the existing zoning of the rest of the parcel and the surrounding area for industrial use, as shown in the Current Zoning Map in Wake Forest Community Plan Update.

July 27, 2023

5000 Stroller Ridge Drive, LLC
701 Finger Lakes Drive
Wake Forest, North Carolina 27587

Re: 4925 Unicon Drive Conditional Rezoning Application

To Whom It May Concern:

The following rezoning conditions are proposed for the property addressed at 4925 Unicon Drive (PIN# 1739-51-8319):

- A 50' landscaped buffer (Type A) and 6' tall opaque wooden fence (painted a neutral color) shall be provided along the entirety of the shared property line adjacent to the Powell House property.

- The LI Zoning District Perimeter 50' buffer along the western property line that is required by Section 2.2.5.A.2 shall be a Type A landscaped buffer as defined in Section 8.5.3.A of the Udo. This buffer shall remain undisturbed and supplemental plantings added where necessary.

- At the time of development of the subject site, the applicant shall provide a Sanitary Sewer Easement to PIN 1739-53-6077. The easement location shall be approved by City of Raleigh Water. A plat shall be recorded showing the easement.

- The allowable uses for the property are limited to:
  - Industry, Light (Ps)
  - Light Manufacturing Workshops
  - Storage – Outdoor Storage Yard
  - Storage – Warehouse, Indoor Storage
  - Wholesaling & Distribution
  - Heavy Equipment/Manufactured Home Rental/Sales
  - Vehicle Services – Minor Maintenance/Repair
  - Vehicle Services – Major Repair/Body Work
  - Amusements, Indoor
  - Amusements, Outdoor
  - Public Safety Station
  - Parking Lot/Structure – Principle Use
  - Gardens (Community and Private)
  - A distributed antenna system (DAS) node
  - DAS hub (Ps)
  - Concealed attached antennae are permitted (Ps)
  - Utilities – Class 1
  - Utilities – Class 2
  - Utilities – Class 3 (SUP)

If you have any questions or comments regarding the proposed conditions, please feel free to contact me at (919) 261-7781 or at cmoffat@moffatproperties.com; or the authorized agent for the 4925 Unicon Drive Conditional Rezoning, Gary J. McCabe, PE at (919) 779-6851 or at gary.mccabe@rlenc.com. Thank you in advance for your acceptance of these conditions.

Warm Regards,

Craig T. Moffat
Member
5000 Stoller Ridge Drive, LLC

Agent Authortization Form

TOWN of WAKE FOREST

The Wake Forest Unified Development Ordinance (UDO) states that applications for development approvals may only be made by the landowner, a lessee or person holding an option or contract to purchase or lease the land, or an authorized agent of the landowner (see Sec. 15.2.5.C). This agent authorization form must be signed by the landowner and included with any application not submitted by the landowner or lessee as specified above. If more than one landowner is involved, a separate agent authorization form must be submitted by each landowner.

Address(es) and Tax PIN(s) for which authorization is granted: 4975 Unicon Drive (PIN: 1739-61-2717)

Landowner's name*: Young Group Holdings, LLC

Application(s) for which authorization is granted (e.g., Rezoning, Special Use Permit): Rezoning

Person authorized to submit application(s) as landowner's agent *(must be the same person listed as the applicant on the application form)*: Timothy Lance; Gary J. McCabe, PE

Landowner's Signature: Jason W. Young

Date: 6/29/23

Please provide below the name, address, and other information of the person signing this form.

Name: Jason Young

Address: 2808 Connector Drive

Telephone number: 919-435-9922

Email address: jason@yccllc.com

If signing for a corporation or other entity, please specify title and/or relationship to the corporation or other entity *(e.g., Member, Executive Officer)*: Member

**Owner of record as shown on the latest equalized assessment rolls of Wake County, or, if ownership has recently been transferred, the grantee shown on the recorded deed (a copy of the deed must accompany this form).*

Agent Authorization Form

TOWN *of* WAKE FOREST

The Wake Forest Unified Development Ordinance (UDO) states that applications for development approvals may only be made by the landowner, a lessee or person holding an option or contract to purchase or lease the land, or an authorized agent of the landowner (see Sec. 15.2.5.C). This agent authorization form must be signed by the landowner and included with any application not submitted by the landowner or lessee as specified above. If more than one landowner is involved, a separate agent authorization form must be submitted by each landowner.

Address(es) and Tax PIN(s) for which authorization is granted: 4925 Unicon Drive (PIN: 1739-51-8319)

Landowner's name*: 5000 Stroller Ridge Drive LLC

Application(s) for which authorization is granted (e.g., Rezoning, Special Use Permit): Conditional Rezoning

Person authorized to submit application(s) as landowner's agent *(must be the same person listed as the applicant on the application form)*: Timothy Lance; Gary J. McCabe, PE

Landowner's Signature: _____

Date: _____

Please provide below the name, address, and other information of the person signing this form.

Name: Craig Moffat

Address: 701 Finger Lakes Drive

Telephone number: 9192954630

Email address: cmoffat@moffatproperties.com

If signing for a corporation or other entity, please specify title and/or relationship to the corporation or other entity *(e.g., Member, Executive Officer)*: member/manager

**Owner of record as shown on the latest equalized assessment rolls of Wake County, or, if ownership has recently been transferred, the grantee shown on the recorded deed (a copy of the deed must accompany this form).*

TOWN OF WAKE FOREST

AGENT AUTHORIZATION FORM:

Application #: _____ Submittal Date: February 23, 2023

Patricia Williams Brothers is the owner of the property for which the attached application is being submitted:

- [x] General Use Rezoning or Conditional District Rezoning
- [ ] Site Master Plan
- [ ] Subdivision Master Plan
- [ ] Construction Drawings
- [ ] Variance
- [ ] Major Architectural Review

The property is located at: 10200 Capital Blvd. (PIN: 1739-51-4482)

The agent for this project is: Red Line Engineering, PC

I am the owner of the property and will be acting as my own agent.

Name: PATRICIA BROTHERS

Address: _____

Telephone Number: 919 622 1958 Fax: _____

Email Address: spbros@earthlink.net

Signature(s) of Owner(s):

Patricia Brothers

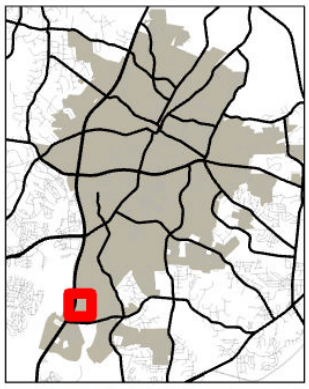
Print or type name(s):

PATRICIA BROTHERS

Attach additional sheets if there are additional owners.

***Owner of record as shown on the latest equalized assessment rolls of Wake County. (An option to purchase does not constitute ownership). If ownership has been recently transferred, a copy of the deed must accompany this authorization.**

Last update: August 2018



Aerials

TOWN *of* WAKE FOREST

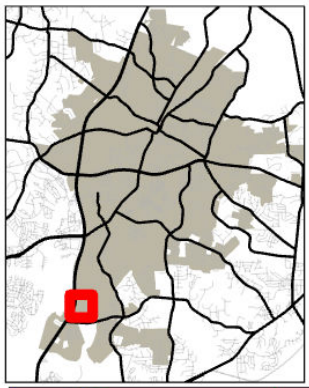
RZ-20-05-01
Fuller Property
PINs:1739612717, 1739518319 & 1739514482 (portion)

8/21/2023



Please note that this map is intended for illustrative purposes only. For specific inquiries regarding zoning boundaries, contact the Town Wake Forest Planning Department at 919-435-9510.

0 500 1,000 US Feet

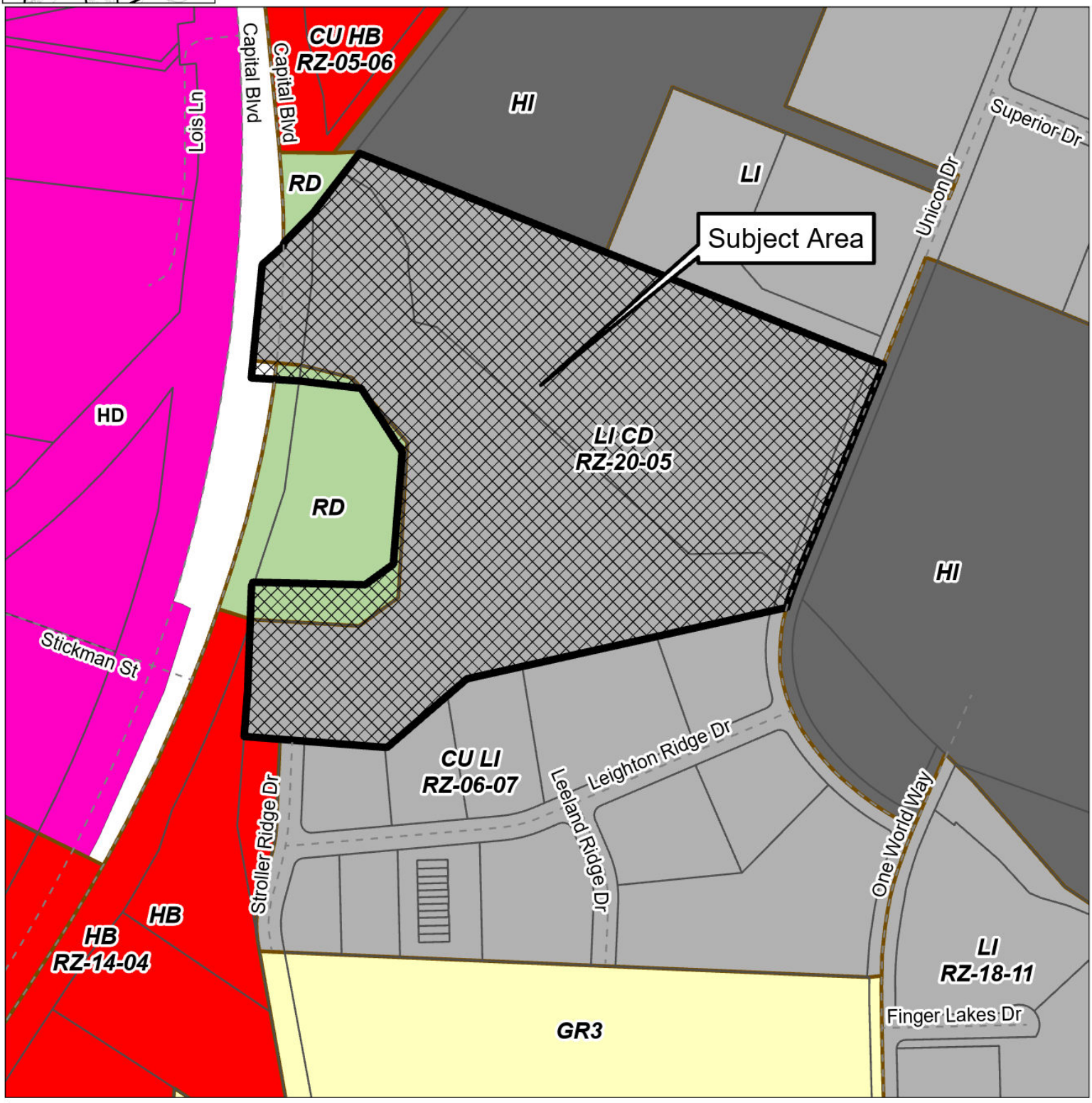


Current Zoning

TOWN of WAKE FOREST

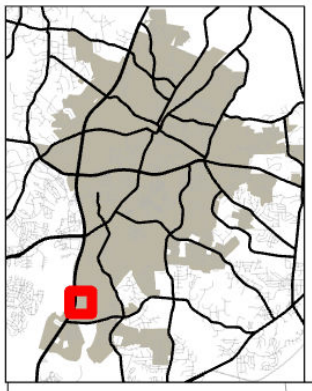
RZ-20-05-01
Fuller Property
PINs:1739612717, 1739518319 & 1739514482 (portion)

8/21/2023



Please note that this map is intended for illustrative purposes only. For specific inquiries regarding zoning boundaries, contact the Town Wake Forest Planning Department at 919-435-9510.

0 500 1,000 Feet

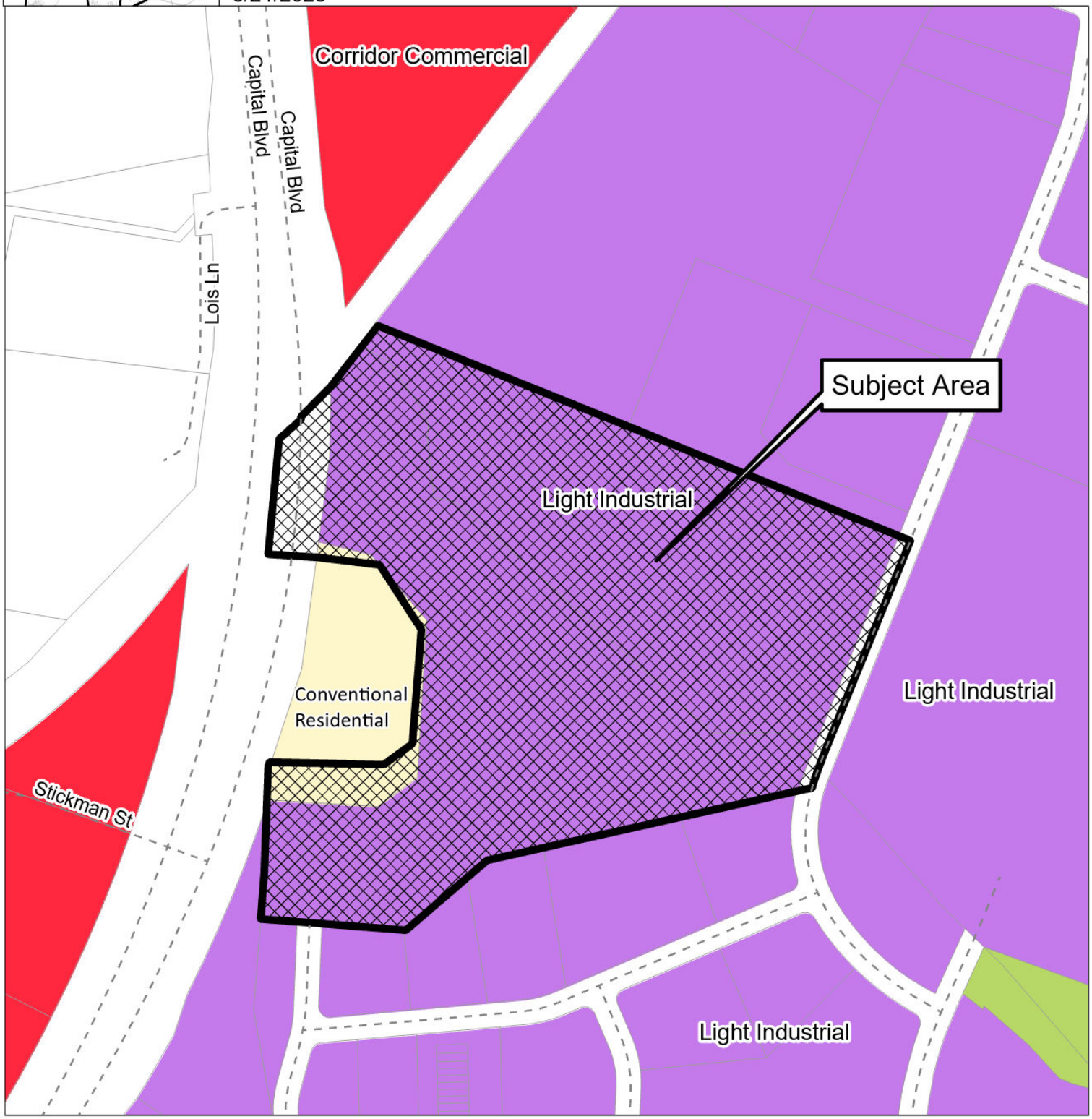


Land Use Plan

TOWN of WAKE FOREST

RZ-20-05-01
Fuller Property
PINs:1739612717, 1739518319 & 1739514482 (portion)

8/21/2023



Please note that this map is intended for illustrative purposes only. For specific inquiries regarding zoning boundaries, contact the Town Wake Forest Planning Department at 919-435-9510.

0 500 1,000 Feet

ORDINANCE 2020-16

ORDINANCE AMENDING THE OFFICIAL ZONING DISTRICT MAP OF THE TOWN OF WAKE FOREST TO CHANGE THE ZONING OF APPROXIMATELY 28.13 ACRES LOCATED AT 0 CAPITAL BOULEVARD FROM RESIDENTIAL HOLDING DISTRICT (RD) TO LIGHT INDUSTRIAL CONDITIONAL DISTRICT (LI-CD)

RZ-20-05, Fuller Capital Boulevard Property

WHEREAS, the application submitted by Moffat Properties, LLC for the rezoning of lands hereinafter described was duly filed with the Planning Department and thereafter a public hearing was held hereon on the 5th day of May, 2020 before the Planning Board and the Board of Commissioners, pursuant to due notice mailed, the property posted and notice published pursuant to G.S. § 160A-384. Thereafter, the Planning Board submitted its recommendation to the Board of Commissioners recommending approval of said application for the rezoning of the lands hereinafter described, all in accordance with the requirements of the Town of Wake Forest Unified Development Ordinance and the provisions of Chapter 160A, Article 19, of the North Carolina General Statutes; **NOW, THEREFORE,**

BE IT ORDAINED BY THE BOARD OF COMMISSIONERS OF THE TOWN OF WAKE FOREST

Section 1: The lands that are the subject of the Ordinance are those certain lands described in Attachment "A" – Legal Description which is incorporated herein by reference, and said lands are hereafter referred to as the "Rezoned Lands."

Section 2: The parcel identified by the Wake County Tax Parcel Identification Number, 1739-51-9596, and described in Attachment "A", is located within the Town of Wake Forest's planning jurisdiction and/or corporate limits.

Section 3: The Town of Wake Forest Unified Development Ordinance, including the Town of Wake Forest North Carolina Official Zoning District Map which is a part of said Ordinance, is hereby amended by changing the zoning classification of the "Rezoned Lands" from Residential Holding District (RD) to Light Industrial Conditional District (LI-CD), subject to the conditions stated herein.

Section 4: The Administrator is hereby authorized and directed to cause the said Official Zoning District Map for the Town of Wake Forest, North Carolina, to be physically revised and amended to reflect the zoning changes ordained by this Ordinance.

Section 5: After reviewing all the information presented at the public hearing and the Wake Forest plans, policies and ordinances, the Wake Forest Board of Commissioners find the zoning map amendment request reasonable in the public interest and consistent with the Community Plan Unified Development Ordinance and adopted a written consistency statement, which is on file with the Wake Forest Planning Department.

Section 6: The "Rezoned Lands" are subject to all of the following conditions which are imposed as part of this rezoning:

1. A 50' landscaped buffer (Type A) and 6' tall opaque wooden fence (painted a neural color) shall be provided along the entirety of the shared property line adjacent to the Powell House property.

2. The LI Zoning District Perimeter 50' buffer along the western property line that is required by Section 2.2.5.A.2 shall be a Type A landscaped buffer as defined in Section 8.5.3.A of the UDO. This buffer shall remain undisturbed and supplemental plantings added where necessary.

3. At the time of development of the subject site, the applicant shall provide a Sanitary Sewer Easement to PIN 1739-53-6077. The easement location shall be approved by City of Raleigh Water. A plat shall be recorded showing the easement.

4. Uses shall be limited to the following:
   - Industry, Light
   - Light Manufacturing Workshops
   - Storage – Outdoor Storage Yard
   - Storage – Warehouse, Indoor Storage
   - Wholesaling and Distribution
   - Heavy Equipment/Manufactured Home Rental/Sales
   - Vehicle Services – Minor Maintenance/Repair
   - Vehicle Services – Major Repair/Body Work
   - Amusements, Indoor
   - Amusements, Outdoor
   - Public Safety Station
   - Parking Lot/Structure – Principle Use
   - Gardens (Community and Private)
   - A distributed antenna system (DAS) node
   - DAS hub
   - Concealed attached antennae are permitted
   - Utilities – Class 1
   - Utilities – Class 2
   - Utilities – Class 3

Section 8: The "Rezoned Lands" shall be perpetually bound to the conditions imposed including the uses authorized, unless subsequently changed or amended as provided for in the Unified Development Ordinance.

Section 9: This ordinance shall be in full force and effect from and after its adoption.

This the _19th _ day of __May_____ 2020.

Motion by Commissioner__ Jim Dyer_____

Seconded by Commissioner____ Chad Sary____

With __5__ Commissioner(s) voting "aye."
With __0__ Commissioner (s) voting "no."

This the _19th _ day of __May_____ 2020.

Mayor

APPROVED AS TO FORM:

Eric A. Vernon
Town Attorney

ATTEST:

Town Clerk

TOWN *of*
WAKE FOREST

Report Requirements:

Per NCGS 160D-604, all proposed amendments to the zoning ordinance or zoning map shall have a written report provided from the Planning Board to the Board of Commissioners within 30 days of referral of the amendment to the Planning Board, or the Board of Commissioners may proceed in its consideration of the amendment without the Planning Board report. Furthermore, in no case is the Board of Commissioners bound by the recommendations, if any, of the Planning Board.

Per NCGS 160D-604, the Planning Board shall advise and comment on whether the proposed zoning amendment is consistent with all applicable officially adopted plans, and provide a written recommendation to the Board of Commissioners that addresses plan consistency and other matters as deemed appropriate by the Planning Board, but a comment by the Planning Board that a proposed amendment is inconsistent with the officially adopted plans shall not preclude consideration or approval of the proposed amendment by the Board of Commissioners.

GENERAL INFORMATION

Applicant:	Timothy Lance, Red Line Engineering
Owners:	5000 Stroller Ridge Drive, LLC, Young Group Holdings, LLC, and Patricia Williams Brothers
Requested Action:	Rezone 29.367 acres on the Town of Wake Forest Zoning Map from Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) to Light Industrial Conditional District (LI-CD).
Existing Zoning:	Rural Holding District (RD) and Light Industrial Conditional District (LI-CD)
Location:	4925 Unicon Dive, 4975 Unicon Drive, 10200 Capital Boulevard (portion)
Size:	29.367 acres
Tax PINs:	1739612717, 1739518319, 1739514482 (portion)
Existing Land Use:	Vacant

Applicable Officially Adopted Plans:

The request is generally Consistent with the relevant policies in the Comprehensive Plan, and Approval of the zoning map request is reasonable and in the public interest. The request is consistent with the Land Use Map in the Community Plan.

This report reflects the recommendation of the Planning Board, this the 12th day of September 2023.

Introduced by Planning Board member: Michael Almquist

Seconded by Planning Board member: Michael Siderio

Attest:

Karin Kuropas, Planning Board Chair

Courtney Tanner, Planning Director

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-222-
Submitted by: Patrick Reidy
Submitting Department: Planning
Meeting Date: October 3, 2023

SUBJECT
Presentation of LEGISLATIVE CASE RZ-21-08, Joyner Property, a rezoning filed by McAdams Company to rezone 124.68 acres located at 1180 and 1200 (portion) Club Villas Dr, being Wake County Tax PINs 1841091336 and 1831895139 (portion) from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) to General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O). (*While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.)

Recommendation:

Item Summary:

ATTACHMENTS

- BOC Agenda Summary RZ-21-08.pdf
- RZ-21-08 Staff Report.pdf
- Attachment A - Neighborhood Meeting Information.pdf
- Attachment B - Application.pdf
- Attachment C - Maps.pdf
- Attachment D - Special Use Permit SU-99-02 Approvals.pdf
- Attachment E - Special Use Permit SU-99-02-01 Approval.pdf
- Attachment F - Planning Board Recommendation & Plan Consistency Analysis.pdf
- Attachment G - TIA Executive Summary and NCDOT Review Report.pdf
- Exhibit 1 - Proposed Conditional District Plan.pdf

Agenda Item: Presentation of LEGISLATIVE CASE RZ-21-08, Joyner Property, a rezoning filed by McAdams Company to rezone 124.68 acres located at 1180 and 1200 (portion) Club Villas Dr, being Wake County Tax PINs 1841091336 and 1831895139 (portion) from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) to General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O). (*While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.)

Summary: A public comment session was held at the September 12, 2023 Planning Board meeting. The Planning Board voted 4-1 to find the request inconsistent with the Community Plan and recommended denial of the zoning map amendment (rezoning). The Planning Board further stated that if the Board of Commissioners were to approve, they requested the Board consider the following:

- Remove Condition #13 and require the UDO standard to be met
- Remove Condition #14 and require the UDO standard to be met
- Accept Staff's recommended condition language for Condition #19
- Accept Staff's recommendation for removing Condition #20
- Accept Staff's recommendation for removing Condition #22

Since the Planning Board meeting, the applicant has revised Condition #20 to change that Country Club Drive be requested as a one-way street to only placing no right turn signs on the service road and street H. The revision was made to try and find a more reasonable solution to the neighbor's concerns about cut-through traffic using Country Club Drive.

Prior to the Public Hearing, the applicant will need to revise Condition #23 to remove draining the existing ponds adjacent to Lots 45-62 as that would be considered development per the UDO definition and would be out of compliance with the Special Use Permit that regulates the ponds.

Attachments: See Staff Report

TOWN of WAKE FOREST

Staff Report
Case RZ-21-08: Joyner Property Conditional District

Meeting Date	October 3, 2023
Requested Actions	Consideration of the following items related to the Conditional Zoning Map Amendment request for 1180 and 1200 (portion) Club Villas Dr: 1. Act on Plan Consistency Statement 2. Rezone 124.68 acres on the Town of Wake Forest Zoning Map from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) to General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O). *While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.
Case Manager	Patrick Reidy, Senior Planner – Development Services
Planning Board Recommendation	Recommended denial by a vote of 4-1 of the zoning map amendment request. The Planning made the following considerations for the Board of Commissioners should they vote to approve the rezoning request: • Remove Condition #13 and require the UDO standard to be met • Remove Condition #14 and require the UDO standard to be met • Accept Staff's recommended condition language for Condition #19 • Accept Staff's recommendation for removing Condition #20 • Accept Staff's recommendation for removing Condition #22 See Attachment F for the Planning Board Recommendation and Plan Consistency Analysis. Since the Planning Board meeting, the applicant has revised Condition #20 to change that Country Club Drive be requested as a one-way street to only placing no right turn signs on the service road and street H. The revision was made to try and find a more reasonable solution to the neighbor's concerns about cut-through traffic using Country Club Drive.

PUBLIC MEETINGS

Neighborhood Meeting	Public Comment Session	Public Hearing
March 30, 2022	September 12, 2023	October 17, 2023

(See Attachment A)		

CASE INFORMATION

Applicant	McAdams Company C/O Laura Holloman 2905 Meridian Parkway Durham, NC 27713
Developer	Mill Ridge Investments C/O James Adams Jr. 919 S. Main Street Wake Forest, NC 27587
Property Owners	Green Timber Foundation C/O Carroll Joyner 394 Fleming Road Youngsville, NC 27596
Location	Frontage along US-1, in between the intersections of Purnell Road and Jenkins Road
Addresses	1180 and 1200 (portion) Club Villas Dr
Wake County Tax PIN(s)	1841091336 and 1831895139 (portion)
Acreage	124.68 acres
Zoning	Existing: General Residential 3 Planned Unit Development[1] (GR3 PUD[1]); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) Proposed: General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O)
Land Use	Existing: Vacant with abandoned recreation facilities Proposed: Dwelling – Single Family (176 shown) Dwelling – Townhome (113 shown)
Community Plan (2009)	Growth Strategies: Sub-urban Zone Neighborhood Planning Area: 5
Corporate Limits	This application is in the Town's corporate limits.

[1] While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.

See Attachment B for a copy of the application and Attachment C for Aerial, Zoning, and Community Plan Maps. See pages 28-123 and 270 for descriptions of Town Areas and Sub-urban Zone in the 2009 Community Plan.

SURROUNDING LAND USES AND ZONING

	Land Use	Zoning
North	Single-Family Dwellings (Hawkshead); Undeveloped/Vacant	Wake County's Residential-40W (R-40W)
South	Single-Family Dwellings (Wake Forest Country Club Subdivision, Riverstone, and Clubhouse Villas at Wake Forest Golf Club); Open Space (Riverstone)	General Residential-3 (GR-3) and General Residential 3 Planned Unit Development (GR3 PUD)
East	Townhouses (Fairway Villas at Wake Forest Golf Club); Vacant/Undeveloped; US1 Right-of-Way	General Residential 3 Planned Unit Development (GR3 PUD)
West	Single-Family Dwellings (Country Club Downs and Canonbie)	Conditional Use General Residential 3 (CU GR3) (RZ-88-7-1); Wake County's Residential-40W (R-40W)
The proposed land use is generally **compatible** with surrounding land uses. The proposed zoning is generally **compatible** with surrounding zoning. *See Attachment C for associated maps.*		

ZONING AND SUP CASE HISTORY

On May 18, 1999, the Board of Commissioners granted a Special Use Permit (SUP) (Attachment D) in accordance with the Planned Unit Development (PUD) and Cluster Development regulations. The PUD had a base zoning district of Residential-40 Watershed Protection District (R-40W). The SUP allowed for the Wake Forest Golf Course property to be developed with a limited number of dwelling units. Tract 1 was permitted up to 20 dwelling units and was developed with 20 townhome lots. Tract 1 is commonly referred to as Fairway Villas. Tract 2 was approved for and developed with 10 dwelling units and is often referred to as Clubhouse Villas. Tract 5, located adjacent to Capital Boulevard, is approximately 5.0 acres in size, and was approved for commercial uses. This Tract is vacant and is owned by the Wake Union Baptist Church. The 1999 ordinance required that 40% of the gross acreage (or 41.45 acres) within the PUD remain as open space. The open space could include areas such as conservation-related uses, passive recreation uses, limited active recreation uses, and agricultural uses. The developer exceeded this 40% minimum with the inclusion of the entire golf course and environmental features. This area is outside of the zoning boundary request, but this information is provided for context of the development history of this property.

On January 21, 2004, a perpetual Conservation Easement was granted by the property owner to the State of North Carolina. The easement was granted as part of the State's Ecosystem Enhancement Program and as part of the Horse Creek stream restoration project performed by the North Carolina Department of Environmental and Natural Resources. As required by the state, the easement must remain under single owner ownership and activity allowed within the easement is restricted to

recreational and educational uses. This area is outside of the zoning boundary request, but this information is provided for context of the development history of this property.

In 2004, the Town approved construction drawings for Tract 2 to develop a 10-lot subdivision (known as Clubhouse Villas). The golf course and country club closed in November 2007.

On September 1, 2009, an SUP amendment was submitted requesting to increase the developable area of the property by reducing the PUD from 165.5 acres to 40 acres to comply with the minimum requirements for the PUD's cluster development that included Fairway Villas and Clubhouse Villas. Tract 4 was also proposed to be deleted from the PUD. On December 15, 2006, the Board of Commissioners chose not to hold a public hearing or consider the application, as allowed by law.

When the UDO was adopted on July 16, 2013, the base zoning district R-40W was changed to General Residential 3 (GR3) and the Falls Lake Watershed Protection Overlay (FL-WMA) district was added. The PUD designation and associated SU-99-02 restrictions remained in place.

On March 23, 2023, the Board of Commissioners held a public hearing for an amendment to the SUP, SU-99-02-01. During the SUP amendment public hearing, Ben Kuhn, attorney with Ragsdale Liggett and witness for the applicant, noted that the Town's Community Plan discussed the future redevelopment of these parcels and noted it as a potential cluster subdivision. (See March 23, 2023 video clip beginning at 1:49:12 mark.) It is the Town's practice to review applications against Plans in effect based on the application submittal dates. The 2009 Community Plan was in effect when the rezoning application was submitted. The Plan Mr. Kuhn referenced in his presentation is the 2022 Community Plan; and if staff reviewed the current rezoning application against the 2022 Community Plan, we would find it inconsistent with those policies. The applicant requested to remove approximately 125.79± acres from the SUP and PUD. This acreage represented most of the former golf course that was held as open space with the original SUP approval as well as the abandoned clubhouse, pool, and tennis courts. The SUP amendment was approved and reduced the overall size of the original Special Use Permit (PUD) (Attachment E). The PUD and SUP requirements remain in place for the Clubhouse Villas, Fairway Villas, and the 5.01 acres of future Highway Business, along with the newly designated open space.

MASTER PLAN ANALYSIS

Open Space	Required:	10% or 12.47 acres
	Proposed:	40.29% or 50.24 acres
	Summary:	The proposed Master Plan **complies** with the minimum open space percentage requirement in the UDO.
Park Space	Required:	2.5% or 3.12 acres
	Proposed:	5.0% or 6.33 acres
	Summary:	The proposed passive recreation uses are outlined in Attachment B, Condition #15. The proposed Master Plan **complies** with the minimum park space percentage requirement in the UDO.
	Required:	25% of park space or 1.58 acres

Active Recreation	Proposed:	30.04% of park space or 1.90 acres
	Summary:	The proposed active recreation uses are outlined in Attachment B, Condition #16. The proposed Master Plan **complies** with the minimum park space percentage requirement in the UDO.
Public Utilities	Required:	The UDO requires that public water and sewer mains are extended to serve the site.
	Proposed:	This property is served by 8" water lines located along Club Villas Drive and Hogan Drive. It is also served by an 8" sewer line located along Club Villas Drive, Hogan Drive, and adjacent to the streams within the project that will be extended through the project.
	Summary:	The proposed Master Plan **complies** with the public utility requirements in the UDO.
Parking	Required:	Per UDO Chapter 9.4, the parking requirement for dwelling-single family is 2 spaces per unit if parking is provided in an enclosed garage or 352 parking spaces. The parking requirement for Dwelling - Townhome is 1.8 spaces per unit or 204 parking spaces. A total of 556 parking spaces are required. There are no bike parking requirements for Dwelling – Single Family. The bike parking requirement for Dwelling – Townhome is 2 per 40 auto spaces for townhomes and 1 per 30 units for private recreation facilities or 45 bike spaces.
	Proposed:	The applicant is proposing to provide 694 parking spaces through off-street parking spaces and parallel parking spaces. The developer will provide at least 46 bike parking spaces. The final locations will be determined at the time of Construction Plan review.
	Summary:	The proposed Master Plan **complies** with the minimum parking requirements in the UDO.
Roads	Required:	The Comprehensive Transportation Plan requires a US-1 Service Road North of S. Main Street cross section adjacent to US-1. Based on the number of lots proposed, the UDO required a Transportation Impact Analysis (TIA).
	Proposed:	The proposed Master Plan (Exhibit 1, Sheet C0.0) complies with the US-1 service road cross sections for the new service road adjacent to US-1. A TIA was provided for the project (Attachment G). The improvements required to mitigate the impact of the development are: <u>US-1/Club Villas Drive</u> Stripe the existing eastbound approach of Club Villas Drive to

		provide two egress lanes on the stem that exists between Capital Boulevard and Wake Union Church Road. The developer has also offered rezoning condition #20 that requires developer to request to the Town and NCDOT that no right turn signs be located at the service road and Street H intersections with Country Club Drive to prohibit access to Chillmark Avenue from the proposed development or service road. Staff is not supportive of this condition due to potential emergency service response time delays. If the Board of Commissioners were to approve the rezoning request, staff recommends this condition be removed since it does not create a complete street network, could cause delays in emergency response times, and would likely be ignored by motorists who want to turn right on to Country Club Drive. The developer has also offered rezoning condition #22 that allows the Town to potentially waive street improvements on the south side of the existing Club Villas Drive if it would interfere with the preservation of the existing landscaping adjacent to Fairway Villas townhomes. Staff is not supportive of this condition due to altering a required cross-section. If the Board of Commissioners were to approve the rezoning request, staff recommends this condition be removed. The developer has also offered rezoning condition #24 that requires that the developer to construct a channelized left-over at Club Villas Drive and US-1 and a U-turn south of that intersection to facilitate traffic from Club Villas Drive to travel northbound on US-1.
	Summary:	The proposed Master Plan **complies** with the minimum roadway infrastructure requirements in the UDO.

PROPOSED MODIFICATIONS OF BASE GENERAL RESIDENTIAL 10 ZONING DISTRICT STANDARDS

Article 2.2.5.A.2 Max Density	
Required:	10/units per acre max
Proposed:	3/units per acre max
Article 2.2.5.B.1 Minimum Lot Area	
Required:	5,000 SF min
Proposed:	30,000 SF min for lots west of Horse Creek
Article 2.4.3.C Special Highway Overlay Landscaping and Buffering	
Required:	30’ average street bufferyard adjacent to access road
Proposed:	10’ street bufferyard adjacent to access road
Article 2.4.3.D Special Highway Overlay Dimensional Requirements	

Required: Building Setback: 100 feet from property line abutting major access corridor. Proposed: Building Setback: 75 feet from property line abutting major access corridor.
Article 6.5.1.C Block Lengths Required: Maximum block lengths shall be 800'. Proposed: Simpson Court may exceed maximum block length requirements.
Article 8.5.3.C Buffer Yard Composition – Type B Buffer Required: Option 1 Minimum depth: 25' Proposed: Option 1 Minimum depth: 25' or 20' as shown on Exhibit 1, Sheet L5.00
See Attachment B for proposed zoning conditions.

COMPREHENSIVE PLAN CONSISTENCY

Community Plan (2009)	The proposed zoning map amendment request is generally inconsistent with the adopted 2009 Community Plan. The four main areas of inconsistency are: • Sub-Urban Zone (page 270): It states that the policy emphasis for Sub-Urban zones is very similar to the General Urban Zone. On Page 269, the Community Plan states that regardless of whether a particular development is of the post-war suburban model or the traditional neighborhood model, the Town wishes to see more well-designed services and places of employment proximate to and well-integrated with nearby residential development. The proposed development is adjacent to US-1 and integrates a portion of the future service road through the development. Staff believes that by not providing any non-residential development, the development is not in keeping with the policy emphasis of the Sub-Urban Zone. • General Policy Recommendation Policy 1 (page 28): Develop complete neighborhoods built around gathering spaces with a mix of housing types, lot sizes, and integrated commercial uses versus monolithic subdivisions. Only single-family dwellings and townhomes are proposed with this development and no commercial uses have been integrated. • Future Neighborhood Policies 3 and 5 (pages 62 and 63): Consider future transit corridors and reinforce these corridors with development mixtures and densities appropriate for transit services and encourage neighborhood serving businesses in neighborhood design. No commercial is being proposed as part of the development even though it is within the US-1 corridor. Also, townhomes are proposed to front on the service road, which is not an appropriate use along a service

	road. • Small Scale Neighborhood Businesses Policies 1 and 3 (Pages 85 and 86): Encourage small scale, pedestrian-oriented shopping and workplaces in the design of new neighborhoods and that they are designed at a residential scale and character. No non-residential development is being proposed within the neighborhood. • Major Street Policies 7 and 10 (Page 133): Provide contrasting streetyards along major streets for change in visual character and employ Special Highway Overlay Zoning to help implement roadway corridor plans particularly with regard to development standards for buildings within sight of the roadway. The SHOD-1 zoning in in place, which requires a 30' buffer from the service road and the applicant is proposing to reduce the planting width to 10' in front of the proposed townhouses. This is an inadequate amount of buffering when a townhouse is facing a service road. • Regional Transportation Policy 2 (Page 206): The Town should continue to anticipate and plan for the transformation of US-1 Capital Boulevard into a limited access freeway and multi-modal transportation corridor. The proposed plan does not provide any non-residential uses along this corridor and proposes townhouses adjacent to the service road. which is not the long term highest and best use of property adjacent to US-1 and a service road. Future residents of Wake Forest should not have a service road out their front door with a reduced streetyard as their only separation from the road.
Comprehensive Transportation Plan (2019)	The proposed zoning map amendment request is generally consistent with the Comprehensive Transportation Plan.
Historic Preservation Plan (2012)	The Historic Preservation Plan is not applicable to the zoning map amendment request.
Northeast Neighborhood Plan (2007)	The Northeast Neighborhood Plan is not applicable to the zoning map amendment request.
Park, Recreation, and Cultural Resources Master Plan (2015)	The Parks, Recreation, and Cultural Resources Master Plan is not applicable to the zoning map amendment request.

Public Art Vision Plan (2009)	The Public Art Vision Plan is not applicable to the zoning map amendment request.
Renaissance Plan (2017)	The Renaissance Plan is not applicable to the zoning map amendment request.
See Attachment F for detailed Plan Consistency Analysis. The Comprehensive Transportation Plan is not included in the Consistency Analysis since cross-sections are the only applicable element of the Plan.	

STAFF RECOMMENDATION

The zoning map amendment request is generally **Inconsistent** with the relevant policies in the Comprehensive Plan, and **Denial** of the zoning map amendment request is reasonable and in the public interest.

If the Board of Commissioners were to approve the rezoning request, staff would suggest the following changes to the proposed conditions:

- Condition 19: Staff recommends that this condition be altered to state "At the time of construction drawing submittal, the Developer shall be required to conduct a Phase 2 Environmental Site Assessment for the entire tract. The data from the Phase 2 Environmental Site Assessment shall meet the requirements of statutes for Soil Sample Collection under the Inactive Hazardous Sites Branch (IHSB) regulatory authority and be submitted to the Eastern Unit of the IHSB. A response from the Eastern Unit of the IHSB shall be obtained prior to the Issuance of a grading permit."
- Condition 20 - Staff recommends this condition be removed since it does not create a complete street network, could cause delays in emergency response times, and would likely be ignored by any motorist wishing to turn right on Country Club Drive.
- Condition 22 – Staff recommends that this condition be removed since it alters the required cross-section and could allow sidewalk, street trees, and curb and gutter to not be installed along a street.

ATTACHMENTS

Attachment A: Neighborhood Meeting Information
Attachment B: Application
Attachment C: Maps
Attachment D: Special Use Permit SU-99-02 Approvals
Attachment E Special Use Permit SU-99-02-01 Approval
Attachment F: Planning Board Recommendation and Plan Consistency Analysis
Attachment G: TIA Executive Summary and NCDOT Review Report

EXHIBITS

Exhibit 1: Proposed Conditional District Plan

REZONING AND SPECIAL USE PERMIT AMENDMENT OF CARROLL JOYNER PROPERTY

REPORT OF MEETING WITH ADJACENT PROPERTY OWNERS
ON MARCH 30, 2022

Pursuant to applicable provisions of the Unified Development Ordinance, a meeting was held with respect to a potential amendment to an existing Special Use Permit (SUP) and rezoning with adjacent property owners on Wednesday, March 30, 2022, at 6:00 p.m. This meeting was held virtually through the Zoom platform. All owners of property within the required notification area were invited to attend the meeting. Attached hereto as **Exhibit A** is a copy of the neighborhood meeting notice. A copy of the required mailing list for the meeting invitations is attached hereto as **Exhibit B**. A summary of the items discussed at the meeting is attached hereto as **Exhibit C**. Attached hereto as **Exhibit D** is a list of individuals who attended the meeting.

EXHIBIT A

Nil Ghosh | Associate
112 W Main St | Second Floor
Durham, NC 27701
919-590-0362
nghosh@morningstarlawgroup.com
www.morningstarlawgroup.com

To: Neighboring Property Owner

From: Nil Ghosh

Date: March 11, 2022

Re: Notice of meeting to discuss potential amendment to Special Use Permit and rezoning of parcels located north of Jenkins Road and west of Capital Boulevard containing approximately 157.45 acres and having Wake County Parcel Identification Numbers 1831895139; 1841091336; 1832712652; 1831773725; & 1831772476 (the "Property").

We are counsel for property owners which are considering developing the above-captioned Property as a mixed-use community consisting of traditional single-family detached homes, townhomes, and some opportunities for commercial uses. Pursuant to §15.3.5 of the Town of Wake Forest Unified Development Ordinance, you are receiving this notice because our records indicate you own property within the 500-foot notification area around the Property.

You probably know a portion of the Property previously operated as a golf course. The golf course closed about 15 years ago and its owners now wish to convert the defunct course into a mixed-use community. This project will require (1) an amendment to the existing Special Use Permit (SU-99-02) which designates a portion of the Property as Open Space; and (2) a rezoning. The base zoning for the parcels currently is General Residential 3 (GR3). The developer is considering rezoning the Property to General Residential 10 Conditional District (GR10 CD) and Highway Business Conditional District (HB CD).

Based on feedback from the community and Town staff, we will hold a second neighborhood meeting on Wednesday, March 30, 2022, starting at 6:00 P.M. via Zoom to discuss changes to our original plans. The purpose of the neighborhood meeting is to ensure that nearby property owners are made aware of the proposed project and can inform us of their questions or comments.

Instructions for registering for and joining the meeting are on the backside of this page.

For more information about rezoning, you may want to visit https://www.wakeforestnc.gov/planning/zoning or contact the Wake Forest Planning Department at (919) 435-9515.

How to Participate in the March 30, 2022 Neighborhood Meeting

- To participate by PC, Mac, iPad, iPhone or Android device,
  - Go to https://morningstarlaw.group/03302022mtg to register for the meeting. (*Registration is necessary to have a record of attendance.*)
  - Upon registration, you will receive a confirmation email with instructions on how to access the meeting.
- To participate by phone,
  - Dial one of the following numbers:
    - +1 301 715 8592
    - +1 312 626 6799
    - +1 929 436 2866
    - +1 253 215 8782
    - +1 346 248 7799
    - +1 669 900 6833
  - Enter Webinar ID: 885 0564 5332
  - Enter password: 983688

If you have difficulty connecting or have technical difficulties during the meeting, you can email us at meetings@mstarlaw.com or call 919-590-0366.

You are encouraged to join the meeting via your computer or smartphone so that you will have access to Zoom Webinar's interactive features including Raise Hand and Chat.

During the meeting, participants will be muted by default. Also, participants' video will be off by default, i.e. only the presenters will be visible.

- If you are participating via your computer, iPhone or Android device, you can submit questions/comments by using the Raise Hand and/or Chat features. If you use Raise Hand, a panelist will either unmute you to allow you to speak or will chat with you to solicit your questions/comments.
- If you are participating via telephone, you can submit questions/comments prior to and during the meeting via email at meetings@mstarlaw.com. At the end of the Q&A period of the meeting, all callers will be unmuted to allow for questions/comments.

EXHIBIT B

LIST OF PROPERTY OWNERS TO WHOM NOTICES WERE SENT

599 RALEIGH ROAD LLC
7208 FALLS OF NEUSE RD STE 101
RALEIGH NC 27615-3244

ADAMS FRY DEVELOPMENTS LLC
909 S MAIN ST
WAKE FOREST NC 27587-9277

ALLEN, KENNETH RAY
1325 JENKINS RD
WAKE FOREST NC 27587-9069

ALSTON, VERNELL PIERCE
3665 W RIVER RD
FRANKLINTON NC 27525-8206

AMH 2015-2 BORROWER LLC
AMERICAN HOMES 4 RENT
30601 AGOURA RD STE 200
AGOURA HILLS CA 91301-2148

ANDERSON, DANIEL W
8026 HOGAN DR
WAKE FOREST NC 27587-6661

BAGWELL, CAITLIN ELIZABETH
7811 HOGAN DR
WAKE FOREST NC 27587-6696

BARKER, KENNETH J BARKER, JACQUELINE S
100 TENBRIDGE CT
WAKE FOREST NC 27587-5332

BARKLEY, HUBERT MERRILL III
BARKLEY, MONICA NABORS
7732 KINGS WAY CT
WAKE FOREST NC 27587-6670

BARR, ARNOLD L BARR, CHIORENE L
1306 COUNTRY CLUB DR
WAKE FOREST NC 27587-8771

BEAL, JASON WAYNE KARAGEORGE, NANCY ANNA
8028 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

BEASLEY, DARYL BERNARD
BEASLEY, CUBIE T
7720 KINGS WAY CT
WAKE FOREST NC 27587-6670

BIELIK, EDWARD A PACE, KAYLA N
1310 CLUB VILLAS DR
WAKE FOREST NC 27587-4536

BOGGS, ANDREW KEITH BOGGS, KRISTINA M
8008 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

BONE, MALCOLM BONE, ELIZABETH
132 ARBORVITAE DR
PINE KNOLL SHORES NC 28512-6200

BOWERS, JAMES S BOWERS, DELIA B
1230 COUNTRY CLUB DR
WAKE FOREST NC 27587-9545

BRASWELL, GEORGE WILBUR JR
BRASWELL, MARGARET O
1113 CHILMARK AVE
WAKE FOREST NC 27587-5334

BREWER, KATHRYN C
8040 HOGAN DR
WAKE FOREST NC 27587-6661

BRYLSKI, JAMES J GANGI, JUDITH A
2538 PALMER CT
WAKE FOREST NC 27587-6445

BYRNE, THOMAS J JR BYRNE, MARY COLLINS
280 SWEETWATER HILLS DR
HENDERSONVILLE NC 28791-8005

CALDERON, NILO CALDERON, REBECCA Y
205 MIDDLESTONE CT
WAKE FOREST NC 27587-5331

CARLE, JACQUELINE D
2509 PALMER CT
WAKE FOREST NC 27587-6445

CARLETON, BETH A CARLETON, JOHN M
7822 HOGAN DR
WAKE FOREST NC 27587-6695

CHEGUE, DAVID RAMIREZ, JUDITH
1306 CLUB VILLAS DR
WAKE FOREST NC 27587-4536

CIMA, DAVID A CIMA, CINDY
1104 CHILMARK AVE
WAKE FOREST NC 27587-5358

CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB HOA, INC
CLUBHOUSE VILLAS AT WAKE FOREST GOL
PO BOX 79032
CHARLOTTE NC 28271-0030

COLEY, KENNETH S COLEY, KATHLEEN C
8006 HOGAN DR
WAKE FOREST NC 27587-6661

COLLINS, KEVIN D COLLINS, SUSAN M
204 MIDDLESTONE CT
WAKE FOREST NC 27587-5331

COMER, GWENDOLYN ANN
990 KINTAIL CT
WAKE FOREST NC 27587-4918

CONLEY, JOHN T CONLEY, LYNN G
2525 CANONBIE LN
WAKE FOREST NC 27587-8766

CORBETT, MICHAEL P CORBETT, VIRGINIA L
1107 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

CORRIVEAU, NANCY
407 SHANNONFORD CT
WAKE FOREST NC 27587-9005

COSGROVE, DONALD R COSGROVE, DANIELLE L
1101 CHILMARK AVE
WAKE FOREST NC 27587-5334

COWPERTHWAIT, DANIEL P COWPERTHWAIT, SHELLEY M
2516 CANONBIE LN
WAKE FOREST NC 27587-9010

DA COSTA, GISELE CANCISSU
8025 HOGAN DR
WAKE FOREST NC 27587-6662

DANIEL, TIMOTHY T DANIEL, PAMELA H
1218 CHILMARK AVE
WAKE FOREST NC 27587-5335

DAYE, LANISHA
998 TEMPLERIDGE RD
WAKE FOREST NC 27587-9006

DEFORE, JOHN T DEFORE, MARY ANNE
7914 HOGAN DR
WAKE FOREST NC 27587-6659

DIAZIT COMPANY INC
8105 DIAZIT DR
WAKE FOREST NC 27587-6684

DICKENS, KIMBERLY POWERS
7732 FAIRLAKE DR
WAKE FOREST NC 27587-5452

DINGBAUM, THOMAS W DINGBAUM, JUDITH ANNE
2537 PALMER CT
WAKE FOREST NC 27587-6445

DION, KATHRYN ANNE
998 SAINT CATHERINES DR
WAKE FOREST NC 27587-6641

DOBLITZ, MICHELE-ANGELLA EJIMA DOBLITZ, STEFAN
1148 CHILMARK AVE
WAKE FOREST NC 27587-5333

DOMINICK, JOHN M DOMINICK, BETSY S
1105 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

DRIBUS, JOHN ALEXANDER DRIBUS, CAMMIE RENEE
7716 KINGS WAY CT
WAKE FOREST NC 27587-6670

DRY TIMBER LLC
394 FLEMING RD
YOUNGSVILLE NC 27596-9698

DUNN, KENNETH III DUNN, JUDY
983 SAINT CATHERINES DR
WAKE FOREST NC 27587-6642

DURHAM, MICHAEL J DURHAM, CAROL I
2421 CANONBIE LN
WAKE FOREST NC 27587-8765

E HUNT III LLC
WILLIAM P ANDREWS
1121 JENKINS RD
WAKE FOREST NC 27587-9064

EBERLE, JOHN C TRUSTEE EBERLE, SUSAN R TRUSTEE
2521 CANONBIE LN
WAKE FOREST NC 27587-8766

ECKHARDT, SAM E ECKHARDT, ALICIA C
1221 CHILMARK AVE
WAKE FOREST NC 27587-5336

EVALDI, FRANK D EVALDI, KAREN SCHLETT
8004 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

FAIRCHILD, JACQUELYN J FAIRCHILD, MARK
8010 HOGAN DR
WAKE FOREST NC 27587-6661

FAIRLAKE COMMUNITY ASSOCIATION
5300 FALLS OF NEUSE RD
RALEIGH NC 27609-4756

FAIRWAY VILLAS AT WF GOLF CLUB &
PPM
11010 RAVEN RIDGE RD
RALEIGH NC 27614-8837

FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC
PPM
11010 RAVEN RIDGE RD
RALEIGH NC 27614-8837

FERN, RICHARD J FERN, MARY M
998 KINTAIL CT
WAKE FOREST NC 27587-4918

FICHERA, JOHN L FICHERA, WENDY M
1240 COUNTRY CLUB DR
WAKE FOREST NC 27587-9545

FINNEGAN, JOSEPH T FINNEGAN, LESLEY E
1102 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

FISHER, C P JR
1430 COUNTRY CLUB DR
WAKE FOREST NC 27587-8773

FISHER, JERRY W FISHER, SARAH H
635 GALASHIELS PL
WAKE FOREST NC 27587-6636

FOSTER, DAVID M FOSTER, CARRIE A
7617 HEURISTIC WAY
WAKE FOREST NC 27587-9000

FOZDAR, MANISH A FOZDAR, RITA M
1109 CHILMARK AVE
WAKE FOREST NC 27587-5334

FREEMAN, JAMES LOUIS JR FREEMAN, JOAN OUTLAND
1336 COUNTRY CLUB DR
WAKE FOREST NC 27587-8771

GADD, CHARLES WEARN JR GADD, SALLY M
8108 HAWKSHEAD RD
WAKE FOREST NC 27587-6679

GADD, DAVID C GADD, STEPHANIE M
2512 CANONBIE LN
WAKE FOREST NC 27587-9010

GAIL M BOWEN REVOCABLE TRUST
7724 FAIRLAKE DR
WAKE FOREST NC 27587-5452

GAYLORD, TRINA RENE GAYLORD, JOHN PATRICK JR
1103 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

GERLITZ, KYLE A TRUSTEE GERLITZ, ANN M TRUSTEE
7909 HOGAN DR
WAKE FOREST NC 27587-6660

GIBBS, LAWRENCE F GIBBS, MITZI KING
2601 WENDLER CT
WAKE FOREST NC 27587-5456

GIBSON, PATRICIA CLIFFORD GIBSON, GARY STEVE
7701 FAIRLAKE DR
WAKE FOREST NC 27587-5453

GIORDANO, GLENN E GIORDANO, JOHNNA D
7736 KINGS WAY CT
WAKE FOREST NC 27587-6670

GOK, KEN Y AYUN, H. LIM
1301 CLUB VILLAS DR
WAKE FOREST NC 27587-4537

GONZALEZ, JOSE L GOMEZ, DENICE E
8014 HOGAN DR
WAKE FOREST NC 27587-6661

GOSSETT, LINDA M
1204 COUNTRY CLUB DR
WAKE FOREST NC 27587-9545

GRADY, DOUGLAS H GRADY, MARTHA S
1106 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

GRAFF, JOSEPH N GRAFF, BARBARA A
38725 DELAFIELD RD
OCONOMOWOC WI 53066-9104

GREEN TIMBER FOUNDATION
394 FLEMING RD
YOUNGSVILLE NC 27596-9698

GREENBERG, MICHAEL HOWARD
GREENBERG, JANN HARRIS
8017 HAWKSHEAD RD
WAKE FOREST NC 27587-6681

GREENE, CHEKITA HULBERT
8038 HOGAN DR
WAKE FOREST NC 27587-6661

GRIMMETT, ANDREW O WRIGHT, ANGELA M
1320 COUNTRY CLUB DR
WAKE FOREST NC 27587-8771

GUILMETTE, GEORGE
2405 CANONBIE LN
WAKE FOREST NC 27587-8765

HADDAD, KHALIL A /TR HADDAD, RITA R /TR
8101 HAWKSHEAD RD
WAKE FOREST NC 27587-6680

HAMILTON, EUGENE D HAMILTON, BARBARA A
8030 HOGAN DR
WAKE FOREST NC 27587-6661

HANSON, CATHERINE W
2526 PALMER CT
WAKE FOREST NC 27587-6445

HARGRAVE, GAIL P
2600 WENDLER CT
WAKE FOREST NC 27587-5456

HARGROVE, JILL LYNN MAY, MARK W
409 SHANNONFORD CT
WAKE FOREST NC 27587-9005

HARKLEY, JOSEPH LEE HARKLEY, MARIA J
7910 HOGAN DR
WAKE FOREST NC 27587-6659

HARRIS, JAMES TODD
2608 LORING LAKE DR
WAKE FOREST NC 27587-5454

HARTLEY, EDITH A HARTLEY, TIMOTHY L
1351 COUNTRY CLUB DR
WAKE FOREST NC 27587-8772

HAUSER, THOMAS BRENT HAUSER, LINDA MARGARET
6625 SPRINGIRTH TER
ALEXANDRIA VA 22315-5585

HEATH, CHARLES LARRY HEATH, MARY EDITH
1112 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

HENDERSON, KAREN W HENDERSON, TIMOTHY L
1105 CHILMARK AVE
WAKE FOREST NC 27587-5334

HODGES, THOMAS R HODGES, SUSAN C
7728 KINGS WAY CT
WAKE FOREST NC 27587-6670

HOLCOMBE, DANIEL ELDON
984 SAINT CATHERINES DR
WAKE FOREST NC 27587-6641

HOLDER, ADAM G HOLDER, JENNIFER L
990 SAINT CATHERINES DR
WAKE FOREST NC 27587-6641

HOLDING, BETH KELLY HOLDING, STEPHEN VICK SR
2520 CANONBIE LN
WAKE FOREST NC 27587-9010

HORNBUCKLE, CASSANDRA HORNBUCKLE, KEN
7903 HOGAN DR
WAKE FOREST NC 27587-6660

HORNER, WESLEY HORNER, MIKAYLA
7915 HOGAN DR
WAKE FOREST NC 27587-6660

HORTON, ROBIN RANDALL SR HORTON, MARY HOLLAND
1101 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

HOWELL, ALBERTO S HOWELL, DIANNA
1225 CHILMARK AVE
WAKE FOREST NC 27587-5336

JACKSON, DAVID E
2519 PALMER CT
WAKE FOREST NC 27587-6445

JACKSON, WESLEY W JACKSON, MELANIE C
992 W DURNESS CT
WAKE FOREST NC 27587-4919

JAFFEE, IRA W JAFFEE, EVA E
994 TEMPLERIDGE RD
WAKE FOREST NC 27587-9006

JALLORINA, CLAUDE H HABON, LORNA D
1305 CLUB VILLAS DR
WAKE FOREST NC 27587-4537

JAREMA, JOHN BLAINE JAREMA, PAMELA JOANN
1205 CHILMARK AVE
WAKE FOREST NC 27587-5336

JEFFREYS, WILLIAM SR JEFFREYS, KIMBERLY
991 SAINT CATHERINES DR
WAKE FOREST NC 27587-6642

JENKS, J HUBERT JENKS, JUDITH W
2513 MCGOWAN CT
WAKE FOREST NC 27587-6658

JOHNS, JASON JOSEPH
2420 PURNELL RD
WAKE FOREST NC 27587-9461

JONES, JO ANNA FINCH
1415 COUNTRY CLUB DR
WAKE FOREST NC 27587-8774

JORDAN, REBECCA ANN JORDAN, JAMES DOUGLAS
629 TOWNSVILLE LANDING RD
HENDERSON NC 27537-5688

JOYNER, SAMUEL H JOYNER, PATRICIA S
1426 COUNTRY CLUB DR
WAKE FOREST NC 27587-8773

KAISER, PETER LAWRENCE KAISER, SHARON MARIE
8042 HOGAN DR
WAKE FOREST NC 27587-6661

KEARNEY, GLORIA
990 TEMPLERIDGE RD
WAKE FOREST NC 27587-9006

KENNEDY, JANET A
7819 HOGAN DR
WAKE FOREST NC 27587-6696

KING, JOHN C JR KING, NETANIS E
1309 CLUB VILLAS DR
WAKE FOREST NC 27587-4537

KIRCHER, MARY L YOUNG, THOMAS H
1217 CHILMARK AVE
WAKE FOREST NC 27587-5336

KOON, JOEL A KOON, SONJA M
209 MIDDLESTONE CT
WAKE FOREST NC 27587-5331

KUMAR, DHRUVA KUMAR, USHA
8040 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

KUSIBAB, GREGORY G KUSIBAB, KATHRYN A
2552 PALMER CT
WAKE FOREST NC 27587-6445

LAINHART, MICHAEL S LAINHART, SANDRA J
2609 WENDLER CT
WAKE FOREST NC 27587-5456

LAMANDO, ANTHONY J LAMANDO, WRONDA
7621 HEURISTIC WAY
WAKE FOREST NC 27587-9000

LEARY, CHRISTOPHER R LEARY, SHARON L
2601 LORING LAKE DR
WAKE FOREST NC 27587-5455

LEATHERMAN, MARK STEPHEN
1213 COUNTRY CLUB DR
WAKE FOREST NC 27587-8770

LEE, WILLIAM JOHN JR LEE, CARRIE LYNNE
2600 LORING LAKE DR
WAKE FOREST NC 27587-5454

LENNAR CAROLINAS LLC
TROY J GEORGE
1100 PERIMETER PARK DR STE E112
MORRISVILLE NC 27560-0180

LERNER, MICHELLE GOLDBERG
7902 HOGAN DR
WAKE FOREST NC 27587-6659

LESTER, JEFFREY A LESTER, JO ANNE D
1352 COUNTRY CLUB DR
WAKE FOREST NC 27587-8771

LILE, TRAVIS LILE, LYNDSEY
7806 HOGAN DR
WAKE FOREST NC 27587-6695

LOVING, JOHN C LOVING, LENNIS F
1115 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

LUFT FAMILY TRUST
179 BRUSH CRK
BEAUMONT CA 92223-7302

LUKOWIAK, PETER ALOYSIUS LUKOWIAK, JENNIFER ANNE
2605 WENDLER CT
WAKE FOREST NC 27587-5456

MAIOLO, THOMAS
1106 LANDRUM RD
COLUMBUS NC 28722-6485

MANLEY, THOMAS J MANLEY, ELIZABETH P
8024 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

MARINOS, DEMETRIOS J MARINOS, ANNAMARIA V
2604 LORING LAKE DR
WAKE FOREST NC 27587-5454

MARTIN, TIMOTHY DAVID MARTIN, D'ETTA JOHNSON
7814 HOGAN DR
WAKE FOREST NC 27587-6695

MASSEY, ANDREW LEE II MASSEY, RENE P
7605 SOUTHWICK CT
WAKE FOREST NC 27587-8716

MASSEY, GEORGE DENNIS MASSEY, CHIKAKO S
2513 CANONBIE LN
WAKE FOREST NC 27587-8766

MATTHEWS, KENNETH MARK MATTHEWS, TRACIE R
7700 FAIRLAKE DR
WAKE FOREST NC 27587-5452

MAYO, RICHARD E MAYO, DEIDRE LYNN
7810 HOGAN DR
WAKE FOREST NC 27587-6695

MCANALLY, DAVID R MCANALLY, PATICIA M
987 KINTAIL CT
WAKE FOREST NC 27587-4918

MCGRATH, PAUL MCGRATH, CAROL COCHRAN
1414 COUNTRY CLUB DR
WAKE FOREST NC 27587-8773

MCILWAIN, GARY E MCILWAIN, CAROL A
2144 PETRUCHIO WAY
ROSEVILLE CA 95661-3221

MCVAY, GLEN A. MCVAY, KIMBERLY
2517 CANONBIE LN
WAKE FOREST NC 27587-8766

MEAD, DAVID W MEAD, KAILYN R
121 KEETER CIR
WAKE FOREST NC 27587-6688

MELVIN, ROGER W MELVIN, ELIZABETH T
1427 COUNTRY CLUB DR
WAKE FOREST NC 27587-8774

MEYER, ROGER P MEYER, KATHLEEN F
2417 CANONBIE LN
WAKE FOREST NC 27587-8765

MICCHIA, JOSEPH M JR TRUSTEE MICCHIA, GINA L TRUSTEE
212 MIDDLESTONE CT
WAKE FOREST NC 27587-5331

MILLER, DYANNE
1116 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

MILLER, GILBERT BENTON JR MILLER, SHELLEY S
8000 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

MILLER, JAMES
1140 CHILMARK AVE
WAKE FOREST NC 27587-5333

MOFFATTE, IAN M MOFFATTE, MICHELLE L
2527 PALMER CT
WAKE FOREST NC 27587-6445

MONTGOMERY, MARK A MONTGOMERY, CYNTHIA L
101 TENBRIDGE CT
WAKE FOREST NC 27587-5332

MOSELEY, THEDRIC JACKSON MOSELEY, KAREN HARRIS
8100 HAWKSHEAD RD
WAKE FOREST NC 27587-6679

MUKHERJEE, SUBIRENDU MUKHERJEE, WANDA
1208 CHILMARK AVE
WAKE FOREST NC 27587-5335

NACITA, ELIJAH Q NACITA, CHRISTY W
8052 HOGAN DR
WAKE FOREST NC 27587-6661

NANCE, DEBORAH A
1205 COUNTRY CLUB DR
WAKE FOREST NC 27587-8770

NASSIF, CHARLES M
8012 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

NASSIF, CHARLES MARTIN NASSIF, RUTH K
8012 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

NEAL, GARY WAYNE NEAL,
KATHLEEN FRANCES
1144 CHILMARK AVE
WAKE FOREST NC 27587-5333

NEEB, LINDA S
8120 DIAZIT DR
WAKE FOREST NC 27587-6683

NEISES, GAIL ELAINE
1111 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

NEWSOME, JOHNATHAN H
NEWSOME, PEGGY D
983 KINTAIL CT
WAKE FOREST NC 27587-4918

NORTH CAROLINA DEPARTMENT OF
TRANSPORTATION
1546 MAIL SERVICE CTR
RALEIGH NC 27699-1500

OAKMARK DEVELOPMENT CO LLC
PO BOX 99277
RALEIGH NC 27624-9277

OBRIEN, THOMAS E OBRIEN, MARY A
2503 MCGOWAN CT
WAKE FOREST NC 27587-6658

O'DELL, MARK A O'DELL, BETH M
2509 CANONBIE LN
WAKE FOREST NC 27587-8766

O'NEAL, ELIZABETH A O'NEAL,
KEITH A
8020 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

OSTERGARD, RICHARD A
OSTERGARD, YONG S
8032 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

PACKETT, MITCHELL G PACKETT,
ANNE A
8104 HAWKSHEAD RD
WAKE FOREST NC 27587-6679

PALMERTON, JEFFREY DALE
PALMERTON, ELIZABETH
7802 HOGAN DR
WAKE FOREST NC 27587-6695

PATCHEL, THOMAS H PATCHEL,
JEAN M
8002 HOGAN DR
WAKE FOREST NC 27587-6661

PATE, JANE HARRIS
3511 MEADOWRUN DR
DURHAM NC 27707-6626

PATRICK, HENRY W PATRICK,
BRENDA T
8009 HAWKSHEAD RD
WAKE FOREST NC 27587-6681

PAYNE, DAVIE PAYNE, ANGELA D
994 SAINT CATHERINES DR
WAKE FOREST NC 27587-6641

PENKUNAS, JOSEPH J PENKUNAS,
PATRICIA A
7725 KINGS WAY CT
WAKE FOREST NC 27587-6670

PERRY, MICHAEL K PERRY, LEE B
208 MIDDLESTONE CT
WAKE FOREST NC 27587-5331

PERVEILER, KEVIN J PERVEILER,
MARIA
2605 LORING LAKE DR
WAKE FOREST NC 27587-5455

PETERSON, GREGORY CLARK
TRUSTEE PETERSON, BARBARA
MELVIN TRUSTEE
2420 CANONBIE LN
WAKE FOREST NC 27587-5450

PIMENTEL, JESSE G PIMENTEL,
ROSEMARY
8044 HOGAN DR
WAKE FOREST NC 27587-6661

PLEASANTS FAMILY LLC
3023 DEVONSHIRE DR
RALEIGH NC 27607-6619

PLEASANTS, CHRIS
9142 JACKSON RD
WAKE FOREST NC 27587-7985

PLUEDDEMANN, MICHAEL L
PLUEDDEMANN, NANCY W
8022 HOGAN DR
WAKE FOREST NC 27587-6661

PONSOLLE, DAWN
1329 COUNTRY CLUB DR
WAKE FOREST NC 27587-8772

POOLE, TARA C
994 W DURNESS CT
WAKE FOREST NC 27587-4919

POTTER, MARCUS H III TRUSTEE
POTTER, CATHERINE O TRUSTEE
8048 HOGAN DR
WAKE FOREST NC 27587-6661

POWELL, ANNE H
2505 CANONBIE LN
WAKE FOREST NC 27587-8766

PRATT, JOEL MICHAEL PRATT, LINDA
2409 CANONBIE LN
WAKE FOREST NC 27587-8765

PRUITT, DELORES
1109 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

QUALLS, JEREMY B QUALLS, THOMAS
1100 CHILMARK AVE
WAKE FOREST NC 27587-5358

RAMSARAN, MICHAEL RAMSARAN, CHARMAINE
1303 CLUB VILLAS DR
WAKE FOREST NC 27587-4537

REDMAN, JOHN MICHAEL
1212 COUNTRY CLUB DR
WAKE FOREST NC 27587-9545

REITMANN, ROBERT
1304 CLUB VILLAS DR
WAKE FOREST NC 27587-4536

RETTIG, THOMAS RETTIG, AMY
8021 HAWKSHEAD RD
WAKE FOREST NC 27587-6681

RIDDLE, SHERRY JAYNE RIDDLE, JAMES CARL
7729 KINGS WAY CT
WAKE FOREST NC 27587-6670

RINDONI, CAROL F
1431 COUNTRY CLUB DR
WAKE FOREST NC 27587-8774

RITCHEY, BRIAN C TRUSTEE
RITCHEY, MARY ELLEN TRUSTEE
8033 HOGAN DR
WAKE FOREST NC 27587-6662

ROBERTS, ANGELIKA LESMANA
ROBERTS, JAMES CARTER
986 W DURNESS CT
WAKE FOREST NC 27587-4919

RODRIGUEZ, PATRICK ANTHONY
RODRIGUEZ, BRENDA KAYLANEY
1231 COUNTRY CLUB DR
WAKE FOREST NC 27587-8770

ROGGE, BEVERLY J TRUSTEE GAIL E AND BEVERLY J ROGGE TRUST
1117 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

ROSE, MELINDA FLETCHER TRUSTEE
THE MELINDA FLETCHER ROSE REVOCABLE TRUST
7704 FAIRLAKE DR
WAKE FOREST NC 27587-5452

ROUSSEAU, CHERYLL E
1110 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

RUDA, EMILY
1104 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

RUPRICH, MARK A RUPRICH, KAREN M
7708 FAIRLAKE DR
WAKE FOREST NC 27587-5452

RUPSKY, MARK J RUPSKY, PENNY L
1311 CLUB VILLAS DR
WAKE FOREST NC 27587-4537

RUSSELL, RENO RUSSELL, LAKEYA
1209 CHILMARK AVE
WAKE FOREST NC 27587-5336

RYAN, BARBARA A
2609 LORING LAKE DR
WAKE FOREST NC 27587-5455

SAMUEL, NEELAM JEWELL, JEFFREY
1116 CHILMARK AVE
WAKE FOREST NC 27587-5333

SAPP, ANDREW J SAPP, JO ANN
7801 HOGAN DR
WAKE FOREST NC 27587-6696

SCHRIER, MARK E SCHRIER, TARA EILEEN
7733 KINGS WAY CT
WAKE FOREST NC 27587-6670

SEAMSTER, IRA SEAMSTER, DENISE
994 KINTAIL CT
WAKE FOREST NC 27587-4918

SFR JV-1 2020-1 BORROWER LLC
TRICON AMERICAN HOMES LLC
1508 BROOKHOLLOW DR
SANTA ANA CA 92705-5426

SIMS, YVONNE M
1307 CLUB VILLAS DR
WAKE FOREST NC 27587-4537

SLIWINSKI, NICOLAS SILWINSKI, CARISSA
8034 HOGAN DR
WAKE FOREST NC 27587-6661

SMITH, KYLE CHRISTOPHER SMITH, CAROLINE ROSE
995 SAINT CATHERINES DR
WAKE FOREST NC 27587-6642

SMITH, MARY ELIZABETH K
120 KEETER CIR
WAKE FOREST NC 27587-6687

SMITH, RICHARD C SMITH, CYNTHIA M
7605 HEURISTIC WAY
WAKE FOREST NC 27587-9000

SNOW, WILLIAM T SNOW, AMY M
1200 CHILMARK AVE
WAKE FOREST NC 27587-5335

SOTELO, NASHELY G SANCHEZ, BRYAN VALLEJO
3302 COMSTOCK RD
RALEIGH NC 27604-3464

SOWA, AUDREY
405 SHANNONFORD CT
WAKE FOREST NC 27587-9005

SPEAS, EDWIN M III SPEAS, POLLY ANNA
7612 LITERARY LN
WAKE FOREST NC 27587-9053

SPRUILL, LORENZA DALLAS III SPRUILL, KAREN
2506 PALMER CT
WAKE FOREST NC 27587-6445

STAFFORDSHIRE HOMEOWNERS ASSOC INC
SENTRY MGMT INC
2180 W SR 434 STE 5000
LONGWOOD FL 32779-5042

STALLINGS, RICHARD N STALLINGS, ROBIN A
7620 HEURISTIC WAY
WAKE FOREST NC 27587-9000

STEVENSON, PETER STEVENSON, CATHI A
1108 CHILMARK AVE
WAKE FOREST NC 27587-5358

STYLES, JACK B STYLES, JUANITA L
2524 CANONBIE LN
WAKE FOREST NC 27587-9010

SUCHER, AARON SUCHER, SOU
7724 KINGS WAY CT
WAKE FOREST NC 27587-6670

SUTHERLAND PTNR LLC
818 S WHITE ST
WAKE FOREST NC 27587-2961

SWINDELL, KEVIN J SWINDELL, BERNADINE F
1213 CHILMARK AVE
WAKE FOREST NC 27587-5336

THARPE, JOHN W JR STRONG, PATRICIA MITCHELL
8025 HAWKSHEAD RD
WAKE FOREST NC 27587-6681

TOLLENS, MARY
991 W DURNESS CT
WAKE FOREST NC 27587-4919

TORRENCE, TARA MAPLES
7625 HEURISTIC WAY
WAKE FOREST NC 27587-9000

TOWN OF WAKE FOREST
PLANNING DEPT
301 S BROOKS ST
WAKE FOREST NC 27587-2932

TURNER, LEO R JR
8001 HAWKSHEAD RD
WAKE FOREST NC 27587-6681

UPTON, KEVIN C UPTON, MITZI M
1358 COUNTRY CLUB DR
WAKE FOREST NC 27587-8771

VAN, ORDEN JOHN E VAN, ORDEN AMARILIS
8036 HAWKSHEAD RD
WAKE FOREST NC 27587-9420

VARNEDOE, WILLIAM S VARNEDOE, WANDA C
2412 CANONBIE LN
WAKE FOREST NC 27587-5450

VELASQUEZ, NOEMY VELASQUEZ, WERNER ROLANDO
999 W DURNESS CT
WAKE FOREST NC 27587-4919

VIGARI, VINCENT F GALLOWAY, KAY C
7608 HEURISTIC WAY
WAKE FOREST NC 27587-9000

VOLLMER, CHARLES B VOLLMER, STELLA
1118 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

VUKOVICH, FRED M VUKOVICH, NADINE M
8033 HAWKSHEAD RD
WAKE FOREST NC 27587-6681

WADFORD, NYLE F WADFORD, TERESA H
8019 HOGAN DR
WAKE FOREST NC 27587-6662

WAKE UNION BAPTIST CHURCH
13345 WAKE UNION CHURCH RD
WAKE FOREST NC 27587-7451

WAKE UNION BAPTIST CHURCH
EARL PLEASANT TRUSTEES
13345 WAKE UNION CHURCH RD
WAKE FOREST NC 27587-7451

WALLACE, MARK FRANKLIN
WALLACE, NICOLE J
7906 HOGAN DR
WAKE FOREST NC 27587-6659

WALSH, DANIEL F WALSH, MICHELLE R
1204 CHILMARK AVE
WAKE FOREST NC 27587-5335

WARE, VALERIE T WARE, ARCHIE L
7807 HOGAN DR
WAKE FOREST NC 27587-6696

WEBER, KEITH A WEBER, CATHERINE J
1136 CHILMARK AVE
WAKE FOREST NC 27587-5333

WENNINGER, STEPHAN FRIEDRICH
WENNINGER, SARAH LESLIE
2501 CANONBIE LN
WAKE FOREST NC 27587-8766

WILLIAMS, TRAMPAS
1113 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5180

WU, THUAN WU, MINH LUU
7818 HOGAN DR
WAKE FOREST NC 27587-6695

YAMASA CO LTD
PO BOX 4090
SCOTTSDALE AZ 85261-4090

YARMOLIK, TATSIANA YARMOLIK, ANDREI
995 W DURNESS CT
WAKE FOREST NC 27587-4919

YAROSH, DANIEL YAROSH, LORI
7815 HOGAN DR
WAKE FOREST NC 27587-6696

YATES, SANDRA J YATES, BURL E
8005 HAWKSHEAD RD
WAKE FOREST NC 27587-6681

ZELVIS, MICHELE HOFFMAN
1120 FAIRWAY VILLAS DR
WAKE FOREST NC 27587-5179

ZENESKI, ANDREW JOSEPH SR
ZENESKI, ANNE BRUMMITT
1214 CHILMARK AVE
WAKE FOREST NC 27587-5335

ZHAO, BAIRU
12310 ANGEL FALLS RD
RALEIGH NC 27614-7619

Owner	Mail Address	City State Zip
599 RALEIGH ROAD LLC	7208 FALLS OF NEUSE RD STE 101	RALEIGH NC 27615-3244
ADAMS FRY DEVELOPMENTS LLC	909 S MAIN ST	WAKE FOREST NC 27587-9277
ALLEN, KENNETH RAY	1325 JENKINS RD	WAKE FOREST NC 27587-9069
ALSTON, VERNELL PIERCE	3665 W RIVER RD	FRANKLINTON NC 27525-8206
AMH 2015-2 BORROWER LLC %AMERICAN HOMES 4 RENT	30601 AGOURA RD STE 200	AGOURA HILLS CA 91301-2148
ANDERSON, DANIEL W	8026 HOGAN DR	WAKE FOREST NC 27587-6661
BAGWELL, CAITLIN ELIZABETH	7811 HOGAN DR	WAKE FOREST NC 27587-6696
BARKER, KENNETH J BARKER, JACQUELINE S	100 TENBRIDGE CT	WAKE FOREST NC 27587-5332
BARKLEY, HUBERT MERRILL III BARKLEY, MONICA NABORS	7732 KINGS WAY CT	WAKE FOREST NC 27587-6670
BARR, ARNOLD L BARR, CHIORENE L	1306 COUNTRY CLUB DR	WAKE FOREST NC 27587-8771
BEAL, JASON WAYNE KARAGEORGE, NANCY ANNA	8028 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
BEASLEY, DARYL BERNARD BEASLEY, CUBIE T	7720 KINGS WAY CT	WAKE FOREST NC 27587-6670
BIELIK, EDWARD A PACE, KAYLA N	1310 CLUB VILLAS DR	WAKE FOREST NC 27587-4536
BOGGS, ANDREW KEITH BOGGS, KRISTINA M	8008 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
BONE, MALCOLM BONE, ELIZABETH	132 ARBORVITAE DR	PINE KNOLL SHORES NC 28512-6200
BOWERS, JAMES S BOWERS, DELIA B	1230 COUNTRY CLUB DR	WAKE FOREST NC 27587-9545
BRASWELL, GEORGE WILBUR JR BRASWELL, MARGARET O	1113 CHILMARK AVE	WAKE FOREST NC 27587-5334
BREWER, KATHRYN C	8040 HOGAN DR	WAKE FOREST NC 27587-6661
BRYLSKI, JAMES J GANGI, JUDITH A	2538 PALMER CT	WAKE FOREST NC 27587-6445
BYRNE, THOMAS J JR BYRNE, MARY COLLINS	280 SWEETWATER HILLS DR	HENDERSONVILLE NC 28791-8005
CALDERON, NILO CALDERON, REBECCA Y	205 MIDDLESTONE CT	WAKE FOREST NC 27587-5331
CARLE, JACQUELINE D	2509 PALMER CT	WAKE FOREST NC 27587-6445
CARLETON, BETH A CARLETON, JOHN M	7822 HOGAN DR	WAKE FOREST NC 27587-6695
CHEGUE, DAVID RAMIREZ, JUDITH	1306 CLUB VILLAS DR	WAKE FOREST NC 27587-4536
CIMA, DAVID A CIMA, CINDY	1104 CHILMARK AVE	WAKE FOREST NC 27587-5358
CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB HOA, INC	PO BOX 79032	CHARLOTTE NC 28271-0030
COLEY, KENNETH S COLEY, KATHLEEN C	8006 HOGAN DR	WAKE FOREST NC 27587-6661
COLLINS, KEVIN D COLLINS, SUSAN M	204 MIDDLESTONE CT	WAKE FOREST NC 27587-5331
COMER, GWENDOLYN ANN	990 KINTAIL CT	WAKE FOREST NC 27587-4918

CONLEY, JOHN T CONLEY, LYNN G	2525 CANONBIE LN	WAKE FOREST NC 27587-8766
CORBETT, MICHAEL P CORBETT, VIRGINIA L	1107 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
CORRIVEAU, NANCY	407 SHANNONFORD CT	WAKE FOREST NC 27587-9005
COSGROVE, DONALD R COSGROVE, DANIELLE L	1101 CHILMARK AVE	WAKE FOREST NC 27587-5334
COWPERTHWAIT, DANIEL P COWPERTHWAIT, SHELLEY M	2516 CANONBIE LN	WAKE FOREST NC 27587-9010
DA COSTA, GISELE CANCISSU	8025 HOGAN DR	WAKE FOREST NC 27587-6662
DANIEL, TIMOTHY T DANIEL, PAMELA H	1218 CHILMARK AVE	WAKE FOREST NC 27587-5335
DAYE, LANISHA	998 TEMPLERIDGE RD	WAKE FOREST NC 27587-9006
DEFORE, JOHN T DEFORE, MARY ANNE	7914 HOGAN DR	WAKE FOREST NC 27587-6659
DIAZIT COMPANY INC	8105 DIAZIT DR	WAKE FOREST NC 27587-6684
DICKENS, KIMBERLY POWERS	7732 FAIRLAKE DR	WAKE FOREST NC 27587-5452
DINGBAUM, THOMAS W DINGBAUM, JUDITH ANNE	2537 PALMER CT	WAKE FOREST NC 27587-6445
DION, KATHRYN ANNE	998 SAINT CATHERINES DR	WAKE FOREST NC 27587-6641
DOBLITZ, MICHELE-ANGELLA EJIMA DOBLITZ, STEFAN	1148 CHILMARK AVE	WAKE FOREST NC 27587-5333
DOMINICK, JOHN M DOMINICK, BETSY S	1105 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
DRIBUS, JOHN ALEXANDER DRIBUS, CAMMIE RENEE	7716 KINGS WAY CT	WAKE FOREST NC 27587-6670
DRY TIMBER LLC	394 FLEMING RD	YOUNGSVILLE NC 27596-9698
DUNN, KENNETH III DUNN, JUDY	983 SAINT CATHERINES DR	WAKE FOREST NC 27587-6642
DURHAM, MICHAEL J DURHAM, CAROL I	2421 CANONBIE LN	WAKE FOREST NC 27587-8765
E HUNT III LLC %WILLIAM P ANDREWS	1121 JENKINS RD	WAKE FOREST NC 27587-9064
EBERLE, JOHN C TRUSTEE EBERLE, SUSAN R TRUSTEE	2521 CANONBIE LN	WAKE FOREST NC 27587-8766
ECKHARDT, SAM E ECKHARDT, ALICIA C	1221 CHILMARK AVE	WAKE FOREST NC 27587-5336
EVALDI, FRANK D EVALDI, KAREN SCHLETT	8004 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
FAIRCHILD, JACQUELYN J FAIRCHILD, MARK	8010 HOGAN DR	WAKE FOREST NC 27587-6661
FAIRLAKE COMMUNITY ASSOCIATION	5300 FALLS OF NEUSE RD	RALEIGH NC 27609-4756
FAIRWAY VILLAS AT WF GOLF CLUB & PPM	11010 RAVEN RIDGE RD	RALEIGH NC 27614-8837
FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC PPM	11010 RAVEN RIDGE RD	RALEIGH NC 27614-8837
FERN, RICHARD J FERN, MARY M	998 KINTAIL CT	WAKE FOREST NC 27587-4918
FICHERA, JOHN L FICHERA, WENDY M	1240 COUNTRY CLUB DR	WAKE FOREST NC 27587-9545
FINNEGAN, JOSEPH T FINNEGAN, LESLEY E	1102 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179

FISHER, C P JR	1430 COUNTRY CLUB DR	WAKE FOREST NC 27587-8773
FISHER, JERRY W FISHER, SARAH H	635 GALASHIELS PL	WAKE FOREST NC 27587-6636
FOSTER, DAVID M FOSTER, CARRIE A	7617 HEURISTIC WAY	WAKE FOREST NC 27587-9000
FOZDAR, MANISH A FOZDAR, RITA M	1109 CHILMARK AVE	WAKE FOREST NC 27587-5334
FREEMAN, JAMES LOUIS JR FREEMAN, JOAN OUTLAND	1336 COUNTRY CLUB DR	WAKE FOREST NC 27587-8771
GADD, CHARLES WEARN JR GADD, SALLY M	8108 HAWKSHEAD RD	WAKE FOREST NC 27587-6679
GADD, DAVID C GADD, STEPHANIE M	2512 CANONBIE LN	WAKE FOREST NC 27587-9010
GAIL M BOWEN REVOCABLE TRUST	7724 FAIRLAKE DR	WAKE FOREST NC 27587-5452
GAYLORD, TRINA RENE GAYLORD, JOHN PATRICK JR	1103 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
GERLITZ, KYLE A TRUSTEE GERLITZ, ANN M TRUSTEE	7909 HOGAN DR	WAKE FOREST NC 27587-6660
GIBBS, LAWRENCE F GIBBS, MITZI KING	2601 WENDLER CT	WAKE FOREST NC 27587-5456
GIBSON, PATRICIA CLIFFORD GIBSON, GARY STEVE	7701 FAIRLAKE DR	WAKE FOREST NC 27587-5453
GIORDANO, GLENN E GIORDANO, JOHNNA D	7736 KINGS WAY CT	WAKE FOREST NC 27587-6670
GOK, KEN Y AYUN, H. LIM	1301 CLUB VILLAS DR	WAKE FOREST NC 27587-4537
GONZALEZ, JOSE L GOMEZ, DENICE E	8014 HOGAN DR	WAKE FOREST NC 27587-6661
GOSSETT, LINDA M	1204 COUNTRY CLUB DR	WAKE FOREST NC 27587-9545
GRADY, DOUGLAS H GRADY, MARTHA S	1106 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179
GRAFF, JOSEPH N GRAFF, BARBARA A	38725 DELAFIELD RD	OCONOMOWOC WI 53066-9104
GREEN TIMBER FOUNDATION	394 FLEMING RD	YOUNGSVILLE NC 27596-9698
GREENBERG, MICHAEL HOWARD GREENBERG, JANN HARRIS	8017 HAWKSHEAD RD	WAKE FOREST NC 27587-6681
GREENE, CHEKITA HULBERT	8038 HOGAN DR	WAKE FOREST NC 27587-6661
GRIMMETT, ANDREW O WRIGHT, ANGELA M	1320 COUNTRY CLUB DR	WAKE FOREST NC 27587-8771
GUILMETTE, GEORGE	2405 CANONBIE LN	WAKE FOREST NC 27587-8765
HADDAD, KHALIL A /TR HADDAD, RITA R /TR	8101 HAWKSHEAD RD	WAKE FOREST NC 27587-6680
HAMILTON, EUGENE D HAMILTON, BARBARA A	8030 HOGAN DR	WAKE FOREST NC 27587-6661
HANSON, CATHERINE W	2526 PALMER CT	WAKE FOREST NC 27587-6445
HARGRAVE, GAIL P	2600 WENDLER CT	WAKE FOREST NC 27587-5456
HARGROVE, JILL LYNN MAY, MARK W	409 SHANNONFORD CT	WAKE FOREST NC 27587-9005
HARKLEY, JOSEPH LEE HARKLEY, MARIA J	7910 HOGAN DR	WAKE FOREST NC 27587-6659
HARRIS, JAMES TODD	2608 LORING LAKE DR	WAKE FOREST NC 27587-5454

HARTLEY, EDITH A HARTLEY, TIMOTHY L	1351 COUNTRY CLUB DR	WAKE FOREST NC 27587-8772
HAUSER, THOMAS BRENT HAUSER, LINDA MARGARET	6625 SPRINGIRTH TER	ALEXANDRIA VA 22315-5585
HEATH, CHARLES LARRY HEATH, MARY EDITH	1112 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179
HENDERSON, KAREN W HENDERSON, TIMOTHY L	1105 CHILMARK AVE	WAKE FOREST NC 27587-5334
HODGES, THOMAS R HODGES, SUSAN C	7728 KINGS WAY CT	WAKE FOREST NC 27587-6670
HOLCOMBE, DANIEL ELDON	984 SAINT CATHERINES DR	WAKE FOREST NC 27587-6641
HOLDER, ADAM G HOLDER, JENNIFER L	990 SAINT CATHERINES DR	WAKE FOREST NC 27587-6641
HOLDING, BETH KELLY HOLDING, STEPHEN VICK SR	2520 CANONBIE LN	WAKE FOREST NC 27587-9010
HORNBUCKLE, CASSANDRA HORNBUCKLE, KEN	7903 HOGAN DR	WAKE FOREST NC 27587-6660
HORNER, WESLEY HORNER, MIKAYLA	7915 HOGAN DR	WAKE FOREST NC 27587-6660
HORTON, ROBIN RANDALL SR HORTON, MARY HOLLAND	1101 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
HOWELL, ALBERTO S HOWELL, DIANNA	1225 CHILMARK AVE	WAKE FOREST NC 27587-5336
JACKSON, DAVID E	2519 PALMER CT	WAKE FOREST NC 27587-6445
JACKSON, WESLEY W JACKSON, MELANIE C	992 W DURNESS CT	WAKE FOREST NC 27587-4919
JAFFEE, IRA W JAFFEE, EVA E	994 TEMPLERIDGE RD	WAKE FOREST NC 27587-9006
JALLORINA, CLAUDE H HABON, LORNA D	1305 CLUB VILLAS DR	WAKE FOREST NC 27587-4537
JAREMA, JOHN BLAINE JAREMA, PAMELA JOANN	1205 CHILMARK AVE	WAKE FOREST NC 27587-5336
JEFFREYS, WILLIAM SR JEFFREYS, KIMBERLY	991 SAINT CATHERINES DR	WAKE FOREST NC 27587-6642
JENKS, J HUBERT JENKS, JUDITH W	2513 MCGOWAN CT	WAKE FOREST NC 27587-6658
JOHNS, JASON JOSEPH	2420 PURNELL RD	WAKE FOREST NC 27587-9461
JONES, JO ANNA FINCH	1415 COUNTRY CLUB DR	WAKE FOREST NC 27587-8774
JORDAN, REBECCA ANN JORDAN, JAMES DOUGLAS	629 TOWNSVILLE LANDING RD	HENDERSON NC 27537-5688
JOYNER, SAMUEL H JOYNER, PATRICIA S	1426 COUNTRY CLUB DR	WAKE FOREST NC 27587-8773
KAISER, PETER LAWRENCE KAISER, SHARON MARIE	8042 HOGAN DR	WAKE FOREST NC 27587-6661
KEARNEY, GLORIA	990 TEMPLERIDGE RD	WAKE FOREST NC 27587-9006
KENNEDY, JANET A	7819 HOGAN DR	WAKE FOREST NC 27587-6696
KING, JOHN C JR KING, NETANIS E	1309 CLUB VILLAS DR	WAKE FOREST NC 27587-4537
KIRCHER, MARY L YOUNG, THOMAS H	1217 CHILMARK AVE	WAKE FOREST NC 27587-5336
KOON, JOEL A KOON, SONJA M	209 MIDDLESTONE CT	WAKE FOREST NC 27587-5331
KUMAR, DHRUVA KUMAR, USHA	8040 HAWKSHEAD RD	WAKE FOREST NC 27587-9420

KUSIBAB, GREGORY G KUSIBAB, KATHRYN A	2552 PALMER CT	WAKE FOREST NC 27587-6445
LAINHART, MICHAEL S LAINHART, SANDRA J	2609 WENDLER CT	WAKE FOREST NC 27587-5456
LAMANDO, ANTHONY J LAMANDO, WRONDA	7621 HEURISTIC WAY	WAKE FOREST NC 27587-9000
LEARY, CHRISTOPHER R LEARY, SHARON L	2601 LORING LAKE DR	WAKE FOREST NC 27587-5455
LEATHERMAN, MARK STEPHEN	1213 COUNTRY CLUB DR	WAKE FOREST NC 27587-8770
LEE, WILLIAM JOHN JR LEE, CARRIE LYNNE	2600 LORING LAKE DR	WAKE FOREST NC 27587-5454
LENNAR CAROLINAS LLC %TROY J GEORGE	1100 PERIMETER PARK DR STE E112	MORRISVILLE NC 27560-0180
LERNER, MICHELLE GOLDBERG	7902 HOGAN DR	WAKE FOREST NC 27587-6659
LESTER, JEFFREY A LESTER, JO ANNE D	1352 COUNTRY CLUB DR	WAKE FOREST NC 27587-8771
LILE, TRAVIS LILE, LYNDSEY	7806 HOGAN DR	WAKE FOREST NC 27587-6695
LOVING, JOHN C LOVING, LENNIS F	1115 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
LUFT FAMILY TRUST	179 BRUSH CRK	BEAUMONT CA 92223-7302
LUKOWIAK, PETER ALOYSIUS LUKOWIAK, JENNIFER ANNE	2605 WENDLER CT	WAKE FOREST NC 27587-5456
MAIOLO, THOMAS	1106 LANDRUM RD	COLUMBUS NC 28722-6485
MANLEY, THOMAS J MANLEY, ELIZABETH P	8024 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
MARINOS, DEMETRIOS J MARINOS, ANNAMARIA V	2604 LORING LAKE DR	WAKE FOREST NC 27587-5454
MARTIN, TIMOTHY DAVID MARTIN, D'ETTA JOHNSON	7814 HOGAN DR	WAKE FOREST NC 27587-6695
MASSEY, ANDREW LEE II MASSEY, RENE P	7605 SOUTHWICK CT	WAKE FOREST NC 27587-8716
MASSEY, GEORGE DENNIS MASSEY, CHIKAKO S	2513 CANONBIE LN	WAKE FOREST NC 27587-8766
MATTHEWS, KENNETH MARK MATTHEWS, TRACIE R	7700 FAIRLAKE DR	WAKE FOREST NC 27587-5452
MAYO, RICHARD E MAYO, DEIDRE LYNN	7810 HOGAN DR	WAKE FOREST NC 27587-6695
MCANALLY, DAVID R MCANALLY, PATICIA M	987 KINTAIL CT	WAKE FOREST NC 27587-4918
MCGRATH, PAUL MCGRATH, CAROL COCHRAN	1414 COUNTRY CLUB DR	WAKE FOREST NC 27587-8773
MCILWAIN, GARY E MCILWAIN, CAROL A	2144 PETRUCHIO WAY	ROSEVILLE CA 95661-3221
MCVAY, GLEN A. MCVAY, KIMBERLY	2517 CANONBIE LN	WAKE FOREST NC 27587-8766
MEAD, DAVID W MEAD, KAILYN R	121 KEETER CIR	WAKE FOREST NC 27587-6688
MELVIN, ROGER W MELVIN, ELIZABETH T	1427 COUNTRY CLUB DR	WAKE FOREST NC 27587-8774
MEYER, ROGER P MEYER, KATHLEEN F	2417 CANONBIE LN	WAKE FOREST NC 27587-8765
MICCHIA, JOSEPH M JR TRUSTEE MICCHIA, GINA L TRUSTEE	212 MIDDLESTONE CT	WAKE FOREST NC 27587-5331
MILLER, DYANNE	1116 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179

MILLER, GILBERT BENTON JR MILLER, SHELLEY S	8000 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
MILLER, JAMES	1140 CHILMARK AVE	WAKE FOREST NC 27587-5333
MOFFATTE, IAN M MOFFATTE, MICHELLE L	2527 PALMER CT	WAKE FOREST NC 27587-6445
MONTGOMERY, MARK A MONTGOMERY, CYNTHIA L	101 TENBRIDGE CT	WAKE FOREST NC 27587-5332
MOSELEY, THEDRIC JACKSON MOSELEY, KAREN HARRIS	8100 HAWKSHEAD RD	WAKE FOREST NC 27587-6679
MUKHERJEE, SUBIRENDU MUKHERJEE, WANDA	1208 CHILMARK AVE	WAKE FOREST NC 27587-5335
NACITA, ELIJAH Q NACITA, CHRISTY W	8052 HOGAN DR	WAKE FOREST NC 27587-6661
NANCE, DEBORAH A	1205 COUNTRY CLUB DR	WAKE FOREST NC 27587-8770
NASSIF, CHARLES M	8012 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
NASSIF, CHARLES MARTIN NASSIF, RUTH K	8012 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
NEAL, GARY WAYNE NEAL, KATHLEEN FRANCES	1144 CHILMARK AVE	WAKE FOREST NC 27587-5333
NEEB, LINDA S	8120 DIAZIT DR	WAKE FOREST NC 27587-6683
NEISES, GAIL ELAINE	1111 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
NEWSOME, JOHNATHAN H NEWSOME, PEGGY D	983 KINTAIL CT	WAKE FOREST NC 27587-4918
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1546 MAIL SERVICE CTR	RALEIGH NC 27699-1500
OAKMARK DEVELOPMENT CO LLC	PO BOX 99277	RALEIGH NC 27624-9277
OBRIEN, THOMAS E OBRIEN, MARY A	2503 MCGOWAN CT	WAKE FOREST NC 27587-6658
O'DELL, MARK A O'DELL, BETH M	2509 CANONBIE LN	WAKE FOREST NC 27587-8766
O'NEAL, ELIZABETH A O'NEAL, KEITH A	8020 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
OSTERGARD, RICHARD A OSTERGARD, YONG S	8032 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
PACKETT, MITCHELL G PACKETT, ANNE A	8104 HAWKSHEAD RD	WAKE FOREST NC 27587-6679
PALMERTON, JEFFREY DALE PALMERTON, ELIZABETH	7802 HOGAN DR	WAKE FOREST NC 27587-6695
PATCHEL, THOMAS H PATCHEL, JEAN M	8002 HOGAN DR	WAKE FOREST NC 27587-6661
PATE, JANE HARRIS	3511 MEADOWRUN DR	DURHAM NC 27707-6626
PATRICK, HENRY W PATRICK, BRENDA T	8009 HAWKSHEAD RD	WAKE FOREST NC 27587-6681
PAYNE, DAVIE PAYNE, ANGELA D	994 SAINT CATHERINES DR	WAKE FOREST NC 27587-6641
PENKUNAS, JOSEPH J PENKUNAS, PATRICIA A	7725 KINGS WAY CT	WAKE FOREST NC 27587-6670
PERRY, MICHAEL K PERRY, LEE B	208 MIDDLESTONE CT	WAKE FOREST NC 27587-5331
PERVEILER, KEVIN J PERVEILER, MARIA	2605 LORING LAKE DR	WAKE FOREST NC 27587-5455
PETERSON, GREGORY CLARK TRUSTEE PETERSON, BARBARA MELVIN TRUSTEE	2420 CANONBIE LN	WAKE FOREST NC 27587-5450

PIMENTEL, JESSE G PIMENTEL, ROSEMARY	8044 HOGAN DR	WAKE FOREST NC 27587-6661
PLEASANTS FAMILY LLC	3023 DEVONSHIRE DR	RALEIGH NC 27607-6619
PLEASANTS, CHRIS	9142 JACKSON RD	WAKE FOREST NC 27587-7985
PLUEDDEMANN, MICHAEL L PLUEDDEMANN, NANCY W	8022 HOGAN DR	WAKE FOREST NC 27587-6661
PONSOLLE, DAWN	1329 COUNTRY CLUB DR	WAKE FOREST NC 27587-8772
POOLE, TARA C	994 W DURNESS CT	WAKE FOREST NC 27587-4919
POTTER, MARCUS H III TRUSTEE POTTER, CATHERINE O TRUSTEE	8048 HOGAN DR	WAKE FOREST NC 27587-6661
POWELL, ANNE H	2505 CANONBIE LN	WAKE FOREST NC 27587-8766
PRATT, JOEL MICHAEL PRATT, LINDA	2409 CANONBIE LN	WAKE FOREST NC 27587-8765
PRUITT, DELORES	1109 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
QUALLS, JEREMY B QUALLS, THOMAS	1100 CHILMARK AVE	WAKE FOREST NC 27587-5358
RAMSARAN, MICHAEL RAMSARAN, CHARMAINE	1303 CLUB VILLAS DR	WAKE FOREST NC 27587-4537
REDMAN, JOHN MICHAEL	1212 COUNTRY CLUB DR	WAKE FOREST NC 27587-9545
REITMANN, ROBERT	1304 CLUB VILLAS DR	WAKE FOREST NC 27587-4536
RETTIG, THOMAS RETTIG, AMY	8021 HAWKSHEAD RD	WAKE FOREST NC 27587-6681
RIDDLE, SHERRY JAYNE RIDDLE, JAMES CARL	7729 KINGS WAY CT	WAKE FOREST NC 27587-6670
RINDONI, CAROL F	1431 COUNTRY CLUB DR	WAKE FOREST NC 27587-8774
RITCHEY, BRIAN C TRUSTEE RITCHEY, MARY ELLEN TRUSTEE	8033 HOGAN DR	WAKE FOREST NC 27587-6662
ROBERTS, ANGELIKA LESMANA ROBERTS, JAMES CARTER	986 W DURNESS CT	WAKE FOREST NC 27587-4919
RODRIGUEZ, PATRICK ANTHONY RODRIGUEZ, BRENDA KAYLANEY	1231 COUNTRY CLUB DR	WAKE FOREST NC 27587-8770
ROGGE, BEVERLY J TRUSTEE GAIL E AND BEVERLY J ROGGE TRUST	1117 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
ROSE, MELINDA FLETCHER TRUSTEE THE MELINDA FLETCHER ROSE REVOCABLE TRUST	7704 FAIRLAKE DR	WAKE FOREST NC 27587-5452
ROUSSEAU, CHERYLL E	1110 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179
RUDA, EMILY	1104 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179
RUPRICH, MARK A RUPRICH, KAREN M	7708 FAIRLAKE DR	WAKE FOREST NC 27587-5452
RUPSKY, MARK J RUPSKY, PENNY L	1311 CLUB VILLAS DR	WAKE FOREST NC 27587-4537
RUSSELL, RENO RUSSELL, LAKEYA	1209 CHILMARK AVE	WAKE FOREST NC 27587-5336
RYAN, BARBARA A	2609 LORING LAKE DR	WAKE FOREST NC 27587-5455
SAMUEL, NEELAM JEWELL, JEFFREY	1116 CHILMARK AVE	WAKE FOREST NC 27587-5333
SAPP, ANDREW J SAPP, JO ANN	7801 HOGAN DR	WAKE FOREST NC 27587-6696

SCHRIER, MARK E SCHRIER, TARA EILEEN	7733 KINGS WAY CT	WAKE FOREST NC 27587-6670
SEAMSTER, IRA SEAMSTER, DENISE	994 KINTAIL CT	WAKE FOREST NC 27587-4918
SFR JV-1 2020-1 BORROWER LLC TRICON AMERICAN HOMES LLC	1508 BROOKHOLLOW DR	SANTA ANA CA 92705-5426
SIMS, YVONNE M	1307 CLUB VILLAS DR	WAKE FOREST NC 27587-4537
SLIWINSKI, NICOLAS SILWINSKI, CARISSA	8034 HOGAN DR	WAKE FOREST NC 27587-6661
SMITH, KYLE CHRISTOPHER SMITH, CAROLINE ROSE	995 SAINT CATHERINES DR	WAKE FOREST NC 27587-6642
SMITH, MARY ELIZABETH K	120 KEETER CIR	WAKE FOREST NC 27587-6687
SMITH, RICHARD C SMITH, CYNTHIA M	7605 HEURISTIC WAY	WAKE FOREST NC 27587-9000
SNOW, WILLIAM T SNOW, AMY M	1200 CHILMARK AVE	WAKE FOREST NC 27587-5335
SOTELO, NASHELY G SANCHEZ, BRYAN VALLEJO	3302 COMSTOCK RD	RALEIGH NC 27604-3464
SOWA, AUDREY	405 SHANNONFORD CT	WAKE FOREST NC 27587-9005
SPEAS, EDWIN M III SPEAS, POLLY ANNA	7612 LITERARY LN	WAKE FOREST NC 27587-9053
SPRUILL, LORENZA DALLAS III SPRUILL, KAREN	2506 PALMER CT	WAKE FOREST NC 27587-6445
STAFFORDSHIRE HOMEOWNERS ASSOC INC SENTRY MGMT INC	2180 W SR 434 STE 5000	LONGWOOD FL 32779-5042
STALLINGS, RICHARD N STALLINGS, ROBIN A	7620 HEURISTIC WAY	WAKE FOREST NC 27587-9000
STEVENSON, PETER STEVENSON, CATHI A	1108 CHILMARK AVE	WAKE FOREST NC 27587-5358
STYLES, JACK B STYLES, JUANITA L	2524 CANONBIE LN	WAKE FOREST NC 27587-9010
SUCHER, AARON SUCHER, SOU	7724 KINGS WAY CT	WAKE FOREST NC 27587-6670
SUTHERLAND PTNR LLC	818 S WHITE ST	WAKE FOREST NC 27587-2961
SWINDELL, KEVIN J SWINDELL, BERNADINE F	1213 CHILMARK AVE	WAKE FOREST NC 27587-5336
THARPE, JOHN W JR STRONG, PATRICIA MITCHELL	8025 HAWKSHEAD RD	WAKE FOREST NC 27587-6681
TOLLENS, MARY	991 W DURNESS CT	WAKE FOREST NC 27587-4919
TORRENCE, TARA MAPLES	7625 HEURISTIC WAY	WAKE FOREST NC 27587-9000
TOWN OF WAKE FOREST %PLANNING DEPT	301 S BROOKS ST	WAKE FOREST NC 27587-2932
TURNER, LEO R JR	8001 HAWKSHEAD RD	WAKE FOREST NC 27587-6681
UPTON, KEVIN C UPTON, MITZI M	1358 COUNTRY CLUB DR	WAKE FOREST NC 27587-8771
VAN, ORDEN JOHN E VAN, ORDEN AMARILIS	8036 HAWKSHEAD RD	WAKE FOREST NC 27587-9420
VARNEDOE, WILLIAM S VARNEDOE, WANDA C	2412 CANONBIE LN	WAKE FOREST NC 27587-5450
VELASQUEZ, NOEMY VELASQUEZ, WERNER ROLANDO	999 W DURNESS CT	WAKE FOREST NC 27587-4919
VIGARI, VINCENT F GALLOWAY, KAY C	7608 HEURISTIC WAY	WAKE FOREST NC 27587-9000

VOLLMER, CHARLES B VOLLMER, STELLA	1118 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179
VUKOVICH, FRED M VUKOVICH, NADINE M	8033 HAWKSHEAD RD	WAKE FOREST NC 27587-6681
WADFORD, NYLE F WADFORD, TERESA H	8019 HOGAN DR	WAKE FOREST NC 27587-6662
WAKE UNION BAPTIST CHURCH	13345 WAKE UNION CHURCH RD	WAKE FOREST NC 27587-7451
WAKE UNION BAPTIST CHURCH %EARL PLEASANT TRUSTEES	13345 WAKE UNION CHURCH RD	WAKE FOREST NC 27587-7451
WALLACE, MARK FRANKLIN WALLACE, NICOLE J	7906 HOGAN DR	WAKE FOREST NC 27587-6659
WALSH, DANIEL F WALSH, MICHELLE R	1204 CHILMARK AVE	WAKE FOREST NC 27587-5335
WARE, VALERIE T WARE, ARCHIE L	7807 HOGAN DR	WAKE FOREST NC 27587-6696
WEBER, KEITH A WEBER, CATHERINE J	1136 CHILMARK AVE	WAKE FOREST NC 27587-5333
WENNINGER, STEPHAN FRIEDRICH WENNINGER, SARAH LESLIE	2501 CANONBIE LN	WAKE FOREST NC 27587-8766
WILLIAMS, TRAMPAS	1113 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5180
WU, THUAN WU, MINH LUU	7818 HOGAN DR	WAKE FOREST NC 27587-6695
YAMASA CO LTD	PO BOX 4090	SCOTTSDALE AZ 85261-4090
YARMOLIK, TATSIANA YARMOLIK, ANDREI	995 W DURNESS CT	WAKE FOREST NC 27587-4919
YAROSH, DANIEL YAROSH, LORI	7815 HOGAN DR	WAKE FOREST NC 27587-6696
YATES, SANDRA J YATES, BURL E	8005 HAWKSHEAD RD	WAKE FOREST NC 27587-6681
ZELVIS, MICHELE HOFFMAN	1120 FAIRWAY VILLAS DR	WAKE FOREST NC 27587-5179
ZENESKI, ANDREW JOSEPH SR ZENESKI, ANNE BRUMMITT	1214 CHILMARK AVE	WAKE FOREST NC 27587-5335
ZHAO, BAIRU	12310 ANGEL FALLS RD	RALEIGH NC 27614-7619

PREPARED BY: Nec Ghosh
PRINTED NAME

SIGNATURE

SWORN AND SUBSCRIBED BEFORE ME ON THIS THE 4th DAY OF APRIL 2022

Robin Edwards
NOTARY PUBLIC

MY COMMISSION EXPIRES: 2/10/2027

ROBIN EDWARDS
My Commission Expires
NOTARY PUBLIC
February 10, 2027
WAKE COUNTY, NC

EXHIBIT C

SUMMARY OF DISCUSSION ITEMS

On Wednesday, March 30, 2022, at 6:00 p.m., the applicant held a neighborhood meeting for a proposed project on the former Wake Forest Golf Club Property. This was the second of two community wide meetings held by the applicant regarding this project. A number of additional meetings with members of surrounding neighborhoods also were held. A summary of the questions asked and answered is offered below.

What methodology did you use to determine who was within 500 ft of the planned development? Parcel 0164255 (the island) is not fully shown on your map so did you measure 500 ft from it? Was the Fairlake HOA notified? We do not like the short notice provided. It appears calculated to minimize neighborhood participation. The island parcel inadvertently was included on the original application and was not used to calculate the notification area for the previous meeting. For the latest meeting, we notified the property owner of record, according to Wake County Tax Records, for properties within 500-ft of the parcels with PIN#s 1831895139; 1841091336; 1832712652; 1831773725; & 1831772476.
What is planned for the 4 acre island of land between Hawkshead and Country Club Downs (Parcel 0164255)? Nothing is planned for that parcel. It is not part of the project.
Joyner now has another LLC Green Timber (Feb 2021) and it is now a 50% owner (Jan 2022) What is the relationship between Dry and Green Timber? Our understanding is that Mr. Joyner is involved with both entities and that they current ownership structure is for both estate and tax planning purposes.
Are you aware of the Town's comment that the Riverstone open space (2 lots) should not be included in the plan? (REID: 0237544; 0230586.) Will they be removed from the next plan submitted? Those parcels no longer will be included in the application.
Once the community is built, who will own the open space? If this project is built out, there will be one or more HOA entities which will own the private open space after the community is built. The project also contemplates dedicated/donating 19-acres of land to the Town for a public park and as part of the Town's greenway system.
What is your understanding of the restrictive covenants for the area west of Horse Creek? Do you plan to respect those covenants? While we cannot speak to their validity, the plan has been revised in a manner which we believe complies with the spirit of those covenants.

How many parks are planned for the neighborhood? At least 25% of the park space must be active. What are your plans for active open space?

There are 4 neighborhood parks planned as amenities for the proposed community. We have planned about 5.32 acres in this project for neighborhood parks. We do not yet have a design for the active amenities, but the UDO does require a certain percentage to be active. We will be meeting that requirement and possibly exceeding it. Those active areas can include any number of amenities, but that has not yet been determined. There also is a set aside of 19 acres for a public park and the planned greenway, which ultimately will be a public amenity. We do not yet have plans for how the open spaces will be programmed.

How are you addressing the UDO requirement to for all residences to be within ¼ mile of a park?

We believe the proposed layout complies with this UDO requirement.

Are there no trees in your parks? How will shade be provided?

All areas that are classified as meeting the neighborhood park requirement will meet UDO requirements which require trees within the park areas.

How is your "proposed" park area along Horse Creek Accessible to the Town residents? Where is the parking? What waivers are required to create park structures like paths and picnic tables etc.? Have you applied for them? To whom? Contact information? How is this park to be connected to the TOWN since there is no access to Purnell or Jenkins?

We are proposing to dedicate approximately 19 acres of land to the Town of Wake Forest for use as a park and as part of the Town's planned Greenway system. The Town is proposing a greenway trail along Horse Creek where it traverses our property and beyond. Access, parking, structures, connectivity and all those things about both the park and the greenway trail probably will not be determined until sometime in the future when the Town designs those features.

Were you aware that the property was zoned R40W when the SUP was approved? Did you have any indication from the city or the planners that you did not need to take that zoning into consideration?

We were aware of the previous zoning, but we had no involvement in the original SUP or zoning. The current zoning is GR-3, PUD; we also had no involvement in that change either. The Town did not tell us we needed to take into consideration the previous R40W zoning district that was changed over 20 years ago.

According to your calculations on your application, there will be fewer than 3 houses per acre. That is consistent with GR3. Why do you want to rezone to GR10?

We plan to offer housing types like townhomes and lot sizes that are not available in the GR-3 zoning. Nevertheless, our proposed zoning limits our density to no more than 3 units per acre.

Are you willing to take 3 water quality samples on Horse Creek if your plan is approved? Before during and after at both edges of the property and in the middle?

We will conduct all testing as required by local, state, and national agencies. We do not know whether this specific test will be required.

If the proposed construction takes place, it could potentially alter the water quality in adjacent neighborhoods that rely on well water. Is the developer willing to pay for public water access to these houses? It is no good to say we will test your well water once after construction since this could happen years later and then where will the developer be?

Our development will use water provided by the City of Raleigh Water Department which draws its water from Falls Lake, Lake Benson and Lake Wheeler. We do not know of any nexus between this project's public drinking water supply and the adjacent lots' well water. We have seen no information which suggests that underground reservoirs are impacted by municipal utility systems. In fact, it is our understanding that adding more wells, for example, would have a greater impact on existing well water supply than bringing in municipal utilities.

Have you gotten permission to build a road across the ponds? What are the issues? Who is the DEWQ POC you are dealing with? We want to see the drawings of the bridge.

No, we do not have permission to cross the stream at this time. We have not yet sought it, but we do think the crossing is likely to be a culvert rather than a bridge.

What are the calculations that show the area drained by this Storm Control Ponds and that it will hold that flow? UDO states 2 year flood requirement but this seems too lenient for an actual watershed area as well as flood prone zone.

Design of the stormwater control measures will be completed during the construction drawings preparation following rezoning and site plan approval. For High-Density developments as proposed for the Joyner Parcel, stormwater control measures (SCMs) will be designed such that the post-development runoff will be controlled to be equal or less than the pre-development runoff for the 1 year, 24 hour and the 10-year, 24 hour storms. In addition, the SCMs will have to be designed to meet maximum nutrient (i.e., nitrogen and phosphorous) loading rates.

Has any study of the environmental impacts of the proposed development been conducted-especially the impact of such a radical change in the density of the proposed housing units? (E.g. wetlands survey, environmental impact study, etc.) If yes, by whom and can the residents get a copy? If no, will such a study be conducted?

Wetland and streams have been delineated and the next step will be to get Corps concurrence. As design progresses during the construction drawings phase, impact maps will be prepared that detail the proposed impacts to wetlands, streams, and stream buffer. An environmental impact study is not required and will not be conducted.

Has there been any thought as to the availability of water with the growing number of residences in Wake Forest? The 2008 drought drove water supply down drastically. What would happen if another drought occurred?

Drinking water supply for the Town of Wake Forest is served by the City of Raleigh. Per recent information obtained from the City of Raleigh, the City's long term drinking water position is very strong. The City's current average daily water demand is around 52 million gallons/day (MGD), which almost is exactly what it was in 2007. This means that 15 years after the last major drought, the City is using approximately the same amount of water, despite adding 10,000 to 11,000 new residents per year to their service area. The reason behind this strong position is water conservation measures, which have extended the City's current water resource portfolio by probably 20 to 25 years. Additionally, in a bold move that literally required an Act of Congress, the City was able to reallocate 4.1 billion gallons of water in Falls Lake. As a result, the City was able to add water storage without actually constructing a new reservoir, which is an incredibly expensive and long process. In short, based on conservative projected water use scenarios, the City's current resources would provide sufficient water supply through 2047 or so. Using more realistic water use projections, water use would trend significantly lower, which extend water supply well beyond the City's traditional planning boundary.

Is the Horse Creek floodplain area sufficiently large to protect the proposed residences in the event of flooding such as occurred in 1996 with Hurricane Fran? How much regrading will be required in the vicinity of the horse Creek Corridor and floodplain? How will regrading affect the ecological balance of the corridor both in the short and long term? What kind of storm water control measures will there be to protect the corridor? The applicant is not the authority which determines the floodplain area. FEMA puts out Flood Rate Insurance Maps; the Army Corp also has some involvement in these types of determinations; and there probably are other governmental entities involved. Whatever the case, we are going to have to follow all local, state, and federal regulations in designing this project with reference to Horse Creek and the flood plain.
What is the amount of impervious surface area in the developed areas---not in relation to the whole property? I cannot answer this question because that is not how impervious is calculated for new development. Impervious surface is looked at wholistically. The Town's UDO specifically states that I*mpervious surface/built-upon area calculations are made based on the total acreage of built-upon area within a proposed development, divided by the total acreage of the lot area.* We are proposing to build this under the high impervious development option, so the maximum impervious coverage, per the UDO, cannot exceed 70%.
Will peripheral lots and houses be developed consistent with the abutting communities per UDO? This means ¾ acre lots and compatible housing sizes and design. The section west of Horse Creek has been revised to be consistent with the previous agreement put in pace for new development in that section of the property. The minimum lot size there is 30,000 sf.
We want to see scale drawings all the dwelling type units you plan to build with a properly scaled human next to it. Square Footage for Each type. Representative floor plan and price ranges for each house type. Toll Brothers has a contract option on the Property. They are designing new product line for this site and do not have elevations at this time. Regardless, their average sales price nationwide in 2020 was $816,500.00. Locally, the data through October of 2021 suggests that Toll has sold about 226 homes in the Triangle with an average sales price of $667,961. Toll's average sales price locally is about 50% higher than other national builders in this market. They have positioned themselves as a luxury builder, and that is what they plan to build within this community.
Do you have covenants prepared? Can we see them? No, we do not have covenants prepared. That step does not come until much later in the process.
Are you going to delete the TOWN homes along Capital BLVD as the Town Planning department recommended? We are leaning towards a fully residential project, but Town staff have been adamant about commercial along Capital. There has been a vacant commercial property right next to this project for some time which still has not been pursued. So, we have our doubts about the viability of even more commercial.
Have you rearranged houses that are in the Capital Blvd access RD overlay? What is the current total proposed housing count? Do you have a master plan we can see? When can we see it? The section along Capital has been revised on account of the service road NCDOT is requiring in this area.

Why have you not consistently met the Wake Forest 100 ft set back from creeks and ponds in you planning? Does your new plan address that? When can we see it? The project will be required to meet the UDO standards. Town staff will be reviewing these plans to ensure compliance with those standards. So, if we have shown development in an area where a riparian buffer is required, the Town will make us move it. That having been said, we believe the layout shown is compliant with required riparian buffers.
with the new housing in the northwest, what is the buffer The buffer against Country Club Downs in the revised drawing is the same as it was in the previous drawing; 20 feet. The buffer along Hawkshead has been revised. It varies from a width of about 150 feet to 120 feet.
Will existing homeowners be grandfathered into any amenities memberships? This is something we can ask the builder about.
How will the units west of Horse Creek be accessed and how will Hogan drive be expanded? Those lots are proposed to be accessed via existing Simpson Court which stubs to the property. We have not yet been told that Hogan Drive will need to be improved or expanded as a result of this project.

EXHIBIT D

NEIGHBORHOOD MEETING ATTENDEES

APPLICANT TEAM		
Name	**Email**	**Organization**
Laura Holloman	holloman@mcadamsco.com	McAdams
Nil Ghosh	nghosh@morningstarlawgroup.com	Morningstar Law Group
Mike Sanchez	sanchez@mcadamsco.com	McAdams
ATTENDEES		
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Mary Horton	beth.horton88@yahoo.com	1101 Fairway Villas Dr
Patrick Rodriguez	patriklos@netscape.net	1231 Country Club Dr
Mary Kircher	mkircher@nc.rr.com	-
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Kevin Upton	kupto@aol.com	1358 country club drive
CALL-IN PARTICIPANTS		
1-919-949-1947		
1-919-427-2572		
1-516-522-1740		
1-919-614-2645		
1-919-302-2651		

Conditional District Rezoning Application

(Conditional District Rezoning Workflow)

Town of Wake Forest, NC
301 S. Brooks St.
Wake Forest, NC 27587-2932
TEL (919) 435-9510 | FAX (919) 435-9539

Project Overview #620129

Project Title: Joyner Property Conditional District Rezoning
Application Type: Conditional District Rezoning
Workflow: Conditional District Rezoning
Jurisdiction: Town of Wake Forest (Wake County)
State: NC
County: Wake

Submittal Requirements

A submittal checklist is available to view additional documents which are required to submitted with this application. After answering the application questions, you will be asked to upload the required documents.

VIEW CONDITIONAL DISTRICT REZONING SUBMITTAL CHECKLIST

Missing items will result in the application being declined and returned to the applicant to resubmit. A revised and complete application including all missing items must be received or the application will be not be deemed complete and routed for review.

Please confirm you have reviewed the associated submitted checklist for this permit and confirm you will submit all documents required on the submittal checklist: Yes

Pre-Application Meeting

Has a pre-application conference been held?: Yes

*Note: This type of project requires a pre-application conference be completed prior to official submittal. If this has not been completed, please return to the home screen and select **Pre-Application Conference** from the application type drop down list in order to schedule your required meeting.*

Pre-Application Conference Date:
Staff Member Met With: Patrick Reidy
IDT Project Number: RZ-21-08

Address & Basic Site Information

Please Note:
In some cases, a parcel address may not verify. In the event that our system is unable to verify the address you enter, please submit the project as an *Unverified Parcel* and provide zoning and land use information as requested below. For verified addresses, the zoning and land use information will be added to the application automatically (you do not need to provide it below).

Project Address or PIN: 1200 CLUB VILLAS DR (1831895139)
Tax PIN: 1831895139

Acreage: 149.66

Name of Existing Development/Subdivision (if applicable--for reference only): Joyner Property Conditional Rezoning

For unverified addresses/parcels only, please provide below 1) the current use of the parcel, 2) the zoning district(s) it is in, and 3) any overlay districts that apply. Reference the zoning map and the overlay districts map on the town's website.

Current Use & Zoning (required only if address/parcel is unverified):

*Note: Projects falling outside the limits of the Town or ETJ will be required to submit an annexation petition in conjunction with their project submittal. In this case, please return to the home screen and select **Annexation Petition** from the application type drop down.*

GIS Site Information (Automatically Generated - Not Available for Unverified Addresses)

Parcel Area: GIS Acreage

- 1200 CLUB VILLAS DR: 147.1

Current Use:

Wake Forest (WF):

Planning and Zoning:

Base District: Zoning

- 1200 CLUB VILLAS DR: CU GR3

In SH1-O Overlay:

In SH2-O Overlay:

In Water Supply Watershed Protection Overlay:

In TND Overlay:

In SF Overlay:

In HL-O Overlay:

In MVCP-O Overlay:

In National Register of Historic Places:

In Flood Hazard Area:

Additional Zoning Information

Currently a Conditional District?: Yes

Currently a Conditional Use?: Yes

Is there an existing Special Use Permit for the Property?: Yes

Related Town of Wake Forest Case Numbers: SU-99-02; RZ-96-12

Project Contacts

Please enter all project contacts related to your application.

This is an important step to ensure all members of the applicant team receive email notifications associated with the project which may include comments, requested revisions, scheduled meetings or hearings, and final decisions. This also informs Town staff of the team members assigned role with the project.

Project Contact - Applicant
Laura Holloman
McAdams Company
2905 Meridian Parkway
Durham, NC 27713
P:919-361-5000
holloman@mcadamsco.com

Project Contact - Property Owner
Carroll Joyner
Green Timber Foundation
394 Fleming Road
Youngsville, NC 27596
P:(919) 556-5418

Project Contact - Developer
James Adams Jr
Mill Ridge Investments
919 S. Main Street
Wake Forest, NC 27587
P:919-556-5418

Project Contact - Engineer
Mike Sanchez
McAdams Company
2905 Meridian Parkway
Durham, NC 27713
P:919-815-4368
sanchez@mcadamsco.com

Project Contact - Traffic Engineer

Project Contact - Attorney

Brittany Chase
Exult Engineering
P.O. BOX 99277
Raleigh, NC 27624
P:984-500-5428
brittany@exultengineering.com

Nil Ghosh
Morningstar Law Group
112 W. Main St
Durham, NC 27701
P:919-590-0362
nghosh@morningstarlawgroup.com

Transportation Impact Analysis

As per Section 6.11.1 of the UDO is the project required to provide a Traffic Impact Analysis (TIA)?: Yes

Was the TIA reviewed in a separate permit prior to this application?: No

Project Number:

For projects requiring a TIA, a separate TIA application must be submitted in conjunction with this application. Please review the TIA submittal checklist and submit a ***Transportation Impact Analysis Review*** application in IDT.

If the request is to a Conditional District (CD), this application should be accompanied by a master plan that includes land use, existing conditions, buildings, lots, etc. per Chapter 15 of the UDO. In addition, please provide a narrative of the proposed use and list any proposed conditions.

Proposed Conditional Zoning District: GR10-CD, General Residential 10

Proposed Land Use:
Residential Subdivision; town park.

Proposed Number of Lots: 336

Number of Buildings: 0

Number of Single-Family Lots: 208

Number of Townhome Lots: 128

Number of Multi-Family Units: 0

Number of Stories: 2

Square Footage of All Buildings (non-residential): 0

Plan Information - Conditional Rezoning

Description of Request:
A residential subdivision consisting of 208 single-family lots and 128 townhome lots, for a total of 336 lots.

Initial Proposed Conditions Offered by Applicant:
1. ALL DEVELOPMENT WILL COMPLY WILL ALL REQUIREMENTS OF THE TOWN OF WAKE FOREST UNIFIED DEVELOPMENT ORDINANCE (UD0) UNLESS EXPRESSLY STATED AS AN EXCEPTION, AND WILL COMPLY WITH APPROVED MASTER PLAN AS SUBMITTED WITH THIS REZONING

APPLICATION.

2. THE DEVELOPMENT SHALL HAVE A MAXIMUM DENSITY OF 3 UNITS PER ACRE.

3. VINYL SIDING SHALL NOT BE PERMITTED; HOWEVER, VINYL WINDOWS, DECORATIVE ELEMENTS, AND TRIM ARE PERMITTED.

4. ANY EXTERIOR WALL OF A UNIT VISIBLE FROM A STREET SHALL CONTAIN AT LEAST THREE DECORATIVE ELEMENTS SUCH AS, BUT NOT LIMITED TO, THE FOLLOWING ELEMENTS:

a. WINDOWS;

b. BAY WINDOW;

c. RECESSED WINDOW;

d. DECORATIVE WINDOW;

e. TRIM AROUND WINDOWS;

f. SIDE PORCH;

g. TWO OR MORE BUILDING MATERIALS;

h. DECORATIVE BRICK OR STONE;

i. DECORATIVE TRIM;

j. DECORATIVE SHAKE;

k. DECORATIVE GABLE;

l. DECORATIVE CORNICE;

m. PORTICO;

n. DORMER.

5. A VARIED COLOR PALETTE SHALL BE UTILIZED ON BUILDINGS THROUGHOUT THE DEVELOPMENT TO INCLUDE A MINIMUM OF THREE COLOR FAMILIES FOR SIDING AND SHALL INCLUDE VARIED TRIM, SHUTTER, AND ACCENT COLORS COMPLIMENTING THE SIDING COLOR.

6. DEVELOPED OPEN SPACE AND PARK SPACE MAY CONTAIN, BUT NOT LIMITED TO, THE FOLLOWING ELEMENTS: WALKING TRAILS; SWIMMING POOL; CLUBHOUSE; BUTTERFLY GARDENS; FITNESS CENTER; DOG PARK; COMMUNITY GARDEN; HAMMOCK LOUNGE; FIREPITS. THE PARK SPACES PROVIDED IN THE DEVELOPMENT SHALL BE A MINIMUM OF 2,000 SQUARE FEET AND A MINIMUM OF FOUR (4) PARKS SHALL BE PROVIDED THROUGHOUT THE DEVELOPMENT (SECTION 7.5.1).

7. TRADITIONAL BUILDING SETBACKS AS OUTLINED IN TABLE 2.2.5. C. SHALL NOT BE APPLICABLE TO BUILDINGS SHOWN WITHIN THIS DEVELOPMENT. YARD REQUIREMENTS SHALL BE REQUIRED PER THE SITE DATA TABLE.

8. THE BUILDINGS ERECTED WITHIN THIS DEVELOPMENT SHALL NOT BE SUBJECT TO TRADITIONAL YARD REQUIREMENTS AND SHALL ONLY BE SUBJECT TO A BUILDING SEPARATION REQUIREMENT OF SIX FEET (SECTION 4.4.3). YARD REQUIREMENTS SHALL BE REQUIRED PER THE SITE DATA TABLE.

9. ALTERNATIVE STREET SECTION DESIGN SEE TYPICAL SECTION C0.00 (SECTION 6.7.2).

Justification of Consistency with Comprehensive Plan: The Growth Strategies Map identifies the subject property as part of the Sub-Urban Zone, which falsely states that land within this designation does not have access to utilities. However, as previously stated, the project area does have access to public utilities at this time.

The following policies are applicable to our request:

Principles for Neighborhood Planning Areas:

- Principle 4: Design the streets (layout and width primarily) according to their intended use.

Principle 5: Rather than building large, single-use subdivisions, build full-service neighborhoods, with residentially services close at hand. Vary the types and price-points of housing to encourage social and economic diversity in each planning area.

The associated Conditional Use Rezoning master plan proposes a variety of housing types on the subject property: traditional front-loaded single-family lots, alley-loaded single-family lots, as well as townhomes. All these differing housing types equates to multiple price points within the community, something the Towns Community Plan is striving to create.

Policies for Future Neighborhoods:

Policy FN-1: To minimize sprawl and land consumption, and to promote a walkable community, most new neighborhoods should be compact in form.

Policy FN-2: New neighborhood streets should be no wider than necessary to serve their intended purpose.

Policy FN-7: As new neighborhoods are developed, a mixture of housing types, sizes, and prices shall be encouraged within the bounds of each neighborhood planning area.

Policy FN-9: New neighborhoods should be connected to other neighborhoods, shopping, and work areas within the neighborhood planning area.

Policy FN-10: Street designs in new neighborhoods should give equal priority to the pedestrian and the automobile.

The proposed residential development will be required to provide sidewalks on both sides of internal streets throughout the development. Additionally, a public greenway will be constructed along Horse Creek, consistent with the Towns Park and Recreation plan and will result in a walkable community, which both local and regional residents alike can enjoy. Streets will be designed to be no wider than necessary to serve the intended local traffic. As mentioned elsewhere, the proposed development will feature a mixture of housing types and sizes which will result in varying price points offered within the community. Street design is also focused on safe and efficient street networks, and avoids long straight-ways whenever possible, which minimizes high vehicular speeds.

Policies for Parks, Open Space, and Recreation:

Policy PR-1: The Town, in cooperation with private sector

interests, should continue to develop a system of open space greenways and walking trails to connect residential areas with, especially, schools and park facilities. The use of (1) natural corridors such as streams and floodplains, and (2) man-made corridors such as utility and transportation rights-of-way and easements, should be emphasized.

Policy PR-2: Mini parks should continue to be supported in existing and proposed neighborhoods to meet the needs of small children and the elderly, an to encourage social interaction and mutual support among area families. Arrangements for some maintenance of new mini parks by volunteers should be preferred.

As previously mentioned, there will be a public greenway built along Horse Creek that will allow the connection of neighborhoods and set a precedent for a regional greenway to be established as adjacent properties develop. A public park will also be developed on-site and will result in an environment where residents, young and old, can gather to enjoy the outdoors and natural open spaces.

Policies for Community Character:

Policy CC-5: Large Trees, ponds, creeks, or other natural features of the landscape should be saved when locating new streets, buildings, parking lots, etc.

As shown on the Special Use Permit Master Plan, Horse Creek will be maintained in its natural state and will be incorporated into overall open space for the Town, as it is planned to be a Town Park. Additionally, there are two existing ponds on-site that are also included within the developments open space, neither of which will be drained.

Policies for Street Trees:

Policy ST-5: The planting or preservation of street trees of appropriate size and species should continue to be required as part of the upfront costs of all new development, in accordance with the Towns Street tree planting master plan.

As shown on the Conditional Rezoning Master Plan, street trees are proposed throughout the proposed development.

Therefore, on balance, the proposed plan is consistent with officially adopted plans and policies of the Town.

PROPOSED JOYNER PROPERTY ZONING CONDITIONS (DATED 9/19/23)

1. SITE MASTER PLAN (SP-21-02) IS A CONDITION OF THE REZONING REQUEST. AMENDMENTS OF THE MASTER PLAN SHALL REQUIRE A REZONING AMENDMENT UNLESS THE ADMINISTRATOR FINDS THE MODIFICATION TO BE MINOR AND IN KEEPING WITH THE SPIRIT AND INTENT OF THE ADOPTED SUBDIVISION MASTER PLAN.

2. THE DEVELOPMENT SHALL HAVE A MAXIMUM DENSITY OF 3 UNITS PER ACRE.

3. VINYL SIDING SHALL NOT BE PERMITTED; HOWEVER, VINYL WINDOWS, DECORATIVE ELEMENTS, AND TRIM ARE PERMITTED.

4. THE FOLLOWING SHALL APPLY TO ALL SINGLE-FAMILY DETACHED AND TOWNHOMES (EXCEPT FOR LOTS 157-182; 201-206), ANY EXTERIOR WALL OF A UNIT VISIBLE FROM A STREET SHALL CONTAIN AT LEAST THREE DECORATIVE ELEMENTS SUCH AS, BUT NOT LIMITED TO, THE FOLLOWING ELEMENTS:
    a. BAY WINDOW;
    b. RECESSED WINDOW;
    c. DECORATIVE WINDOW;
    d. SIDE PORCH;
    e. TWO OR MORE BUILDING MATERIALS;
    f. DECORATIVE BRICK OR STONE;
    g. DECORATIVE TRIM;
    h. DECORATIVE SHAKE;
    i. DECORATIVE GABLE;
    j. DECORATIVE CORNICE;
    k. PORTICO;
    l. DORMER.

5. TOWNHOMES IN THE AREA NUMBERED 157-182; 201-206 WITHIN THE MASTER PLAN SHALL BE SUBJECT TO THE FOLLOWING ARCHITECTURAL CONDITIONS:
    a. END UNITS SHALL BE AT LEAST 34’ WIDE. INTERIOR UNITS SHALL BE AT LEAST 28’ WIDE.
    b. EACH UNIT SHALL HAVE AT LEAST A 2-CAR GARAGE.
    c. EACH UNIT SHALL BE ACCESSED OFF A REAR ALLEY.
    d. NO UNIT SHALL EXCEED TWO FULL STORIES IN HEIGHT.
    e. EACH UNIT SHALL CONTAIN A MINIMUM OF 1,600 SQUARE FEET OF LIVABLE SPACE. THE ACTUAL NUMBER OF UNITS AND LOCATION WILL BE FINALIZED DURING THE CONSTRUCTION DRAWING PROCESS.
    f. ANY EXTERIOR WALL FRONTING A STREET SHALL CONTAIN AT LEAST 3 DECORATIVE ELEMENTS SUCH AS, BUT NOT LIMITED TO, THE FOLLOWING:
        1. BAY, RECESSED, OR DECORATIVE WINDOW.
        2. 3.5” MINIMUM TRIM AROUND WINDOWS.
        3. SHUTTERS.
        4. BALCONY.

5. PORCH, COVERED STOOP, OR PORTICO. ALL WILL BE A MINIMUM OF 5’ IN DEPTH.
6. DECORATIVE TRIM.
7. BRICK OR STONE COVERING THE FIRST FLOOR (TO INCLUDE EXPOSED FOUNDATION), PATTERNED FINISH (SCALES, WAINSCOTTING, ETC.) FOR SECOND FLOOR AND WALLS NOT FACING THE STREET.
8. ROOF ELEMENT (DORMER, TURNED GABLE, CUPOLA). ROOF SHALL NOT VISUALLY REPRESENT ONE LONG SINGLE GABLE.

g. EXTERIOR WALL MATERIALS SHALL BE SOLELY OR A COMBINATION OF; WOOD CLAPBOARD; CEMENTITIOUS FIBER BOARD SIDING; SHINGLE/SHAKE; OR BOARD AND BATTEN; BRICK; AND CULTURED OR NATURAL STONE.
h. VINYL SIDING WILL NOT BE ALLOWED. VINYL WINDOWS, DECORATIVE ELEMENTS, TRIM, AND SOFFITS SHALL BE PERMITTED.
i. EACH BUILDING SHALL INCLUDE A MINIMUM OF PREDOMINANT COLORS/(EXCLUDING TRIM COLORS). NO TWO ADJACENT UNITS SHALL HAVE THE SAME PREDOMINANT COLORS. FRONT DOORS SHALL BE AN ACCENT COLOR DIFFERENT THAN THE PREDOMINANT UNIT COLOR. IN ADDITION, FRONT DOORS SHALL HAVE EITHER A TRANSOM OVER THE DOOR, A SIDELIGHT OR A GLASS DOOR INSERT.
j. ALL FRONT ENTRANCES SHALL BE RAISED FROM THE FINISHED GRADE (AT THE RIGHT-OF-WAY LINE) A MINIMUM OF ONE INCHES AND ANY EXPOSED FOUNDATION ON THE FRONT OF THE UNITS SHALL BE BRICK OR STONE.
k. ROOF MATERIALS SHALL BE COMPRISED OF ASPHALT SHINGLES. STANDING SEAM METAL ROOFS SHALL BE PERMITED ON PORCH ROOFS OR COVERED FRONT ENTRY ONLY.
l. FRONT EAVES SHALL PROJECT AT LEAST 2 INCHES FROM THE WALL OF THE STRUCTURE, SIDE EAVES SHALL PROJECT A MINIMUM OF 8 INCHES FROM THE WALL OF THE STRUCTURE. EAVES WILL BE ALLOWED TO ENCROACH INTO SETBACKS AS ALLOWED IN THE UDO.

6. A VARIED COLOR PALETTE SHALL BE UTILIZED ON BUILDINGS THROUGHOUT THE DEVELOPMENT TO INCLUDE A MINIMUM OF THREE COLOR FAMILIES FOR SIDING AND SHALL INCLUDE VARIED TRIM, SHUTTER, AND ACCENT COLORS COMPLIMENTING THE SIDING COLOR.

7. TRADITIONAL BUILDING SETBACKS AS OUTLINED IN TABLE 2.2.5. C. SHALL NOT BE APPLICABLE TO BUILDINGS SHOWN WITHIN THIS DEVELOPMENT. YARD REQUIREMENTS SHALL BE REQUIRED PER THE SITE DATA TABLE. SETBACKS AS SHOWN IN THE SITE DATA TABLE ARE AS FOLLOWS:

TRADITIONAL SINGLE FAMILY DWELLING (MIN):	REAR LOADED SINGLE FAMILY DWELLING (MIN):	REAR LOADED TOWNHOME DWELLING (MIN):
FRONT: 20’	FRONT: 5’	FRONT: 10’
SIDE: 5’	SIDE: 5’	SIDE: 5’
CORNER: 8’	CORNER: 8’	CORNER: 8’
REAR: 25’	REAR: 5’	REAR: 25’

8. FOR SINGLE FAMILY AND TOWNHOME DWELLINGS, AT LEAST 15% OF AREA OF EACH FAÇADE THAT FACES A STREET LOT LINE MUST BE WINDOWS OR MAIN ENTRANCE DOORS, AS MEASURED FROM THE FINISHED FLOOR ELEVATION TO THE EAVE.

9. ROOF MATERIALS: RESIDENTIAL ROOFS SHALL BE CLAD IN WOOD SHINGLES, STANDING SEAM METAL (PORCH ROOF OR COVERED ENTRY ONLY), TERNE, SLATE, ASPHALT SHINGLES, OR SYNTHETIC MATERIALS SIMILAR AND/OR SUPERIOR IN APPEARANCE AND DURABILITY, THE PRIMARY MATERIALS USED FOR ROOFS SHOULD REFLECT THE CONTEXT OF THE SURROUNDING AREA OR NEIGHBORHOOD.

10. ALL RESIDENTIAL LOTS WEST OF HORSE CREEK SHALL HAVE A MINIMUM LOT SIZE OF 30,000 SQUARE FEET.

11. IN ACCORDANCE WITH RESTRICTIVE CONVENANTS RECORDED IN WAKE COUNTY REGISTRY AT BOOK 4662, PAGE 0366, ADJCENT TO WAKE COUNTY PINS: 1832706809 AND 1832707851 A 160' BUFFER ZONE SHALL BE ESTABLISHED; ADJACENT TO WAKE COUNTY PINS: 1832709714 AND 1832800697 A 120' BUFFER ZONE SHALL BE ESTABLISHED.

12. AS NECESSARY TO MINMIZE ENVRONMENTAL IMPACTS AND MAXIMIZE DEVELOPABLE AREA, "SIMPSON COURT" MAY EXCEED MAXIMUM BLOCK LENGTH REQUIREMENTS (SECTION 6.5.1.C).

13. DUE TO PRESCRIBED ALIGNMENT OF THE PROPOSED SERVICE ROAD, THE REQUIRED STREET BUFFERYARD SHALL BE REDUCED FROM 30' TO 10'. (SECTION 2.4.3.C.).

14. THE BUILDING SETBACK SHALL BE REDUCED FROM 100' TO 75' FROM THE PROPERTY LINE ABUTTING THE MAJOR ACCESS CORRIDOR (US-1 ROW) (SECTION 2.4.3. D.).

15. DEVELOPED PASSIVE PARK SPACES SHALL CONTAIN A MINIMUM OF 3 OF THE FOLLOWING ELEMENTS, BUT NOT LIMITED TO: WALKING TRAILS; BUTTERFLY/POLLINATOR GARDENS; CUT FLOWER GARDENS; COMMUNITY GARDEN; DOG PARK; HAMMOCK LOUNGE; FIREPITS; CORNHOLE. THE PARK SPACES PROVIDED IN THE DEVELOPMENT SHALL BE A MINIMUM OF 2,000 SQUARE FEET.

16. DEVELOPED ACTIVE PARK SPACES SHALL CONTAIN A MINIMUM OF 3 OF THE FOLLOWING ELEMENTS, BUT NOT LIMITED TO: CLUBHOUSE; SWIMMING POOL; FITNESS CENTER; PLAYGROUND; VOLLEYBALL COURT; TENNIS/PICKLEBALL COURT. THE PARK SPACES PROVIDED IN THE DEVELOPMENT SHALL BE A MINIMUM OF 2,000 SQUARE FEET.

17. PARK #1 AS SHOWN WITHIN THE MASTER PLAN, SHALL BE CONSTRUCTED BY THE DEVELOPER AND THEN CONVEYED BY NON-WARRANTY THE FAIRWAY VILLAS AT WAKE FOREST GOLF CLUB AND CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB TOWNHOMES OWNERS ASSOCIATION, INC. THIS PARK SHALL NOT BE LESS THAN 90,000 SQUARE FEET IN SIZE. A MINIMUM OF THREE DECORATIVE BENCHES WILL BE INSTALLED IN THE PARK. A BERM AT LEAST 4' IN HEIGHT AND

LANDSCAPED WITH A TOWN OF WAKE FOREST UDO TYPE A LANDSCAPE BUFFER (USING OPTION #2) SHALL BE INSTALLED ADJACENT TO THE PROPOSED SERVICE ROAD DEPICTED WITHIN THE MASTER PLAN THAT BORDER SAID PARK. PIN OAKS AND MAGNOLIAS SHALL BE PROHIBITIED FROM THE BUFFER. SHRUBS ARE TO BE EVERGREENS AND NON-FLOWERING. SECTION 7.5.5.A. SHALL BE PROVIDED EXCEPT FOR TRASH AND RECYCLING BINS IN SECTION 7.5.5.A.3.

18. THERE WILL BE NO NEW DEVELOPMENT SOUTH OF THE THREE EXISTING PONDS, WITH THE POSSIBLE EXCEPTION OF ANY UTILITY IMPROVEMENTS REQUIRED BY CITY OF RALEIGH PUBLIC UTILTIES DEPARTMENT. THE LAND WILL REMAIN IN ITS CURRENT STATE AS A COMMUNITY OPEN SPACE. THE LAND SHALL BE DEEDED PRIOR TO FIRST PLAT APPROVAL, TO THE TOWN, COUNTY, STATE, NON-PROFIT ORGANIZATION (UNAFFILIATED WITH THE DEVELOPER) OR HOA.

19. PRIOR TO ISSUANCE OF A GRADING PERMIT, THE DEVELOPER SHALL BE REQUIRED TO CONDUCT A PHASE 2 ENVIRONMENTAL SITE ASSESSMENT FOR THE ENTIRE TRACT. THE DATA FROM THE PHASE 2 ENVIRONMENTAL SITE ASSESSMENT SHALL BE SUBMITTED TO THE TOWN FOR REVIEW WITH INITIAL SUBMITTAL OF CONSTRUCTION DRAWINGS TO THE TOWN.

20. AT THE TIME OF INITIAL CONSTRUCTION DRAWING APPROVAL, THE DEVELOPER SHALL BE REQUIRED TO REQUEST THAT THE TOWN OF WAKE FOREST AND NCDOT APPROVE THE ADDITION OF “NO RIGHT TURN” SIGNS ALONG THE SOUTHBOUND SERVICE ROAD AT THE INTERSECTION WITH COUNTRY CLUB DRIVE AND ALONG SOUTHBOUND STREET “H” AT THE INTERSECTION WITH COUNTRY CLUB DRIVE. THIS CONDITION SHALL BE SATISFIED UPON THE MAKING OF THE REQUEST REGARDLESS OF WHETHER SUCH REQUEST IS GRANTED.

21. A 20’ TYPE B PERIMETER BUFFER SHALL BE PROVIDED AND SHALL BE PLANTED IN ACCORDANCE WITH LANDSCAPE DETAILS ONLY AS ALLOWED ON SHEET LS 5.00 WITHIN THE MASTER PLAN.

22. IN ORDER TO NOT INTERFERE WITH THE EXISTING BERM AND LANDSCAPING BETWEEN CLUB VILLAS DRIVE AND THE EXISTING TOWNHOMES; THE SIDEWALK, CURB, AND/OR UPGRADES MAY BE WAIVED ON THE SOUTH SIDE OF CLUB VILLAS DRIVE. THE DETERMINATION OF REQUIREMENTS SHALL BE MADE BY THE TOWN OF WAKE FOREST PLANNING DEPARTMENT AT TIME OF CONSTRUCTION PLANS.

23. IF ANY OF THE EXISTING PONDS ADJACENT TO LOTS 45-62 ARE DRAINED AND ARE NOT RE-ESTABLISHED, THE ADJACENT PROPOSED LOTS TO THE NORTH WILL BE ALLOWED TO REMAIN AS SHOWN ON THE MASTER PLAN. IF THE EXISTING PONDS ARE NOT DRAINED, THE ADJACENT PROPOSED LOTS TO THE NORTH WILL EITHER BE ELIMINATED OR REVISED TO ENSURE THAT THE REQUIRED 100-FOOT BUFFER IS NOT ON ANY OF THE SINGLE-FAMILY DETACHED LOTS.

24. TO FACILITATE THIS DEVELOPMENT'S TRAFFIC TO TRAVEL NORTHBOUND ON CAPITAL BOULEVARD AND SUBJECT TO NCDOT APPROVAL AND ADEQUATE EXISTING RIGHT-OF-WAY, THE DEVELOPER SHALL DESIGN CONSTRUCTION PLANS THAT CREATE A NORTHBOUND U-TURN SOUTH OF CLUB VILLAS DRIVE AND A CHANNELIZED LEFTOVER ONTO CLUB VILLAS DRIVE FROM

CAPITAL BOULEVARD. THE CONSTRUCTION PLANS SHALL BE SUBMITTED TO NCDOT WHEN ON-SITE CONSTRUCTION PLANS ARE SUBMITTED TO THE TOWN FOR INITIAL REVIEW. CONSTRUCTION OF THESE IMPROVEMENTS SHALL BE STARTED WITHIN 90 DAYS OF NCDOT APPROVAL AND COMPLETED WITHIN ONE YEAR OF NCDOT APPROVAL OF THE CONSTRUCTION PLANS.

RESPECTFULLY SUBMITTED BY,



TOWN OF WAKE FOREST

AGENT AUTHORIZATION FORM:

Application #: SU-99-02-01 Submittal Date: 4/5/22

Green Timber Foundation is the owner of the property for which the attached application is being submitted:

- ☐ General Use Rezoning or Conditional District Rezoning
- ☐ Site Master Plan
- ☐ Subdivision Master Plan
- ☐ Construction Drawings
- ☐ Variance
- ☐ Major Architectural Review
- ☒ Special Use Permit Amendment

The property is located at: 1200 Club Villas Drive

The agent for this project is: Morningstar Law Group

☐ I am the owner of the property and will be acting as my own agent.

Name: Laura Holloman, McAdams
Nil Ghosh, Morningstar Law Group

Address: McAdams: 621 Hillsborough Street, Suite 500, Raleigh, NC 27603
Morningstar Law Group: 700 W Main Street, Second Floor, Durham, NC 27701

Telephone Number: Laura Holloman: (919) 610-7377
Nil Ghosh: (919) 590-0362

Fax: N/A

Email Address: Laura Holloman: holloman@mcadamsco.com
Nil Ghosh: nghosh@morningstarlawgroup.com

Signature(s) of Owner(s):

✓ E. Carroll Joyner

Print or type name(s):

Attach additional sheets if there are additional owners.

***Owner of record as shown on the latest equalized assessment rolls of Wake County. (An option to purchase does not constitute ownership). If ownership has been recently transferred, a copy of the deed must accompany this authorization.**

Last update: August 2018

TOWN OF WAKE FOREST

AGENT AUTHORIZATION FORM:

Application #: SU-99-02-01 Submittal Date: 4/5/22

Dry Timber LLC is the owner of the property for which the attached application is being submitted:

- ☐ General Use Rezoning or Conditional District Rezoning
- ☐ Site Master Plan
- ☐ Subdivision Master Plan
- ☐ Construction Drawings
- ☐ Variance
- ☐ Major Architectural Review
- ☒ Special Use Permit Amendment

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Telephone Number: Laura Holloman: (919) 610-7377
Nil Ghosh: (919) 590-0362 Fax: N/A

Email Address: Laura Holloman: holloman@mcadamsco.com
Nil Ghosh: nghosh@morningstarlawgroup.com

Signature(s) of Owner(s):

Print or type name(s):

Attach additional sheets if there are additional owners.

***Owner of record as shown on the latest equalized assessment rolls of Wake County. (An option to purchase does not constitute ownership). If ownership has been recently transferred, a copy of the deed must accompany this authorization.**

Last update: August 2018

TOWN OF WAKE FOREST

AGENT AUTHORIZATION FORM:

Application #: RZ-21-08 Submittal Date: 4/5/22

Green Timber Foundation is the owner of the property for which the attached application is being submitted:

- [x] General Use Rezoning or Conditional District Rezoning
- [ ] Site Master Plan
- [ ] Subdivision Master Plan
- [ ] Construction Drawings
- [ ] Variance
- [ ] Major Architectural Review

The property is located at: 1200 Club Villas Drive

The agent for this project is: Morningstar Law Group

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Name: Laura Holloman, McAdams
Nil Ghosh, Morningstar Law Group

Address: McAdams: 621 Hillsborough Street, Suite 500, Raleigh, NC 27603
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Print or type name(s):

Attach additional sheets if there are additional owners.

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Last update: August 2018

TOWN OF WAKE FOREST

AGENT AUTHORIZATION FORM:

Application #: RZ-21-08 Submittal Date: 4/5/22

Dry Timber LLC is the owner of the property for which the attached application is being submitted:

- [x] General Use Rezoning or Conditional District Rezoning
- [ ] Site Master Plan
- [ ] Subdivision Master Plan
- [ ] Construction Drawings
- [ ] Variance
- [ ] Major Architectural Review

The property is located at: 1200 Club Villas Drive

The agent for this project is: Morningstar Law Group

☐ I am the owner of the property and will be acting as my own agent.

Name: Laura Holloman, McAdams
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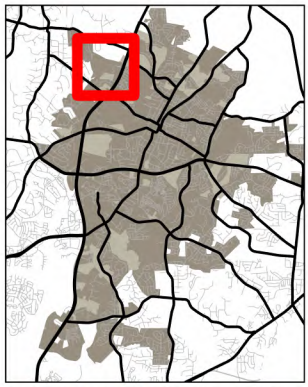
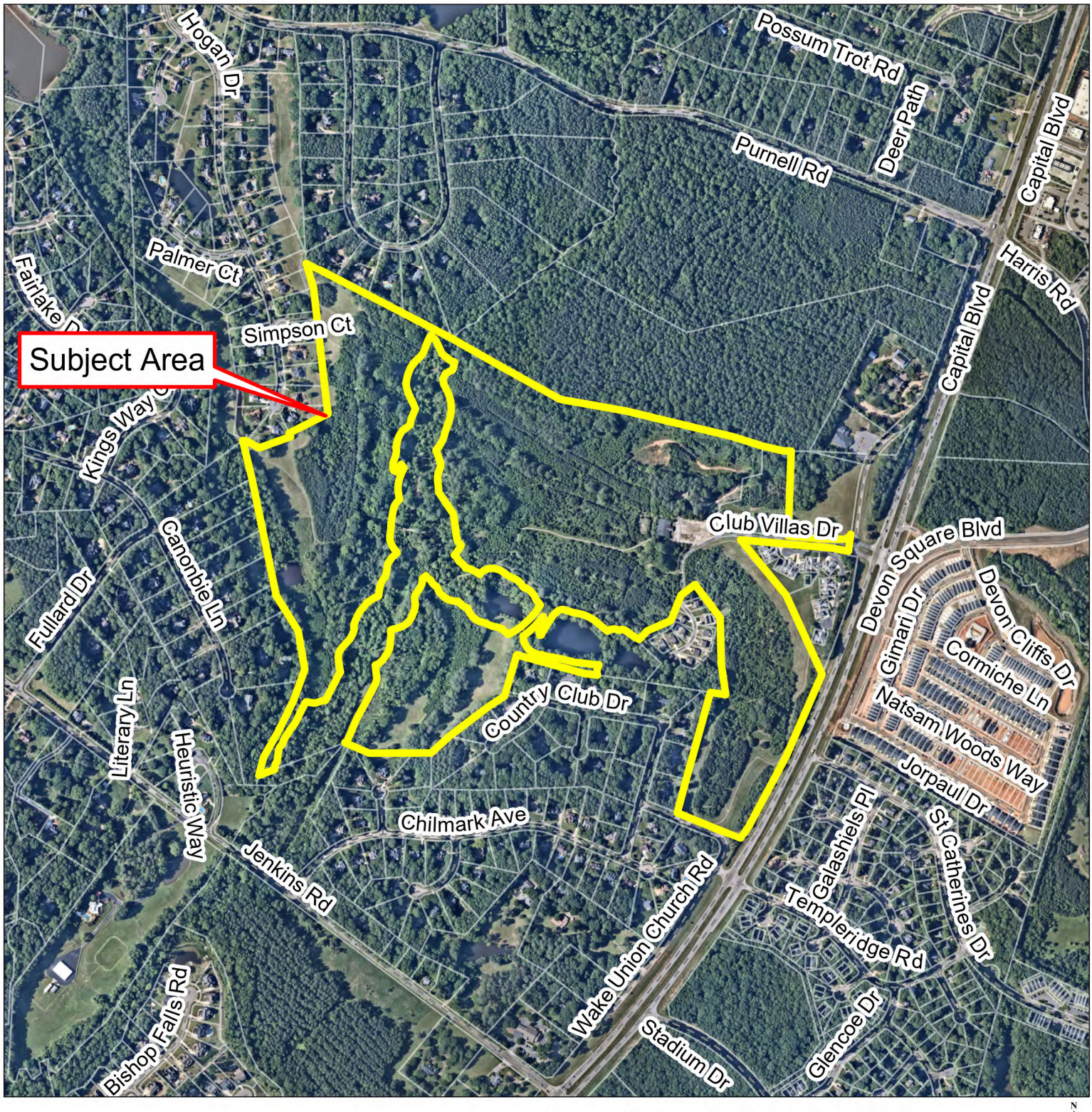
Last update: August 2018



TOWN of WAKE FOREST

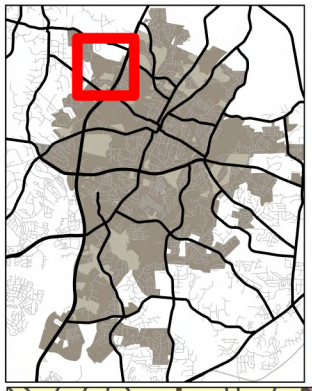
RZ-21-08
Joyner Property Conditional District Rezoning
PIN: 1831895139 (Portion) & 1841091336

8/28/2023



Please note that this map is intended for illustrative purposes only.
For specific inquiries regarding zoning boundaries, contact the
Town Wake Forest Planning Department at 919-435-9510.

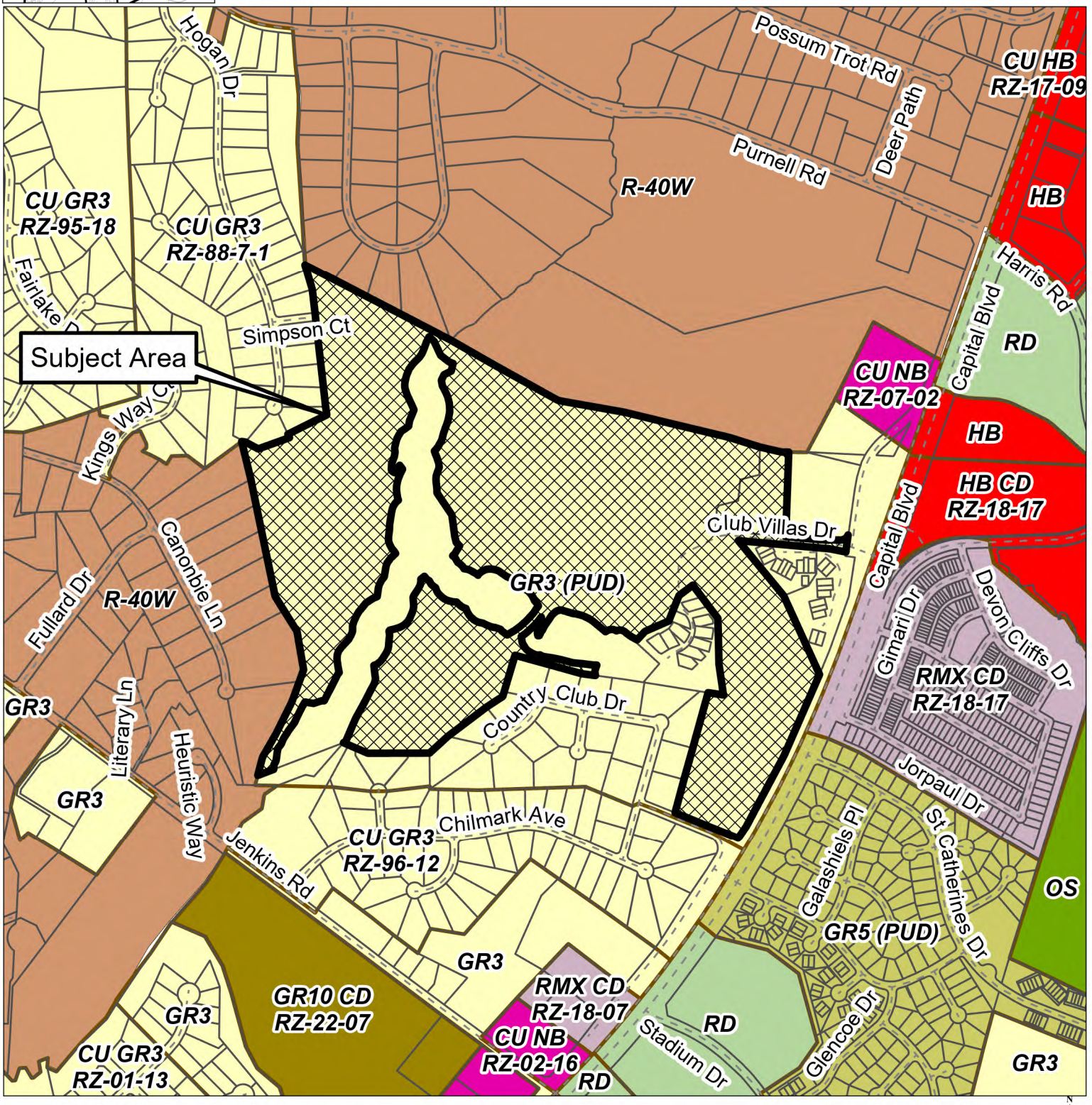
0 500 1,000 1,500 2,000 Feet



TOWN of WAKE FOREST

RZ-21-08
Joyner Property Conditional District Rezoning
PIN: 1831895139 (Portion) & 1841091336

8/28/2023



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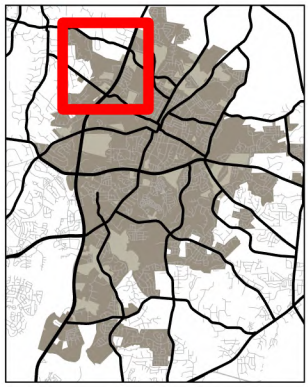
0 500 1,000 1,500 2,000 Feet

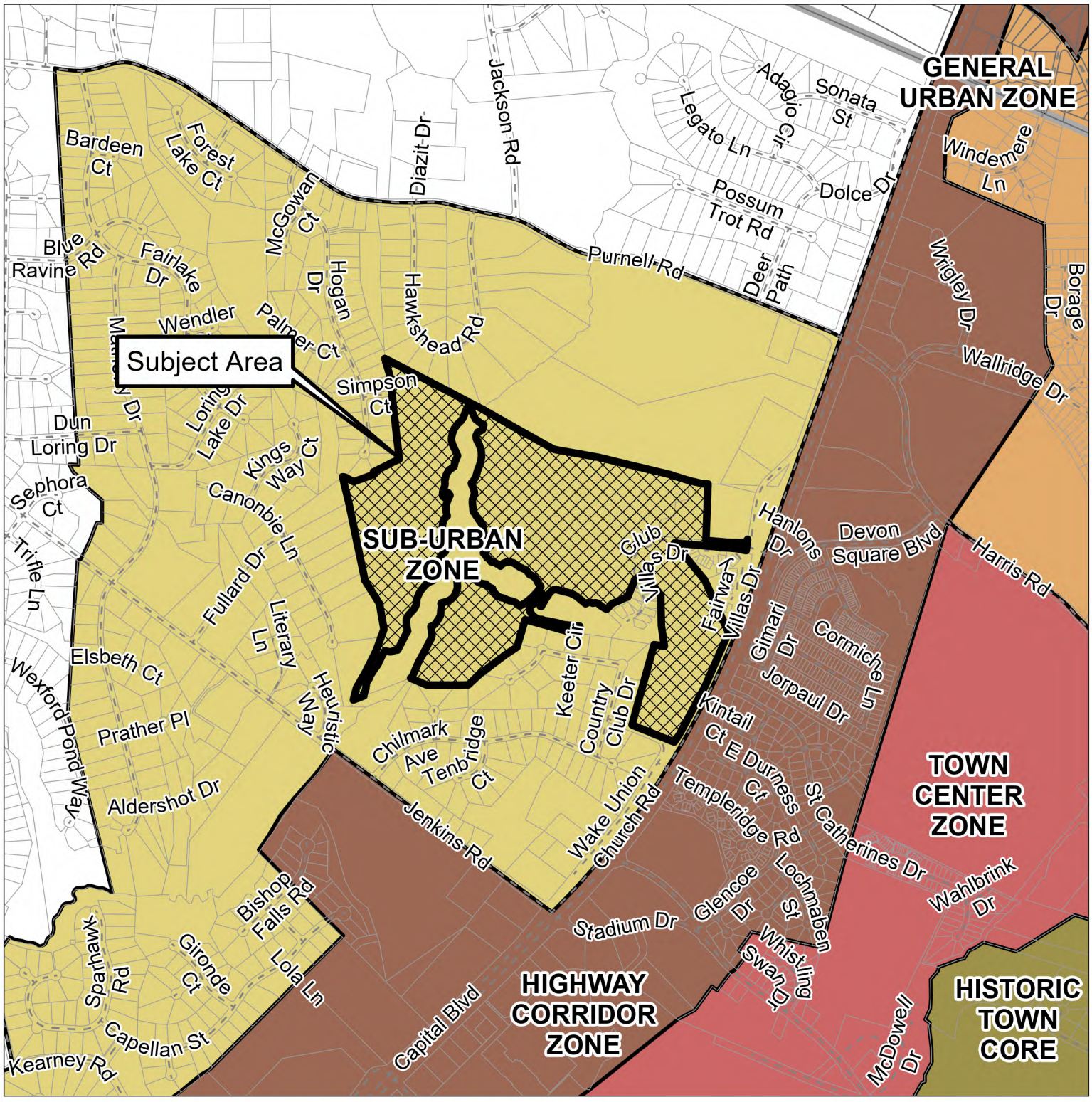


Community Plan Zones

TOWN of WAKE FOREST

RZ-21-08
Joyner Property Conditional District Rezoning
PIN: 1831895139 (Portion) & 1841091336

8/28/2023



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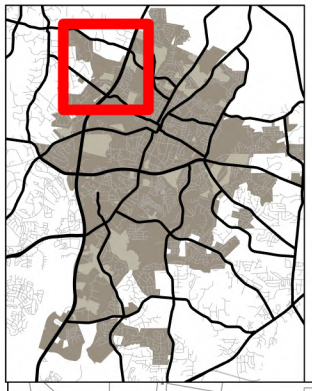
0 0.4 0.8 Miles

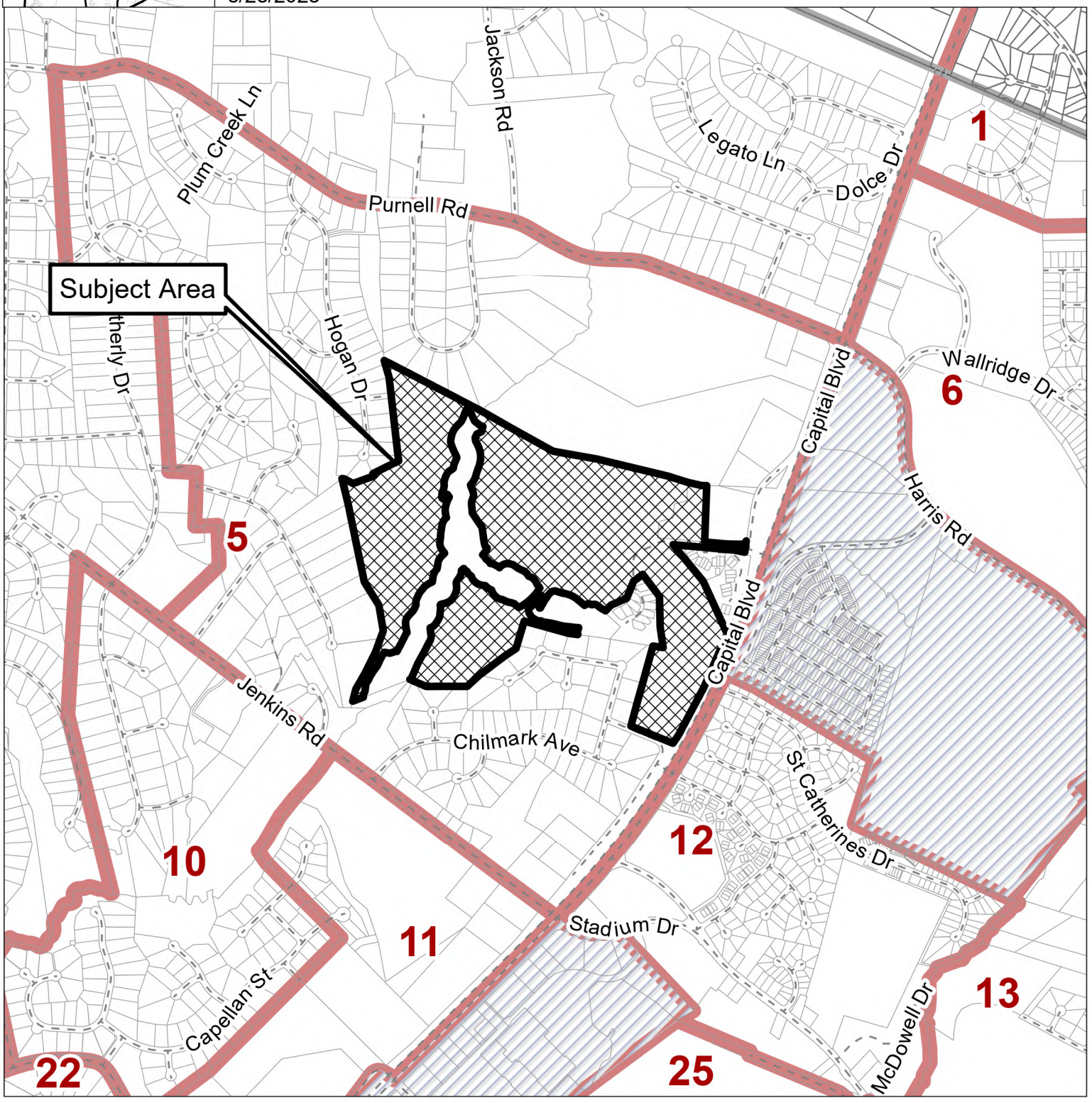


Neighborhood Planning Areas

TOWN of WAKE FOREST

RZ-21-08
Joyner Property Conditional District Rezoning
PIN: 1831895139 (Portion) & 1841091336

8/28/2023



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0 0.25 0.5 0.75 Miles

Town of Wake Forest

401 ELM AVENUE WAKE FOREST, N. C. 27587-2932
PHONE 919/554-6100 FAX 919/554-6195

SPECIAL USE PERMIT

Special Use Permit No.: SU-99-02

Date Issued: May 18, 1999

Petitioner: Oakmark Development Co., LLC
P.O. Box 99277
Raleigh, NC 27624

Property Location: 13239 Capital Boulevard

Tax PIN: 1831.08-89-2193

Property Size: 165.79 acres

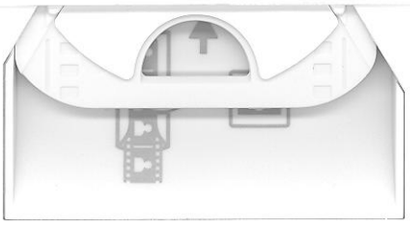
Land Use: Planned Unit Development (30 dwelling units)

The Wake Forest Board of Commissioners considered your request on May 18, 1999 for a special use permit for a planned unit development.

The Wake Forest Board of Commissioners voted to approve your request for a Planned Unit Development (30 dwelling units) on the Wake Forest Golf Club property, being tracts 1, 2 and 4, based on the development master plan and the following findings of fact:

Finding 1: **The proposed use or development is located, designed and proposed to be operated as not to be detrimental to the public health, safety and general welfare,** in that the site, upon annexation, will be zoned R-40W, Residential-40 Watershed Protection District which allows planned unit developments; the proposed use involves the annexation of the entire Golf Club property affording the provision of municipal services; and, the proposed locations of dwelling units allow traffic to be routed directly to US-1, a major thoroughfare, thereby maintaining low traffic volume in any given residential area.

Finding 2: **The proposed use is appropriately located with respect to transportation facilities, water supply, fire and police protection, waste disposal and similar facilities,** in that site has frontage and access to a major thoroughfare (Capital Boulevard /US-1); and, the site will be located in the town limits and municipal services will be provided; and, municipal water and sewer service is available on-site and will sufficiently service the proposed use.



Finding 3: **The proposed use will not substantially injure the value of adjoining or abutting property,** in that buffering and screening as required by Town Ordinances will be provided; the club owner will have approval of architectural design to insure quality and uniformity to the WF Golf Club thereby preserving the quality and beauty of the area; each residential area will be landscaped so as to provide beauty and protection of surrounding property values; and, the townhomes will be priced between $150,000 and $200,000.

Finding 4: **The proposed use will not cause undue traffic congestion or create a traffic hazard,** in that the proposed use will generate 176 vehicle trips per day, which can be accomodated by US-1 and adjoining streets without effecting the level of service; and, the proposed dwelling units will be clustered in different locations on the golf course allowing traffic to be routed through two separate locations, with the bulk of traffic directly accessing US-1, thereby maintaining low traffic volumes in any given residential area.

Finding 5: **The proposed use will not create undue noise, dust, and gasses,** in that the proposed use is a residential use to which noise, dust and gasses are not normally associated; and, all vehicle access areas will be paved thus alleviating potential dust problems.

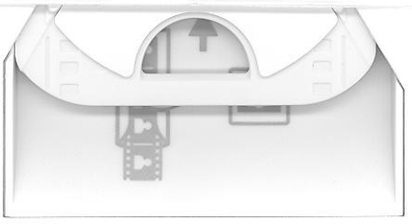
Finding 6: **The proposed use if developed according to the plan submitted and approved, will be in harmony with the area in which it is located,** in that the proposed use is comprised of single-family, attached dwellings priced in a range consistent with the surrounding residential areas.

Finding 7: **The proposed use or development conforms with the general plans for the physical development of the town,** in that the proposed use and Master Plan presents no conflicts with the general plans for the physical development of the Town, including the Land Use Management Plan, Land Development Plan, and the Official Zoning Map.

Finding 8: **The proposed use or development meets all other rules and regulations within the zoning ordinance and all existing Town policies,** in that the proposed plan submitted with the special-use permit application complies with the requirements of the R-40W, Residential-40 Watershed Protection District and the requirements for planned unit developments.

The special use permit is hereby issued subject to the following conditions:

1. Within sixty (60) days of the date of issuance of the special use permit and approval of the master plan, a petition of annexation for the entire Wake Forest Golf Club property shall be filed with the Town of Wake Forest. The effective date of the annexation ordinance shall be the effective date of the special use permit.



2. In accordance with Article V. Section 23.B.3 of the Wake Forest Zoning Ordinance, the property shall be zoned R-40W, Residential-40 Watershed Protection District upon the effective date of the annexation ordinance.

3. The entire acreage of the Wake Forest Golf Club shall be subject to the provisions and conditions of the special use permit and master plan as approved including, but not limited to, calculations of density, open space, and impervious surface area.

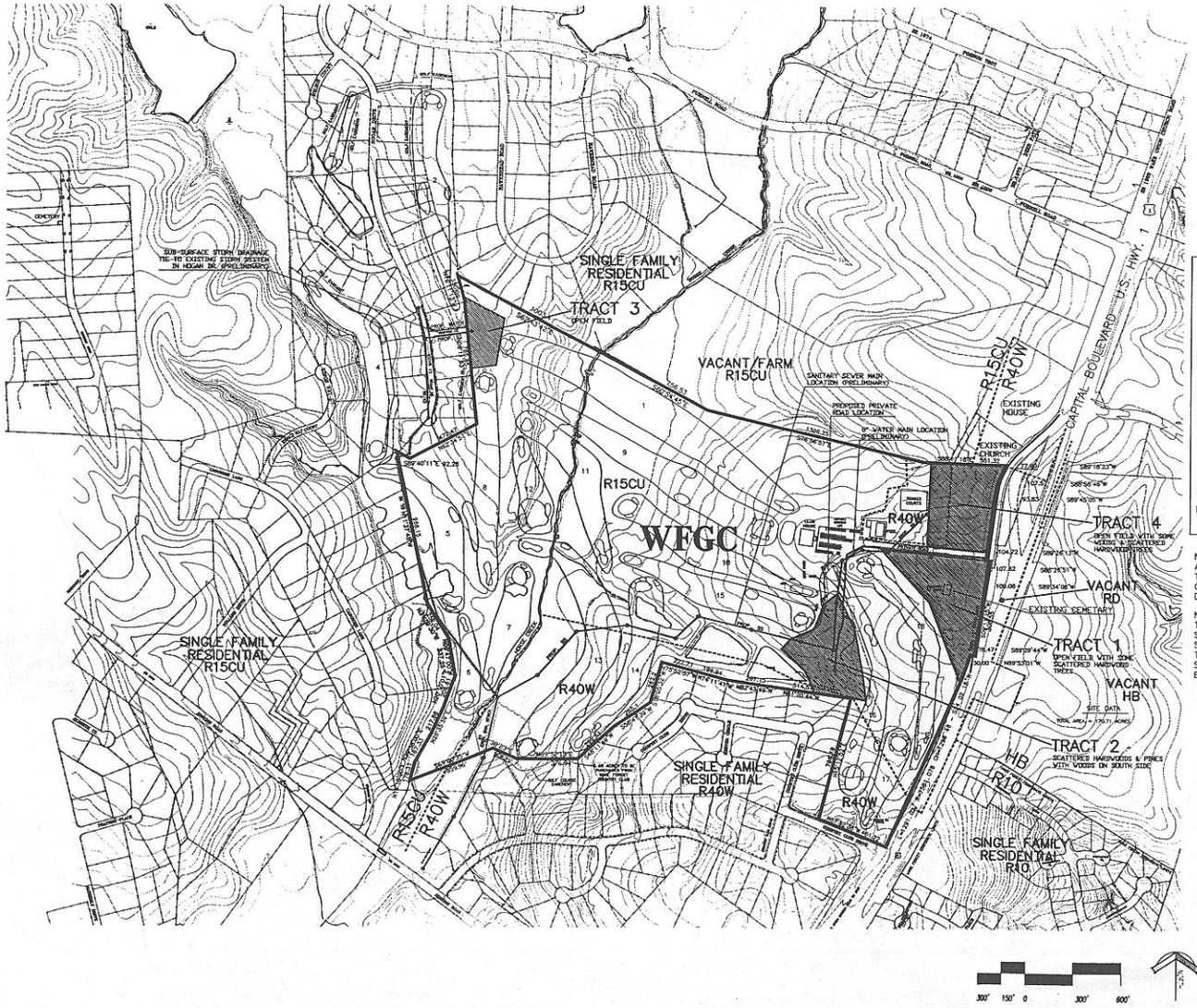
4. The commercial area shall require rezoning.

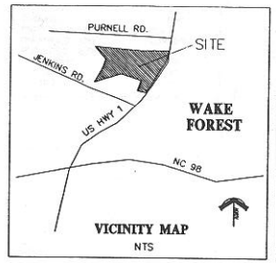
5. The facades of the townhomes shall be constructed with brick and hardi-plank.

6. The homeowner association of the development shall be responsible for the maintanance of the cemetery located on tract #1. Plans for the improvement of the cemetery shall be reviewed by the DAR and the Town of Wake Forest. The cemetery shall not be moved and the existing stone wall shall be kept in its historic condition with repairs as necessary.

Mayor

May 18, 1999
Date





VICINITY MAP
NTS

SITE DATA

TRACT	PROPOSED USE	AREA
TRACT #1	20 TOWNHOMES	+/- 5.55 AC.
TRACT #2	10 TOWNHOMES	+/- 4.45 AC.
TRACT #3	6 0 LOT LINE HOMES	+/- 1.70 AC.
TRACT #4	COMMERCIAL	+/- 5.01 AC.
WFGC	GOLF COURSE	+/-149.08 AC.
TOTAL		+/-165.79 AC.

PROPOSED DWELLING UNITS:
2 STORY, 3 BEDROOM, 1650 SF TO 2500 SF

PROPOSED OPEN SPACE (GOLF COURSE): 147.05 AC.
(87% OF THE ENTIRE WFGC PUD)

PROPOSED COMMON AREA (RESIDENTIAL):
TRACT #1: 2.6 AC. (SHARED ACCESS DRIVES
TRACT #2: 2.5 AC. & AREAS OUTSIDE OF
TRACT #3: 0.7 AC. INDIVIDUAL D.U. LOTS)

EXISTING IMPERVIOUS SURFACE AREA: +/-2.0 AC.
(ENTIRE WAKE FOREST GOLF CLUB PUD)

PROPOSED IMPERVIOUS SURFACE AREA: +/-6.0 AC.
(3.6 % OF ENTIRE WFGC PUD)

NOTE: EXISTING VEGETATION AND NATURAL AREAS AS SHOWN ON THE MASTER PLAN WILL BE PROTECTED TO THE GREATEST EXTENT POSSIBLE AND MINIMAL CLEARING OF LAND SHALL BE UNDERTAKEN DURING DEVELOPMENT.

NOTE: STORM DRAINAGE FOR TRACTS 1, 2 AND THE EASTERN PART OF TRACT 3 SHALL BE VIA SURFACE RUNOFF TO EXISTING DRAINAGE WAYS. STORM DRAINAGE FOR THE WESTERN PART OF TRACT 3 AND TRACT 4 SHALL BE VIA SUB-SURFACE STRUCTURES TO EXISTING STORM SYSTEMS OR EXISTING DRAINAGE WAYS.

OWNER
WAKE FOREST GOLF AND COUNTRY CLUB, INC.
13239 CAPITAL BOULEVARD
WAKE FOREST, NORTH CAROLINA 27587
556-1709

DEVELOPER
OAKMARK DEVELOPMENT COMPANY, LLC
P. O. BOX 99277
RALEIGH, NORTH CAROLINA 27624
846-9981

NOTE:
THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. CHANGES MAY OCCUR PRIOR TO APPROVAL, CONSTRUCTION OR COMPLETION OF THE PROJECT.

CLINE DAVIS
ARCHITECTS PA

414 West Jones St.
Raleigh, NC 27603

919/833-6413
919/836-1280 FAX
CDA@INTERPATH.COM

WAKE FOREST GOLF CLUB

Town of Wake Forest
North Carolina

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT 755 PAUL R. MEDLIN
4/29/99

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Project #9701.4
Date 01.22.99
Revisions 04.22.99

Drawn By PRM
Checked By
Content
MASTER LAND USE PLAN

Sheet *1*

TOWN *of*
WAKE FOREST

301 S. Brooks Street
Wake Forest, NC 27587
t 919.435.9400

www.wakeforestnc.gov

SPECIAL USE PERMIT AMENDMENT ORDER OF APPROVAL

Special Use Permit Case #: SU-99-02-01

Date Issued: May 4, 2023

Applicant:
McAdams Company
C/O Laura Holloman
2905 Meridian Parkway
Durham, NC 27713

Owner:
Green Timber Foundation
C/O Carroll Joyner
394 Fleming Road
Youngsville, NC 27596

Property Location: 1180 and 1200 Club Villas Drive

Tax PINs: 1841091336 and 1831895139 (portion)

Property Size:
Property Acreage for PINs - 165± acres
Area removed from original SUP acreage - 125± acres
Revised SUP acreage - 40± acres

Development Name: Joyner Property

Zoning: General Residential 3 Planned Unit Development (GR3 PUD) Falls Lake Watershed Protection Overlay (FL-WMA); Special Highway Overlay (SH1-O)

The Wake Forest Board of Commissioners conducted a public hearing on **March 21, 2023** to consider **Case No. SU-99-02-01**; a request to amend the existing Special Use Permit SU-99-02 to reduce the acreage from 165.79 acres to 40.0 acres. **The Wake Forest Board of Commissioners voted 3-2 to approve your request.**

Based on the evidence presented during the public hearing, the Wake Forest Board of Commissioners made the following FINDINGS OF FACT:

Finding 1: **The proposed special use conforms to the character of the neighborhood, considering the location, type, and height of the buildings or structures and**

the type and extent of landscaping on the site.

The SUP amendment removes the former golf course and the abandoned clubhouse, pool, and tennis courts from the previously approved plan which reduced the open space provided to the minimum required. No additional housing units, commercial space or the like are granted by approving this amendment, and the Clubhouse Villas and Fairway Villas neighborhoods are to remain as currently developed. The 5± acre vacant tract, identified in the PUD as commercial, also remains as part of the SUP. No additional entitlements are granted as part of this amendment request; therefore the request conforms to the character of the neighborhood, considering the location, type, and height of building and structures and the landscaping on site.

Finding 2: **The proposed use will not cause undue traffic congestion or create a traffic hazard.**

No additional uses (e.g., housing units, commercial space, etc.) are approved as part of this amendment. Therefore, the amendment does not cause undue traffic congestion or create a traffic hazard.

Finding 3: **Adequate utilities (water, sewer, drainage, electric, etc.) are available for the proposed use.**

The existing development is served by public water, sewer, and other utilities, and no additional uses (e.g., housing units or commercial space) are part of this amendment. Therefore, adequate utilities are in place.

Finding 4: **The proposed use shall not be noxious or offensive by reason of vibration, noise, odor, dust, smoke or gas.**

There are no noxious or offensive uses by reason of vibration, noise, odor, dust, smoke, or gas within the SUP amendment area since no additional uses are included in this amendment.

Finding 5: **The establishment of the proposed use shall not impede orderly development and improvement of surrounding property.**

There are no new uses included as part of the amendment request; therefore, the orderly development and improvement of the surrounding area is not impeded.

Finding 6: **The establishment, maintenance or operation of the proposed use shall not be detrimental to or endanger the public health, safety or general welfare.**

The SUP amendment removes a former golf course as well as the club house, pool and tennis courts that are currently in disrepair from the SUP. There is no new proposed use; therefore, this SUP amendment is not detrimental to and does not endanger the public health, safety, or general welfare.

Finding 7: **The application will not substantially injure the value of adjoining or abutting property.**

No new uses are proposed as part of the amendment request; therefore, it does not

substantially injury the value of adjoining or abutting property.

Finding 8: **The proposed use is consistent with the officially adopted plans and policies of the town.**

No new uses proposed as part of this request. Therefore, the amendment is consistent with adopted plans and policies of the town.

Vivian Jones, Mayor

5-5-2023
Date

NOTE: If you are dissatisfied with the decision of this Board, an appeal may be taken to the Superior Court of Wake County within thirty (30) days after the date of this order.

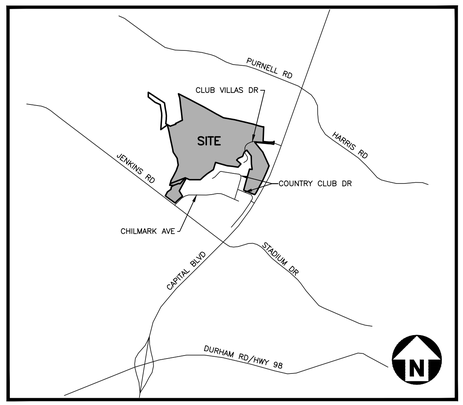
JOYNER PROPERTY

CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

SPECIAL USE PERMIT AMENDMENT
MASTER LAND USE PLAN

PROJECT NUMBER: 202011075
DATE: FEBRUARY 27, 2023

TOWN OF WAKE FOREST
PROJECT #SU-99-02-01



VICINITY MAP
N.T.S.

SHEET INDEX

C-1	EXISTING CONDITIONS
C-2	PROPOSED CONDITIONS
C-3	TRACT #1 ILLUSTRATIVE PLAN
C-4	TRACT #2 ILLUSTRATIVE PLAN
C-5	TRACT #4 ILLUSTRATIVE PLAN

APPROVAL BY THE
WAKE FOREST BOARD
OF COMMISSIONERS

DATE _____

AMENDMENT TO PORTION OF EXISTING SPECIAL USE PERMIT IS SOUGHT PURSUANT TO NCGS 160D-705(C). MODIFICATIONS SHALL APPLY ONLY TO THE PROPERTIES INDICATED HEREIN.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CONTACT

LAURA HOLLOMAN
holloman@mcadamsco.com
PHONE: 919. 361. 5000

PROPERTY OWNER

DRY TIMBER LLC
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

NORTH CAROLINA PROFESSIONAL SEAL 22286 ENGINEER MICHAEL J.E. SANCHEZ
NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 05. 2022	PER TOWN COMMENTS
2	12. 08. 2022	PER TOWN COMMENTS
3	02. 27. 2023	PER TOWN COMMENTS

SPECIAL USE PERMIT FOR:

JOYNER PROPERTY
WAKE FOREST, NORTH CAROLINA
PROJECT NUMBER: 2021110197

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APPROVED SITE DATA

TRACT	PROPOSED USE	AREA
TRACT #1	20 TOWNHOMES	+/- 5.55 AC
TRACT #2	10 TOWNHOMES	+/- 4.45 AC
TRACT #5	COMMERCIAL	+/- 5.01 AC
TOTAL		+/- 15.01 AC

PROPOSED DWELLING UNITS
2 STORY, 3 BEDROOM, 1650 SF TO 2500 SF

PROPOSED OPEN SPACE:
TRACT #1 2.6 AC
TRACT #2 2.5 AC

EXISTING IMPERVIOUS SURFACE AREA : +/- 2.0 AC
(ENTIRE WAKE FOREST GOLF CLUB PUD)

PROPOSED IMPERVIOUS SURFACE AREA : +/- 6.0 AC
(3.6% OF ENTIRE WAKE FOREST GOLF CLUB PUD)

LEGEND

- EXISTING VACANT COMMERCIAL 5.01 AC
- EXISTING RESIDENTIAL 10 AC
- EXISTING CONSERVATION EASEMENT 10.35 AC PER WAKE COUNTY REGISTER OF DEEDS BM2003, PG 02044

GENERAL NOTES:

1. ALL TOPOGRAPHIC INFORMATION TAKEN FROM WAKE COUNTY GIS
2. ALL PROPERTY BOUNDARY AND OWNER INFORMATION TAKEN FROM WAKE COUNTY GIS AND WAKE COUNTY IMAPS
3. ALL EXISTING SANITARY SEWER AND WATER INFORMATION TAKEN FROM WAKE COUNTY IMAPS

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McAdams
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2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

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CLIENT

DRY TIMBER LLC
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

JOYNER PROPERTY
OPEN SPACE EXHIBIT
MASTER LAND USE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22286 MICHAEL J.E. SANCHEZ
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

NO.	DATE	
1	04. 05. 2022	PER TOWN COMMENTS
2	12. 08. 2022	PER TOWN COMMENTS
3	02. 27. 2023	PER TOWN COMMENTS

PLAN INFORMATION

PROJECT NO.	202011075
FILENAME	202011075-XC1
CHECKED BY	LPH
DRAWN BY	JAR
SCALE	1"=200'
DATE	02. 27. 2023

SHEET

EXISTING CONDITIONS
C-1

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LEGEND

- TRACT #1 - EXISTING RESIDENTIAL 5.55 AC
- TRACT #3 - PROPOSED OPEN SPACE AREA 10.00 AC
- TRACT #2 - EXISTING RESIDENTIAL 4.45 AC
- TRACT #4 - PROPOSED OPEN SPACE AREA 14.99 AC
- TRACT #5 - EXISTING VACANT COMMERCIAL 5.01 AC
- EXISTING CONSERVATION EASEMENT 10.35 AC PER WAKE COUNTY REGISTER OF DEEDS BM2003, PG 02044

OPEN SPACE

TRACT 1
10.00 AC PROPOSED

TRACT 2
14.99 AC PROPOSED

TOTAL OPEN SPACE PROVIDED = 24.99 AC

- OPEN SPACE SHALL BE MAINTAINED BY PROPERTY OWNER(S) OF SUBJECT PROPERTY. AT A FUTURE DATE, THE OPEN SPACE'S OWNERSHIP MAY BE TRANSFERRED TO A NON-PROFIT CONSERVATION ORGANIZATION, GOVERNMENT ENTITY, OR HOMEOWNERS ASSOCIATION.
- EXISTING CART PATHS WITHIN OPEN SPACE MAY BE UTILIZED FOR PEDESTRIAN TRAILS IN THE FUTURE.

GENERAL NOTES

1. ALL TOPOGRAPHIC INFORMATION TAKEN FROM WAKE COUNTY GIS
2. ALL PROPERTY BOUNDARY AND OWNER INFORMATION TAKEN FROM WAKE COUNTY GIS AND WAKE COUNTY IMAPS
3. ALL EXISTING SANITARY SEWER AND WATER INFORMATION TAKEN FROM WAKE COUNTY IMAPS

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

JOYNER PROPERTY
OPEN SPACE EXHIBIT
MASTER LAND USE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22286 MICHAEL J.E. SANCHEZ

REVISIONS

NO.	DATE	
1	04. 05. 2022	PER TOWN COMMENTS
2	12. 08. 2022	PER TOWN COMMENTS
3	02. 27. 2023	PER TOWN COMMENTS

PLAN INFORMATION

PROJECT NO.	202011075
FILENAME	202011075-S1
CHECKED BY	LPH
DRAWN BY	JAR
SCALE	1"=200'
DATE	02. 27. 2023

SHEET

PROPOSED CONDITIONS
C-2

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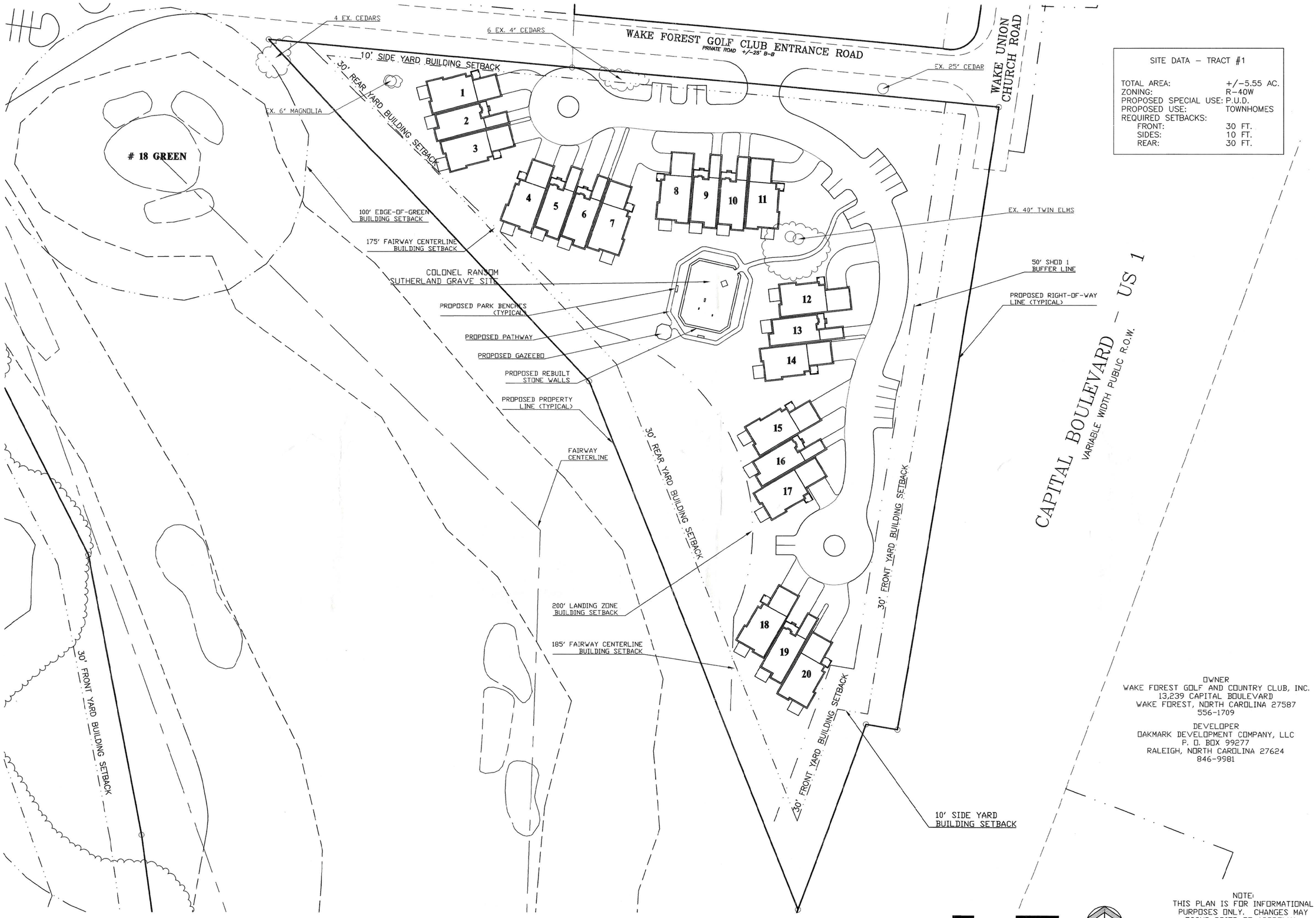

SITE DATA – TRACT #1

TOTAL AREA:	+/-5.55 AC.
ZONING:	R-40W
PROPOSED SPECIAL USE:	P.U.D.
PROPOSED USE:	TOWNHOMES
REQUIRED SETBACKS:	
FRONT:	30 FT.
SIDES:	10 FT.
REAR:	30 FT.

NOTE:
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OWNER
WAKE FOREST GOLF AND COUNTRY CLUB, INC.
13,239 CAPITAL BOULEVARD
WAKE FOREST, NORTH CAROLINA 27587
556-1709

DEVELOPER
OAKMARK DEVELOPMENT COMPANY, LLC
P. O. BOX 99277
RALEIGH, NORTH CAROLINA 27624
846-9981

CLINE DAVIS
ARCHITECTS PA

414 West Jones St.
Raleigh, NC 27603

919/833-6413
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CDA@INTERPATH.COM

WAKE FOREST GOLF CLUB

Town of Wake Forest, North Carolina

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Project #98014
Date 12.03.98
Revisions

Drawn By PRM
Checked By
Content

TRACT #1 ILLUSTRATIVE SITE PLAN

Sheet **C-3**

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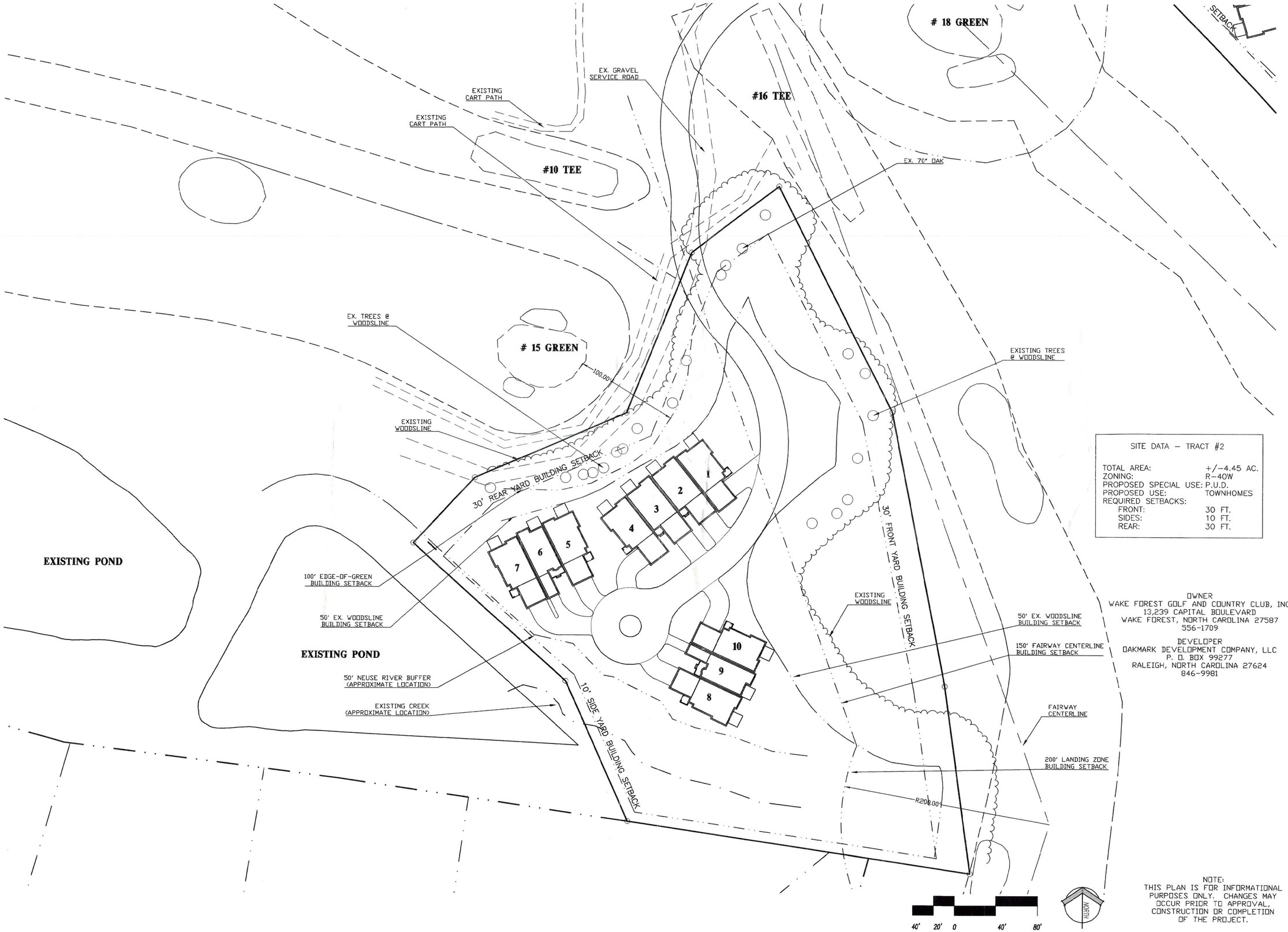

SITE DATA – TRACT #2

TOTAL AREA:	+/–4.45 AC.
ZONING:	R–40W
PROPOSED SPECIAL USE:	P.U.D.
PROPOSED USE:	TOWNHOMES
REQUIRED SETBACKS:	
FRONT:	30 FT.
SIDES:	10 FT.
REAR:	30 FT.

OWNER
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13,239 CAPITAL BOULEVARD
WAKE FOREST, NORTH CAROLINA 27587
556-1709

DEVELOPER
OAKMARK DEVELOPMENT COMPANY, LLC
P. O. BOX 99277
RALEIGH, NORTH CAROLINA 27624
846-9981

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Town of Wake Forest, North Carolina

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Project #98014
Date 12.03.98
Revisions

Drawn By PRM
Checked By
Content

TRACT #2 ILLUSTRATIVE SITE PLAN

Sheet **C-4**

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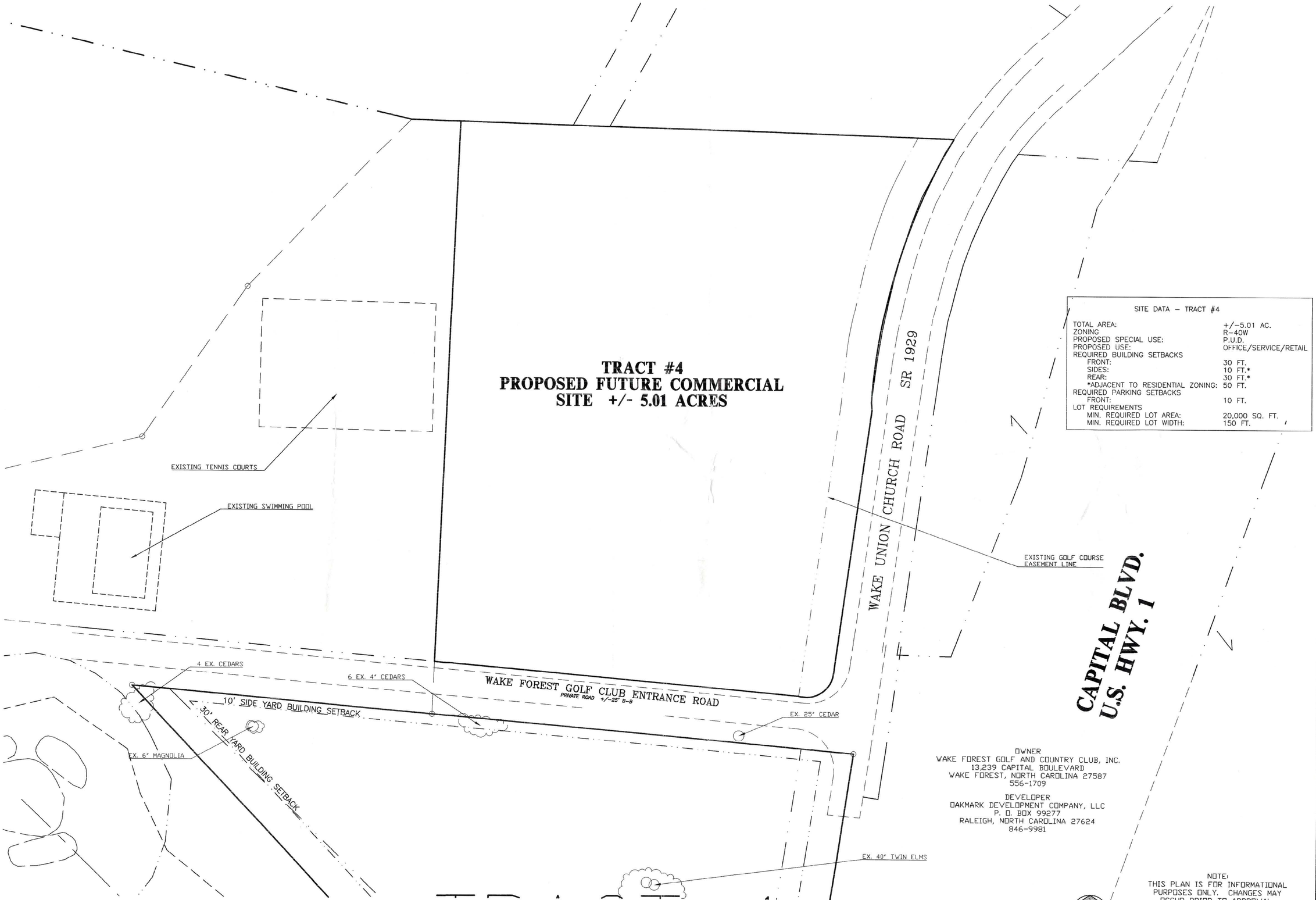

SITE DATA – TRACT #4	
TOTAL AREA:	+/–5.01 AC.
ZONING	R–40W
PROPOSED SPECIAL USE:	P.U.D.
PROPOSED USE:	OFFICE/SERVICE/RETAIL
REQUIRED BUILDING SETBACKS	
FRONT:	30 FT.
SIDES:	10 FT.*
REAR:	30 FT.*
*ADJACENT TO RESIDENTIAL ZONING:	50 FT.
REQUIRED PARKING SETBACKS	
FRONT:	10 FT.
LOT REQUIREMENTS	
MIN. REQUIRED LOT AREA:	20,000 SQ. FT.
MIN. REQUIRED LOT WIDTH:	150 FT.

OWNER
WAKE FOREST GOLF AND COUNTRY CLUB, INC.
13,239 CAPITAL BOULEVARD
WAKE FOREST, NORTH CAROLINA 27587
556-1709

DEVELOPER
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Project #98014
Date 12.03.98
Revisions

Drawn By PRM
Checked By
Content

TRACT #4 ILLUSTRATIVE SITE PLAN

Sheet **C-5**

TOWN *of*
WAKE FOREST

Report Requirements:

Per NCGS 160D-604, all proposed amendments to the zoning ordinance or zoning map shall have a written report provided from the Planning Board to the Board of Commissioners within 30 days of referral of the amendment to the Planning Board, or the Board of Commissioners may proceed in its consideration of the amendment without the Planning Board report. Furthermore, in no case is the Board of Commissioners bound by the recommendations, if any, of the Planning Board.

Per NCGS 160D-604, the Planning Board shall advise and comment on whether the proposed zoning amendment is consistent with all applicable officially adopted plans, and provide a written recommendation to the Board of Commissioners that addresses plan consistency and other matters as deemed appropriate by the Planning Board, but a comment by the Planning Board that a proposed amendment is inconsistent with the officially adopted plans shall not preclude consideration or approval of the proposed amendment by the Board of Commissioners.

GENERAL INFORMATION

Applicant:	McAdams Company
Owner:	Green Timber Foundation
Requested Action:	Rezone 124.68 acres on the Town of Wake Forest Zoning Map from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) to General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) *While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.
Existing Zoning:	from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O)
Location:	1180 and 1200 (portion) Club Villas Dr
Size:	124.68 acres
Tax PINs:	1841091336 and 1831895139 (portion)
Existing Land Use:	Vacant with abandoned recreation facilities

Applicable Officially Adopted Plans:

The request is generally inconsistent with the relevant policies in the Comprehensive Plan, and denial of the zoning map request is reasonable and in the public interest. See Attachment.

This report reflects the recommendation of the Planning Board, this the 12th day of September 2023.

Introduced by Planning Board member: Shelia Bishop

TOWN *of*
WAKE FOREST

Seconded by Planning Board member: Michael Hickey

Attest:

Karin Kuropas, Planning Board Chair

Courtney Tanner, Planning Director

	Community Plan Consistency Grid				
	GENERAL POLICY RECOMMENDATIONS		**YES**	**NO**	**NA**
	GPR-1	Develop complete neighborhoods built around gathering spaces with a mix of housing types, lot sizes, and integrated commercial uses versus monolithic subdivisions			
	GPR-2	Appropriately transition large-scale commercial, institutional, and industrial uses into surrounding neighborhoods			
	GPR-3	Integrate alternative modes of transportation, such as transit and biking, into development			
	GPR-4	Carefully configure street patterns to allow for multiple outlets from neighborhoods, and to continue the policy of providing for connections between neighborhoods, without encouraging through traffic			
	GPR-5	Require sidewalks, bikeways and greenways as part of the necessary infrastructure for new development			
	GPR-6	Require regularly spaced street trees, selected and planted in accordance with a street tree master plan, in new developments, whether commercial, office or residential			
	GPR-7	Place new public and private buildings of architectural significance in locations of prominence and visual importance			
	GPR-8	Ensure neighborhoods have adequate open space areas designed into the development			
	GPR-9	Ensure residential architecture respects the value of the street upon which it faces with houses pulled up to the street, porches in the front, garages to the rear or setback from the rest of the home's front facade, and front walkways to the sidewalk			
	POLICIES FOR OLDER NEIGHBORHOODS		**YES**	**NO**	**NA**
	ON-1	Concentrate police protection, preferably in the form of foot and bicycle patrols, as part of a comprehensive strategy for neighborhood revitalization and crime prevention			
	ON-2	Encourage pedestrian-level streetlights and appropriately designed private property lights , particularly in the town's older walkable neighborhoods			
	ON-3	Implement housing programs, code enforcement activities, and public improvements in partnership with residents in targeted neighborhood areas and include restoration and rehabilitation activities			
	ON-4	Ensure new infill development is architecturally compatible with existing structures, site layout and the streetscape within its vicinity			
	ON-5	Continually reinvest in the infrastructure of older urban neighborhoods, including but not limited to: park improvements, sidewalks, street paving and maintenance, street trees, street lights, water and sewer lines, and drainage			
	ON-6	Encourage pedestrian-oriented, designed and scaled stores and services providing basic necessities to residents of the town's older neighborhoods			
	ON-7	Facilitate mass transit services through recognition of planned transit routes, development mix and density, and accommodation for future transit stop locations in redevelopment and infill projects in older neighborhoods			
	POLICIES FOR NEWER NEIGHBORHOODS		**YES**	**NO**	**NA**
	NN-1	Encourage architecturally compatible accessory housing on developed lots within existing neighborhood areas, especially for the elderly			
	NN-2	Working in cooperation with neighborhood residents, support the provision of greenways, bikeways and walkways within existing neighborhoods			
	NN-3	Architecturally compatible, residentially scaled office and institutional development may be permitted along major streets forming a boundary of a neighborhood planning area			
	NN-4	Existing, less intensive development (i.e. residential or office uses) located at the intersection of two or more major streets may be allowed to undergo an orderly transition to appropriate commercial use, provided that original use is no longer viable and that careful site design will allow for compatibility with adjoining areas			

Community Plan Consistency Grid

	POLICIES FOR FUTURE NEIGHBORHOODS		**YES**	**NO**	**NA**
	FN-1	Promote a walkable community to minimize sprawl, as most new neighborhoods should be compact in form			
	FN-2	Ensure new neighborhood streets are no wider than necessary to serve their intended purpose			
	FN-3	Consider future transit service corridors and reinforce these corridors with development mixtures and densities appropriate for transit services			
	FN-4	Include at least one neighborhood center or focal point in neighborhood planning areas			
	FN-5	Encourage neighborhood serving businesses in neighborhood design			
	FN-6	Encourage centrally located amenity centers and discourage them on the periphery of neighborhoods			
	FN-7	Encourage a mixture of housing types, sizes, and prices for each neighborhood planning area			
	FN-8	Encourage higher density housing that is served by transit and located close to adjoining work and shopping areas			
	FN-9	Ensure new neighborhoods are connected to other neighborhoods, shopping, and work areas within the neighborhood planning area			
	FN-10	Ensure street design gives equal priority to pedestrians and automobiles			
	FN-11	Recognize bike routes and greenways in neighborhoods at the time of development			
	POLICIES FOR EXISTING COMMERCIAL AREAS		**YES**	**NO**	**NA**
	EC-1	Encourage appropriate landscaping and reconfiguration of large, existing unlandscaped parking areas.			
	EC-2	Encourage the provision of convenience clusters for pedestrians, bicyclists and future transit services at strategic locations in existing commercial areas			
	EC-3	Encourage the consolidation of commercial driveways onto major streets and the connection of adjacent parking lots			
	EC-4	Encourage businesses to replace existing, non-conforming signage with more attractive, conforming signage.			
	EC-5	Encourage new infill development across the front street face of existing, over-designed parking lots			
	EC-6	Continue to prohibit billboards within the planning jurisdiction of Wake Forest			
	EC-7	Ensure bicycle and pedestrian access to existing commercial areas			
	POLICIES FOR FUTURE LARGE-SCALE COMMERCIAL AREAS		**YES**	**NO**	**NA**
	LSC-1	Encourage large-scale commercial developments where appropriate, to contain a diverse mixture of retail, office, restaurant and service uses			
	LSC-2	Locate large-scale commercial uses on the corners of neighborhood planning areas, that is, at the intersection of two or more major streets			
	LSC-3	Allow planned mixed-use developments which allow for a compatible mixture of residential and non-residential uses with a pedestrian scale and design should be encouraged			
	LSC-4	In planning for a new large scale development, buffer large-scale uses from adjacent residential areas by smaller scale buildings or by buffer strips			
	LSC-5	Except for limited access highways, pull up new commercial buildings to the street; parking should be placed to the rear or side of the structure			
	LSC-6	When appropriate, require the use of all around architecture (high quality facades on all sides of a building)			
	LSC-7	Plan ahead for new large-scale commercial development in regards to future public transit stops and convenience clusters			
	LSC-8	Limit driveway access for new large-scale commercial development to major thoroughfares and connect all adjacent parking lots			
	LSC-9	Cluster together auto dealerships, large equipment sales and other businesses primarily dependent upon expansive outdoor sales lots for both functional and economic reasons			
	LSC-10	Strongly discourage the abandonment of “big box” retail stores, for the purpose of relocating to another “bigger box” location in the community			

	Community Plan Consistency Grid				
	POLICIES FOR SMALL SCALE NEIGHBORHOOD BUSINESSES		**YES**	**NO**	**NA**
	SSB-1	Encourage small scale, pedestrian-oriented shopping and work places in the design of new neighborhoods			
	SSB-2	Locate neighborhood businesses at center of planning area rather than major thoroughfares			
	SSB-3	Ensure neighborhood businesses are designed at a residential scale and character			
	SSB-4	Coordinate the location of neighborhood serving businesses with bikeways and, where appropriate, future transit stops			
	SSB-5	Employ on-street parking in coordination with a limited amount of off-street parking for neighborhood serving businesses			
	SSB-6	Ensure neighborhood businesses have residential scale signage and lighting			
	SSB-7	Ensure neighborhood businesses encouraged as upfront infrastructure cost of new development			
	SSB-8	Ensure neighborhood businesses locate near public amenities if opportunity allows			
	SSB-9	Encourage living quarters over small retail shops and offices			
	POLICIES FOR FIRST GENERATION BUSINESS AND INDUSTRIAL AREAS		**YES**	**NO**	**NA**
	FGI-1	Actively participate, facilitate and partner in the adaptive reuse and conversion of former production, warehousing and manufacturing buildings into uses compatible with their design and location			
	FGI-2	If the demolition of an old industrial building or complex becomes necessary, any new structure(s) and site redevelopment should be compatible with the neighborhood context; such redevelopment should serve to improve the quality, character and livability of the surrounding area			
	POLICIES FOR SECOND GENERATION BUSINESS AND INDUSTRIAL AREAS		**YES**	**NO**	**NA**
	SGI-1	Encourage and support the rehabilitation, improvement, and re-occupancy of viable business and industrial properties that have become vacant.			
	SGI-2	The Town of Wake Forest acknowledges and supports the work of state and federal agencies, as well as its own town building inspectors, concerning the enforcement of environmental regulations and building standards, particularly concerning the redevelopment or adaptive reuse of manufacturing sites and buildings			
	POLICIES FOR THIRD GENERATION BUSINESS AND INDUSTRIAL AREAS		**YES**	**NO**	**NA**
	TGI-1	Periodically examine zoning ordinance and other development regulations to maintain or update appropriate standards and locations for manufacturing, warehouse and distribution opportunities within the Town's planning jurisdiction			
	TGI-2	Employ industrial development performance standards to promote the establishment or expansion of industries that are compatible with the public health, safety, and welfare of area residents, and that are supportive of the long term economic prosperity and environmental quality of the community			
	TGI-3	Provide and maintain adequate screening and buffering between residential areas and newly developed industrial sites			
	TGI-4	Ensure industrial and warehouse sites located within view of a public right-of-way or nearby property provide landscaping that enhances the property and is consistent with a quality image			

Community Plan Consistency Grid

	POLICIES FOR DOWNTOWN		**YES**	**NO**	**NA**
	D-1	Encourage a compatible, diverse mixture of retail, office, institutional, residential, dining, services, entertainment, and public open space in the downtown area			
	D-2	Recognize the advantages of clustering similar activities and development forms in appropriate parts of the downtown			
	D-3	Expand pedestrian oriented streetscape improvements, including wider sidewalks, street trees, decorative street lights, street furniture, and landscaping			
	D-4	Direct new and expanding businesses to compatible buildings and sites in or near the downtown area			
	D-5	Reserve ground floor space for retail uses with office and other uses on upper floors			
	D-6	Maintain a tangible presence and committment to the downtown through the location of the Town's major municipal offices there and encourage other local, state and federal government agencies to maintain similar commitments to the downtown			
	D-7	Continue to support the Wake Forest farmers market at the municipal parking lot in downtown Wake Forest			
	D-8	Continue to utilize the Renaissance Area Urban Code to ensure that development and redevelopment will be supportive of the architectural and historic context that is vital to the economic success of downtown Wake Forest			
	D-9	Encourage efforts to restore missing or underutilized street frontages, particularly on lots where previous buildings have been demolished and replaced with (oftentimes) surface parking			
	D-10	Locate parking lots to the side or behind buildings or in the interior of the block with off-street parking spaces for multi-family buildings being in the rear yard			
	POLICIES FOR PARKS, OPEN SPACE AND RECREATION		**YES**	**NO**	**NA**
	PR-1	In cooperation with private sector interests, develop a system of open space greenways and walking trails to connect to residential areas with, especially, schools and park facilities			
	PR-2	Include mini-parks in existing and proposed developments to meet the needs of small children and the elderly, and to encourage social interaction and mutual support among area families			
	PR-3	Locate parks in full view of residential/non-residential activity for security			
	PR-4	Provide funding to help demand for open space and recreation created by development			
	PR-5	Co-locate parks & recreation facilities with schools, utility companies, and federal, state and local government agencies			
	PR-6	Continue to seek efficiencies, cost savings, and quality services for park maintenance as the Town grows			
	PR-7	Continue to explore new opportunities for providing recreation programs with all available partners			
	POLICIES FOR MAJOR STREETS		**YES**	**NO**	**NA**
	S-1	Space major streets no more than 1 mile apart			
	S-2	Ensure access to undeveloped sections of major streets are from intersecting minor streets, rather than private driveways			
	S-3	Ensure minor streets intersect major streets regularly at approximately every 400 to 600 feet			
	S-4	Incorporate central medians into the design of new or improved major streets			
	S-5	Plant landscaping, and where possible, street trees in central medians of major streets			
	S-6	Plant and retain streetyard vegatation along major streets to soften and unify the streetscape			
	S-7	Ensure contrasting streetyards along major streets for change in visual character			
	S-8	Preserve and enhance natural, cultural and historic features along major streets			
	S-9	Ensure parking areas are screened from view within major street corridors			
	S-10	Employ special roadway overlay zoning to help implement corridor plans			
	S-11	Ensure road widenings and/or one-way pairs are avoided for streets where the original design intent and relationship to adjoining land uses was otherwise			

	Community Plan Consistency Grid				
	POLICIES FOR MINOR STREETS		**YES**	**NO**	**NA**
	S-12	Encourage street patterns that respond to site topography, accentuate focal points and interesting vistas, create interesting public spaces and intersections, and that are coordinated with the placement of significant structures or open spaces			
	S-13	Consider incorporation of medians in neighborhood axial streets			
	S-14	Create short blocks of 300-500 feet in length to allow for many alternative routes for walking and biking, as well as a beneficial network of local streets			
	S-15	Design street widths to fit the intended use of the street, corresponding to the traffic load and planned development types			
	S-16	Employ a fully-connected honeycomb of streets to promote convenient circulation within the neighborhood and provide for multiple, alternative outlets from the area to adjoining neighborhoods and major streets			
	S-17	Encourage on-street parking in compact neighborhoods			
	S-18	Utilize grass swales to capture runoff in conservation subdivisions			
	S-19	Ensure turning radius of corners at intersections are as small as possible to shorten the street crossing distance for pedestrians at intersections			
	S-20	Install traffic calming methods as necessary to enhance livability			
	POLICIES FOR SIDEWALKS		**YES**	**NO**	**NA**
	SW-1	Where no sidewalks are present, provide sidewalks in existing developed areas to connect residential areas to walkable pedestrian destinations			
	SW-2	Ensure sidewalks are required on both sides of the street in new developments when along thoroughfares and collectors, in multi-family developments, in “front porch” developments, and along local streets within walking distance of a major pedestrian trip attractor			
	SW-3	Ensure sidewalk widths correspond with anticipated pedestrian traffic volumes, adjoining land uses, and sidewalk activities with minimum sidewalk widths at 5 feet, or 6 feet if along the verge of a street			
	SW-4	Continue curb stamp installation and retrofit curb ramps in existing sidewalks			
	SW-5	Ensure crosswalks are plainly marked and well lit, especially where significant pedestrian activity is observed or expected			
	POLICIES FOR BIKEWAYS		**YES**	**NO**	**NA**
	B-1	The bicycle facility selection guide, as used by the Federal Highway Administration, shall be employed for determining the most suitable type of bicycle facility for any new or upgraded roads in Wake Forest			
	B-2	Facilitate bicycle and pedestrian way connections between neighborhoods, either by street or connecting path, to enable the effective use of local, minor streets for pedestrian and bicycle travel			
	B-3	Install striped bicylce lanes and appropriate signage along existing streets where called for in the Bicycle Plan			
	B-4	Install striped bicylce lanes and appropriate signage along new collector streets			
	B-5	Install bicycle-responsive signals at intersections where appropriate			
	B-6	Ensure all new public and private developments have bike parking and bicycle access			
	B-7	Examine all future road construction and improvements for bikeway feasibility and conformity with the Town of Wake Forest Bicycle Plan			
	B-8	Examine all future developments and site plans for bicycle compatibility and conformity with the town Bicycle Plan			
	B-9	Include bicycle facilities and their impacts in traffic impact analyses for new private developments			
	B-10	Establish and implement pedestrian and bicycle friendly schools zones around all schools			
	B-11	Ensure bicycle-related improvements are an integral component of the Town’s annual budget for public infrastructure investment			

Community Plan Consistency Grid

	POLICIES FOR GREENWAY TRAILS		**YES**	**NO**	**NA**
	GT-1	Continue to pursue a greenway trails system that connects residential areas with schools and park facilities			
	GT-2	Develop greenway trails in accordance with the environmental conditions of its corridor, its intended use for travel versus recreation, and the anticipated traffic volume of pedestrians and bicyclists			
	GT-3	Ensure greenway construction is treated as a normal element of infrastructure necessary to support new development			
	GT-4	Ensure greenway maintenance and safety in Town control after transfer from private control			
	POLICIES FOR PUBLIC TRANSPORTATION		**YES**	**NO**	**NA**
	PT-1	Support the successful operation and expansion of transit with compact, transit-compatible development patterns			
	PT-2	Require site planning that incorporates transit stops and convenience clusters			
	POLICIES FOR STREET TREES		**YES**	**NO**	**NA**
	ST-1	Prepare and maintain an official Street Tree Planting Master Plan			
	ST-2	Ensure consistent street tree species occur along certain sections of streets			
	ST-3	Ensure a diversity of street tree species Town wide with no single species comprising more than 10-15% of total trees			
	ST-4	Install regularly spaced street trees in central medians and frontage street medians			
	ST-5	Continue to require The planting or preservation of street trees of appropriate size and species			
	ST-6	Maximize available budget dollars for street tree master plan implementation			
	POLICIES FOR STREETLIGHTS		**YES**	**NO**	**NA**
	SL-1	Ensure streetlights are installed according to the design speed and/or intended use of the street or area they serve			
	SL-2	Periodically evaluate emerging lighting technologies for best color, brightness and energy efficiency			
	SL-3	Continue to develop and implement joint policies and standards for street light selection, installation, operation and maintenance in cooperation with Wake Electric and Duke/Progress Energy			
	SL-4	Ensure streetlights are installed on both sides of streets unless a newly approved street is planned from the outset to have a sidewalk on only one side			
	POLICIES FOR UTILITY POLES AND WIRES		**YES**	**NO**	**NA**
	UPW-1	Maintain a master plan for the undergrounding of utilities, with priority given to pre-determined areas			
	UPW-2	Ensure major town entrances and gateway corridors receive first priority for the undergrounding of overhead utilities			
	UPW-3	Ensure high visibility, pedestrian-oriented areas receive second priority for the undergrounding of overhead utilities			
	UPW-4	Ensure overhead utilities in other priority areas are placed underground or relocated as opportunities arise			
	POLICIES FOR WIRELESS TELECOMMUNICATION FACILITIES		**YES**	**NO**	**NA**
	WTF-1	Facilitate the development of wireless service technology as an economic development asset and significant benefit to the town and its residents			
	WTF-2	Ensure the impacts of wireless telecommunication facilities should not be permitted to compromise the health, safety and public welfare of area residents; nor should such facilities be allowed to diminish the character of the community and visual quality of its environment			
	WTF-3	Ensure that in residential areas, historic districts and the Renaissance districts, cell towers are only considered when there is no alternative for serving those areas and no other alternative wireless telecommunication structure can be utilized			
	WTF-4	Initiate updates to standards for wireless telecommunication facilities as new technologies and structural requirements for wireless capabilities emerge over time			

	Community Plan Consistency Grid				
	POLICIES FOR TOWN AND SPECIAL AREA ENTRANCES		**YES**	**NO**	**NA**
	TSE-1	Employ noticeable streetscape improvements to clearly announce a town entrance and to enhance gateway corridors			
	TSE-2	Extend streetscape improvements as the Town limits expand			
	TSE-3	Employ special “gateway” treatment where where a bridge, underpass, overpass or other roadway feature is located at an entry point to the town or some portion of it			
	POLICIES FOR COMMUNITY CHARACTER		**YES**	**NO**	**NA**
	CC-1	Employ architectural standards consistent with Wake Forest’s architectural character for new, expanding, or improved businesses			
	CC-2	Exceptional locations, views and vistas in the town should receive exceptional treatment and/or protection in design and development			
	CC-3	Place noteworthy buildings, important outdoor spaces, objects of historic merit, important monuments, and significant works of art in positions of visibility and prominence			
	CC-4	Incorporate significant natural and existing man-made elements into the thematic design of new developments			
	CC-5	Save large trees, ponds, creeks, or other natural features of the landscape when locating new streets, buildings,parking lots, etc			
	CC-6	Support community character by ensuring development is compatible with surrounding area			
	CC-7	Ensure exterior lighting is attractive, functional and safety conscious, while also avoiding negative impacts on the night sky visibility of Wake Forest			
	POLICIES FOR REGIONAL TRANSPORTATION		**YES**	**NO**	**NA**
	RT-1	Continue to anticipate and plan for the impacts of new high speed rail service as it passes through Wake Forest en route to major urban centers north and south along the east coast			
	RT-2	Continue to anticipate and plan for the transformation of US 1 Capital Blvd into a limited access freeway and multi-modal transportation corridor as per the plans of the US 1 Corridor Study			
	RT-3	Support the express bus service between downtown Wake Forest and downtown Raleigh			
	POLICIES FOR WATER AND SEWER		**YES**	**NO**	**NA**
	WS-1	Work proactively with other local governments, utility service providers, and the State of North Carolina on regional, long term solutions for water supplies and sewage treatment			
	WS-2	Place water and sewer utilities in areas where growth is desired			
	WS-3	Avoid placing sewer utilities in environmentally sensitive areas or in areas where open space is desired			
	WS-4	Encourage the development of sewer services that employ water reuse technologoes			
	POLICIES FOR WATER CONSERVATION		**YES**	**NO**	**NA**
	WC-1	Conserve, to the fullest extent possible, potable water and waste water treatment capacity			
	WC-2	Employ other types of non-municipal water supplies such as wells, rainwater catching systems, rain barrels and in-ground cisterns			
	WC-3	Eliminate or reduce usage of the municipal water supply for outside irrigation			
	WC-4	Encourage new development to plant drought tolerant grasses on lawns			
	WC-5	Encourage construction of new rainwater retainage systems			
	WC-6	Encourage new development to include traditional plants native to the area			
	WC-7	Encourage the installation of water saving devices in new and existing development			

	Community Plan Consistency Grid				
	POLICIES FOR COMMUNITY ORIENTED SCHOOLS		**YES**	**NO**	**NA**
	S-1	Plan for new school locations in advance through joint collaboration between the Town and School Board — with emphasis on steering facilities to desirable growth areas and avoiding sprawl			
	S-2	Encourage offering land for new school facilities, particularly in conjunction with related neighborhood development			
	S-3	Design safe campuses with pedestrian access to adjoining neighborhoods			
	S-4	Prioritize traffic management and safety in the vicinity of public schools			
	S-5	Co-locate school facilities with other community facilities and services			
	S-6	Ensure costs for new schools should be borne largely by new growth and development creating the demand			
	S-7	Foster diversity in community-oriented public schools by encouraging diversity in nearby neighborhoods feeding each school			
	POLICIES FOR PAYING FOR GROWTH		**YES**	**NO**	**NA**
	PFG-1	Ensure the costs of infrastructure, facilities and services related to new growth and development should be borne primarily by those creating the demand			
	PFG-2	Continually seek to balance residential and non-residential development to foster a favorable service-cost to revenue-generated tax base			
	PFG-3	Fees charged by the Town for development reviews and inspections should approximate the actual costs to the Town of conducting such work			
	PFG-4	Explore cost recovery fees for new "greenfield" development			
	PFG-5	Undertake annual planning and budegting for capital facilities			
	POLICIES FOR A HEALTHY SUSTAINABLE ENVIRONMENT		**YES**	**NO**	**NA**
	HSE-1	Ensure development policies work to make Wake Forest more walkable and pedestrian-friendly, and less dependent on the single-occupant automobile			
	HSE-2	Encourage compact, transit-oriented, mixed-use developments to facilitate walking, biking and transit options			
	HSE-3	Locate new higher density residential development within walking distance of jobs and services and design it to be transit compatible with current and future transit services			
	HSE-4	Recognize and facilitate low impact development			
	HSE-5	Ensure runoff and drainage from development is of a quality and quantity as near to natural conditions as possible			
	HSE-6	Require vegetative riparian buffers along all creeks, rivers, lakes and other water bodies in Wake Forest			
	HSE-7	Encourage conservation subdivisions where site conditions call for minimizing environmental disturbance and protecting adjoining natural resources			
	HSE-8	Ensure large parking lots have landscaped planting islands and perimeter buffer strips and may use other design technologies to intercept and absorb runoff			
	HSE-9	Carefully control development activities in the special flood hazard areas			
	HSE-10	Encourage the construction of energy efficient structures, including the use of "green" building design			
	HSE-11	Ensure site plans for new development work sympathetically with the natural features of the land, including existing topography and significant existing vegetation			
	HSE-12	Explore a combination of incentives and disincentives to protect existing trees and/or require the replacement of trees removed for development			
	HSE-13	Encourage green infrastructure (grassed swales, rain gardens, bio-retention strips, cisterns, rain barrels, permeable pavements, etc.)			
	HSE-14	Offer a variety of solid waste reduction strategies and services including educational programs on waste prevention, recycling and reuse			
	HSE-15	Facilitate proper disposal of household hazardous waste materials			
	HSE-16	Encourage on-site residential composting			
	HSE-17	Continue off-site mulching and redistribution of landscape yard waste			
	HSE-18	Continue to support education and activities that reduce litter and illegal dumping			
	HSE-19	Continue to plan in advance for area requirements concerning solid waste collection and disposal			

	Community Plan Consistency Grid				
	POLICIES FOR ECONOMIC DEVELOPMENT		**YES**	**NO**	**NA**
	ED-1	Encourage new and expanding industries and businesses that are compatible with the long-term quality of the area's natural and cultural resources, match up well with the area's infrastructure and services, employ and develop the skills of area workers, and diversify the local economy			
	ED-2	Retain quality businesses and to attract new ones continue to invest in infrastructure and services that sustain and enhance the area's already high quality of life, image and cultural identity			
	ED-3	Pursue economic and business development partnerships between the Town, other local jurisdictions, other economic development organizations, and private companies			
	ED-4	Strive for a financial and regulatory environment that supports the establishment and growth of small business			
	ED-5	Develop real estate "product" suitable for business placement that focuses on the identification, enhancement and certification of buildings and sites readily available for construction and/or occupancy			
	POLICIES FOR ARTS CULTURE AND HISTORIC PRESERVATION		**YES**	**NO**	**NA**
	ACH-1	Encourage efforts and actively participate in the provision of indoor and outdoor public and private spaces to showcase the work of visual and performing artists in Wake Forest			
	ACH-2	Encourage new private sector developments to include art as an integral element of privately owned common areas and semi-public spaces			
	ACH-3	Ensure budgets for new construction and renovations of town buildings include a line item for the purchase and display of art			
	ACH-4	Continue to have cultural arts be enhanced as a permanent function of the Town's recreation program offerings			
	ACH-5	Employ design standards that ensure development and redevelopment is consistent with the architectural context, community character, economic attractiveness and livability of Wake Forest			
	ACH-6	Encourage the identification, restoration, and active use of structures, buildings, monuments, landmarks, sites and neighborhoods of historic or architectural significance			
	ACH-7	Strongly discourage the destruction of architectural, historic, and archealogical resources of Wake Forest			
	POLICIES FOR PUBLIC SAFETY		**YES**	**NO**	**NA**
	PS-1	Employ community education, school, and public involvement programs to enhance community awareness of public safety issues			
	PS-2	Periodically review the need for additional paid personnel, capital improvements and equipment needs to meet or exceed public safety standards, insurance ratings and other measures of public safety			
	PS-3	Strategically locate additional public safety substations, provided that sufficient resources can be made available to properly staff and equip them			
	PS-4	Proactively support legislative efforts to strengthen local law enforcement tools			
	PS-5	Employ a holistic approach to public safety involving residents, businesses, and institutions in the preparation of neighborhood improvement plans, with priority given to public safety concerns			
	PS-6	Encourage excellence in law enforcement, fire protection, and emergency services through on-going education, training and participation in national accreditation programs			
	PS-7	Support the establishment of an east-west through street (or loop road) on the north side of town to improve emergency access to locations in that area			
	POLICIES FOR LEADERSHIP AND COMMUNITY INVOLVEMENT		**YES**	**NO**	**NA**
	LCI-1	Continue to emphasize the importance of advisory boards & committees in conducting the Town's business			
	LCI-2	Ensure boards and committees of the Town are representative of the population and geography of the planning area or subject matter being addressed			
	LCI-3	Encourage public involvement in decisions on land use and development by making the public aware of proposed developments at the earliest lawful opportunity, as well as fostering communication between developers and the general public			
	LCI-4	Encourage neighborhood and special area planning			
	LCI-5	Continue to ensure maintenance and enhancements to the Town's internet and multi-media news dissemination capabilities			
	LCI-6	Participate proactively in the cooperation of efforts among civic and volunteer organizations for maximum impact in the community			

May 2021





CARROLL JOYNER RESIDENTIAL

Traffic Impact Analysis

LOCATED IN WAKE FOREST, NC

Prepared for:

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394 Fleming Road
Youngsville, NC 28596

Prepared by:

Exult Engineering, PC
P.O. Box 99277
Raleigh, NC 27624

EXULT ENGINEERING

This document entitled Carroll Joyner Residential Traffic Impact Analysis was prepared by Exult Engineering, PC for the account of Dr. E. Carroll Joyner. The material in it reflects Exult Engineering's best judgement in light of the information available to them at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Exult Engineering, PC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Carroll Joyner Residential Traffic Impact Analysis

Prepared by: _____ (sign)

Date: 5-24-2021

Lisa Lundeen, PE

Reviewed by: _____ (sign)

Date: 5-24-21

Brittany Chase, PE

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5-24-21

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EXECUTIVE SUMMARY

The proposed 131.65-acre site is situated on the west side of Capital Boulevard south of Purnell Road in Wake Forest, North Carolina. The property is currently zoned as General Residential 3 Planned Unit Development (GR3 PUD). The proposed development consists of 168 single family residential units, 137 residential townhomes, and 90 senior adult detached residential units and does require rezoning to the GR-10 Conditional District. The proposed site is to be developed within six years by the year 2027. The proposed development will be accessed via connectivity to the existing Club Villas Drive and the existing Country Club Drive, both of which currently provide full movement access to Capital Boulevard. The western portion of the site will serve the senior adult detached residential units and will have access to Purnell Road via connectivity to Simpson Court. The purpose of this TIA is to analyze the potential traffic impacts of the proposed development on the surrounding roadway network and to identify any roadway improvements necessary to mitigate the impact of the project traffic.

A TIA Scoping Meeting was held on Tuesday, April 6, 2021 and a follow-up Memorandum of Understanding was prepared and submitted to the Town of Wake Forest and North Carolina Department of Transportation (NCDOT). The MOU and subsequent correspondence regarding the scope of the TIA is included in the Appendix of this report. The *NCDOT Congestion Management Capacity Analysis Guidelines* were referenced to perform this traffic study.

As determined by the Town of Wake Forest and NCDOT, the study area includes:

1. Purnell Road and Hogan Drive
2. Capital Boulevard and Purnell Road/Harris Road
3. Capital Boulevard and Club Villas Drive
4. Capital Boulevard and Country Club Drive/Templeridge Road
5. Capital Boulevard and Jenkins Road/Stadium Drive

The proposed development is expected to generate 3,186 daily trips, 228 AM peak hour trips (59 entering, 169 exiting), and 292 PM peak hour trips (183 entering, 109 exiting).

Based on coordination with the Town, a 3% annual growth rate was applied to the existing traffic volumes to determine 2027 background traffic volumes. Approved developments are developments in the area of the proposed site that have been approved but not yet constructed. The traffic from these approved developments is expected to contribute to the background traffic volumes projected for the study intersections. According to the Town and NCDOT, the following approved developments were to be considered in the future year analysis scenarios:

1. Devon Square - 135 single family homes and 150 townhomes located on the east side of Capital Boulevard to the south of Harris Road in Wake Forest with an anticipated buildout year of 2022.
2. Glen Oaks – 225 single family homes and 73 townhomes located on the east side of Capital Boulevard to the north of Wall Road in Wake Forest with an anticipated buildout year of 2022.

To determine the traffic impacts of the proposed development, capacity analyses were performed at the study intersections under the following scenarios:

- Existing (2021) Traffic Conditions
- No-Build (2027) Traffic Conditions

- Buildout (2027) Traffic Conditions
- Buildout (2027) Traffic Conditions with Recommended Improvements

NCDOT and the Town have indicated there are no roadway improvements committed to by others to include in the future analysis for the study intersections.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed **by the developer** to accommodate project traffic:

U.S. 1/Capital Boulevard at Club Villas Drive:

- Stripe the existing eastbound approach of Club Villas Drive to provide two egress lanes on the stem that exists between Capital Boulevard and Wake Union Church Road.

In addition to the improvement listed above, the Town of Wake Forest is requiring the developer to construct the service road along Capital Boulevard within the site in accordance with the Town of Wake Forest's *Comprehensive Transportation Plan*. The service road will provide connectivity when Capital Boulevard is upgraded to a controlled-access facility (NCDOT TIP# U-5307).

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

June 1, 2021

Toll Brothers - Carroll Joyner Residential

Traffic Impact Analysis Review Report

Congestion Management Section

TIA Project: SC-2021-119
Division: 5
County: Wake



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Toll Brothers - Carroll Joyner Residential

SC-2021-119	Wake Forest	Wake County

Per your request, the Congestion Management Section (CMS) of the Transportation Mobility and Safety Division has completed a review of the subject site. The comments and recommendations contained in this review are based on data for background conditions presented in the Traffic Impact Analysis (TIA) and are subject to the approval of the local District Engineer's Office and appropriate local authorities.

Date Initially Received by CMS	05/03/21	Date of Site Plan	N/A
Date of Complete Information	05/03/21	Date of Sealed TIA	05/03/21

Proposed Development

The TIA assumes the development is to be completed by 2027 and consist of the following:

Land Use	Land Use Code	Size
Single Family	210	168 d.u.
Multi-Family Housing (Low-Rise)	220	137 d.u.
Senior Adult Housing	251	90 d.u.

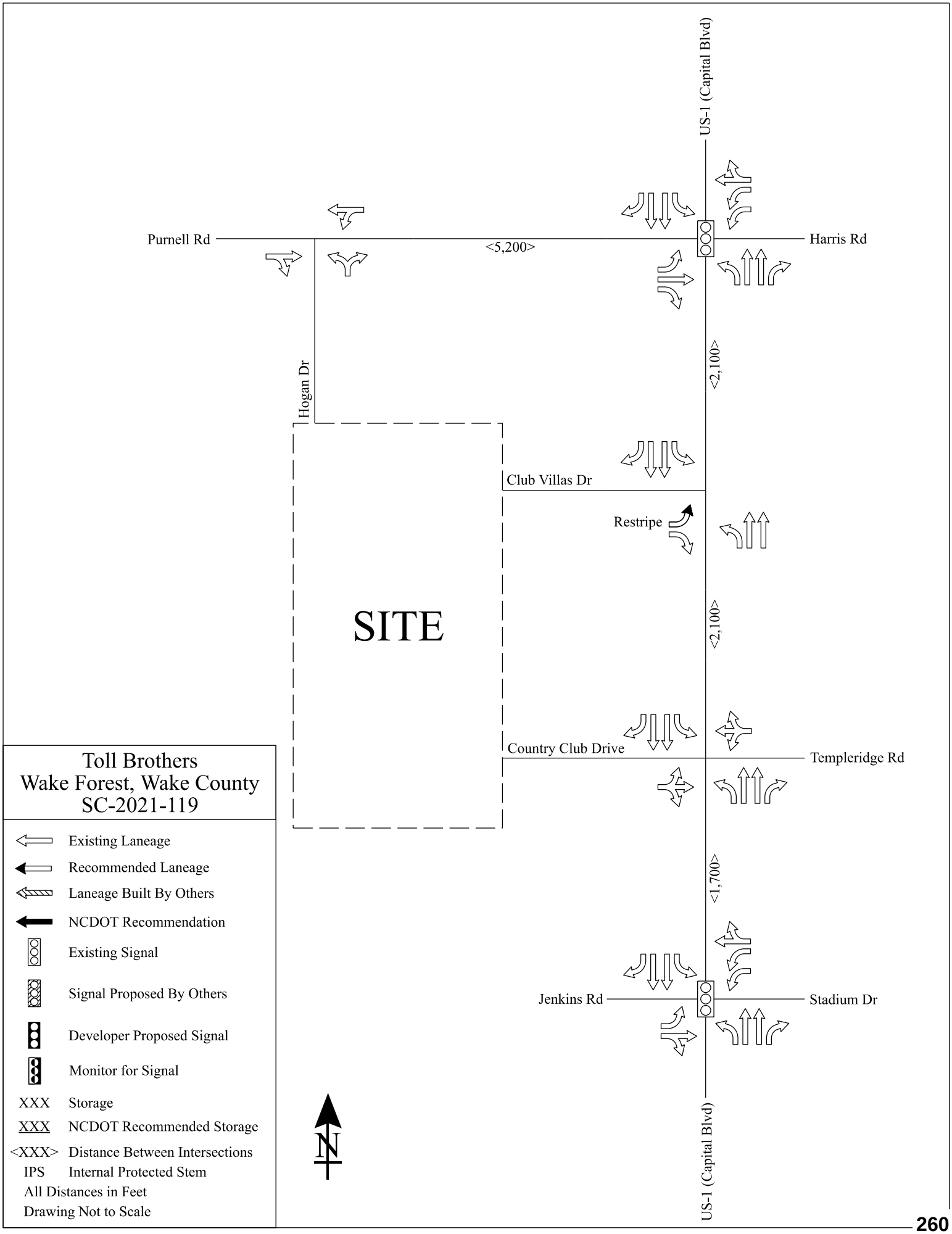
Trip Generation - Unadjusted Volumes During a Typical Weekday

	IN	OUT	TOTAL
AM Peak Hour	59	169	228
PM Peak Hour	183	109	292
Daily Trips			3,186

General Reference

For reference to various documents applicable to this review please reference the following link: *http://www.ncdot.org/doh/preconstruct/traffic/teppl/Topics/C-37/C-37.html*

Once the driveway permit has been approved and issued, a copy of the final driveway permit requirements should be forwarded to this office. If we can provide further assistance, please contact the Congestion Management Section.



Toll Brothers
Wake Forest, Wake County
SC-2021-119

- Existing Laneage
- Recommended Laneage
- Laneage Built By Others
- NCDOT Recommendation
- Existing Signal
- Signal Proposed By Others
- Developer Proposed Signal
- Monitor for Signal
- XXX Storage
- XXX NCDOT Recommended Storage
- <XXX> Distance Between Intersections
- IPS Internal Protected Stem
- All Distances in Feet
- Drawing Not to Scale

JOYNER PROPERTY

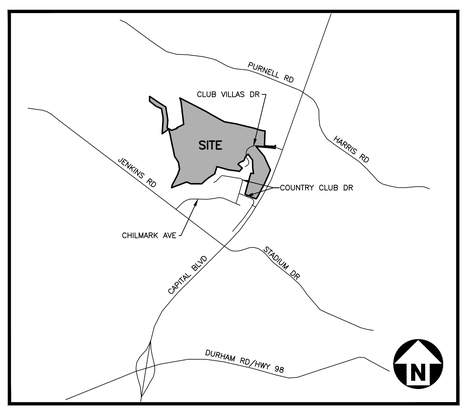
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA
MASTER SITE PLAN

PROJECT NUMBER: 2021110197
DATE: SEPTEMBER 07, 2023

TOWN OF WAKE FOREST
PROJECT #SP-21-02
REZONING CASE #RZ-21-08

SITE DATA

PIN	1831895139 (PORTION OF); 1841091336	
REAL ESTATE ID	0132708; 0338557	
SITE AREA	5,430,882 SF (124.68 AC) - GROSS 68,917 SF (1.58 AC) - R/W DEDICATION 5,361,965 SF / 123.10 AC - NET	
EXISTING ZONING	GR3-PUD	
PROPOSED ZONING	GR-10-CD	
WATERSHED OVERLAY	FALLS LAKE WATERSHED MANAGEMENT AREA DISTRICT (FL-WMA)	
WATER SUPPLY WATERSHED	FALLS LAKE	
RIVER BASIN	NEUSE	
COMMUNITY PLAN DESIGNATION	GENERAL URBAN	
EXISTING USE	VACANT, GOLF COURSE	
PROPOSED USE	176 SINGLE FAMILY UNITS, 113 TOWNHOME UNITS (289 UNITS TOTAL)	
MAXIMUM UNITS ALLOWED	448 UNITS	
DENSITY	MAXIMUM	3 DU/AC
	PROPOSED	289 UNITS / 149.66 AC = 1.93 DU/AC
BUILDING HEIGHT	MAXIMUM	3 STORIES
	PROPOSED	2 STORIES
SETBACKS	REQUIRED	TRADITIONAL SINGLE FAMILY DWELLING FRONT: 20' SIDE: 5' CORNER: 8' REAR: 25' REAR LOADED SINGLE FAMILY DWELLING FRONT: 5' SIDE: 5' CORNER: 8' REAR: 5' REAR LOADED TOWNHOME DWELLING FRONT: 10' SIDE: 5' CORNER: 8' REAR: 25'
PARKING	REQUIRED	289 UNITS x 1.8/UNIT = 520 SPACES
	PROPOSED	116 SPACES (SURFACE PARKING, PARKING LOTS) 578 SPACES (DRIVEWAYS, GARAGES) TOTAL SPACES: 694
ACCESSIBLE PARKING	REQUIRED	694 SPACES x 2% = 14 SPACES (2 VAN)
	PROPOSED	15 SPACES (15 VAN)
BICYCLE PARKING	REQUIRED	694 SPACES x 2/40 VEHICLE SPACES = 35 SPACES 289 UNITS x 1/30 UNITS = 10 SPACES
	PROPOSED	444 TOTAL SPACES 46 SPACES (13 SPACES FOR PARK SPACE AREA)
IMPERVIOUS AREA	PROPOSED	35% (OF TOTAL PROJECT AREA)
IMPERVIOUS AREA ALLOWED	WEST OF HORSE CREEK: 70% HIGH DENSITY OPTION EAST OF HORSE CREEK: 70% HIGH DENSITY OPTION	
EXISTING CONSERVATION EASEMENT AREA	450,841 SF (10.35 AC) PER WAKE COUNTY REGISTER OF DEEDS BOOK: BM2003; PAGE: 02044	
TREE COVERAGE	SEE CALCULATIONS SHEET L5.11	
FLOODPLAIN	THIS SITE IS IN A SPECIAL FLOOD HAZARD AREA PER FEMA MAPS 3720183200K DATED 04/16/2013 AND 3720183100J DATED 05/02/2006	
PROPOSED SCMs	4	
EXISTING SCMs	4 (NOT TO BE USED AS SCMs)	
OPEN SPACE (UNIMPROVED)	REQUIRED	5,430,882 SF x 10% = 543,088 SF
	PROPOSED	2,188,322 SF (40.29%)
OPEN SPACE W/IN:	TREE SAVE	1,004,444 SF (45.9%)
	REFORESTATION	63,901 SF (2.92%)
	CONSERVATION ESMTS	0 SF (EXCLUDED)
OPEN SPACE OUTSIDE OF FLOOD HAZARD, WATERCOURSES, AND WATERSHED BUFFERS	REQUIRED	2,188,322 SF x 25% = 54,708 SF
	PROPOSED	1,119,977 SF (51.18%)
PARK SPACE	REQUIRED	5,430,882 SF x 2.5% = 135,772 SF
	PROPOSED	275,886 SF (5.0%)
	ACTIVE REQUIRED	68,971 SF (25% PARK SPACE)
	ACTIVE PROPOSED	82,881 SF (30.04%)
PARK SPACE OUTSIDE OF PONDS, LAKES, WETLANDS, AND POWER EASEMENTS	REQUIRED	275,886 SF x 50% = 91,306 SF
	PROPOSED	275,886 SF (100%)



VICINITY MAP
N.T.S.

PROPOSED JOYNER PROPERTY ZONING CONDITIONS

1. SITE MASTER PLAN (SP-21-02) IS A CONDITION OF THE REZONING REQUEST. AMENDMENTS OF THE MASTER PLAN SHALL REQUIRE A REZONING AMENDMENT UNLESS THE ADMINISTRATOR FINDS THE MODIFICATION TO BE MINOR AND IN KEEPING WITH THE SPIRIT AND INTENT OF THE ADOPTED SUBDIVISION MASTER PLAN.

2. THE DEVELOPMENT SHALL HAVE A MAXIMUM DENSITY OF 3 UNITS PER ACRE.

3. VINYL SIDING SHALL NOT BE PERMITTED; HOWEVER, VINYL WINDOWS, DECORATIVE ELEMENTS, AND TRIM ARE PERMITTED.

4. THE FOLLOWING SHALL APPLY TO ALL SINGLE-FAMILY DETACHED AND TOWNHOMES (EXCEPT FOR LOTS 157-182; 201-206), ANY EXTERIOR WALL OF A UNIT VISIBLE FROM A STREET SHALL CONTAIN AT LEAST THREE DECORATIVE ELEMENTS SUCH AS, BUT NOT LIMITED TO, THE FOLLOWING ELEMENTS:
a. BAY WINDOW;
b. RECESSED WINDOW;
c. DECORATIVE WINDOW;
d. SIDE PORCH;
e. TWO OR MORE BUILDING MATERIALS;
f. DECORATIVE BRICK OR STONE;
g. DECORATIVE TRIM;
h. DECORATIVE SHAKE;
i. DECORATIVE GABLE;
j. DECORATIVE CORNICE;
k. PORTICO;
l. DORMER.

5. TOWNHOMES IN THE AREA NUMBERED 157-182; 201-206 WITHIN THE MASTER PLAN SHALL BE SUBJECT TO THE FOLLOWING ARCHITECTURAL CONDITIONS:
a. END UNITS SHALL BE AT LEAST 34' WIDE. INTERIOR UNITS SHALL BE AT LEAST 28' WIDE.
b. EACH UNIT SHALL HAVE AT LEAST A 2-CAR GARAGE.
c. EACH UNIT SHALL BE ACCESSED OFF A REAR ALLEY.
d. NO UNIT SHALL EXCEED TWO FULL STORIES IN HEIGHT.
e. EACH UNIT SHALL CONTAIN A MINIMUM OF 1,600 SQUARE FEET OF LIVABLE SPACE. THE ACTUAL NUMBER OF UNITS AND LOCATION WILL BE FINALIZED DURING THE CONSTRUCTION DRAWING PROCESS.
f. ANY EXTERIOR WALL FRONTING A STREET SHALL CONTAIN AT LEAST 3 DECORATIVE ELEMENTS SUCH AS, BUT NOT LIMITED TO, THE FOLLOWING:
- BAY, RECESSED, OR DECORATIVE WINDOW.
- 3.5" MINIMUM TRIM AROUND WINDOWS.
- SHUTTERS.
- BALCONY.
- PORCH, COVERED STOOP, OR PORTICO. ALL WILL BE A MINIMUM OF 5' IN DEPTH.
- DECORATIVE TRIM.
- BRICK OR STONE COVERING THE FIRST FLOOR (TO INCLUDE EXPOSED FOUNDATION), PATTERNED FINISH (SCALES, WAINSCOTTING, ETC.) FOR SECOND FLOOR AND WALLS NOT FACING THE STREET.
- ROOF ELEMENT (DORMER, TURNED GABLE, CUPOLA). ROOF SHALL NOT VISUALLY REPRESENT ONE LONG SINGLE GABLE.
g. EXTERIOR WALL MATERIALS SHALL BE SOLELY OR A COMBINATION OF; WOOD CLAPBOARD; CEMENTITIOUS FIBER BOARD SIDING; SHINGLE/SHAKE; OR BOARD AND BATTEN; BRICK; AND CULTURED OR NATURAL STONE.
h. VINYL SIDING WILL NOT BE ALLOWED. VINYL WINDOWS, DECORATIVE ELEMENTS, TRIM, AND SOFFITS SHALL BE PERMITTED.
i. EACH BUILDING SHALL INCLUDE A MINIMUM OF PREDOMINANT COLORS/(EXCLUDING TRIM COLORS). NO TWO ADJACENT UNITS SHALL HAVE THE SAME PREDOMINANT COLORS. FRONT DOORS SHALL BE AN ACCENT COLOR DIFFERENT THAN THE PREDOMINANT UNIT COLOR. IN ADDITION, FRONT DOORS SHALL HAVE EITHER A TRANSOM OVER THE DOOR, A SIDELIGHT OR A GLASS DOOR INSERT.
j. ALL FRONT ENTRANCES SHALL BE RAISED FROM THE FINISHED GRADE (AT THE RIGHT-OF-WAY LINE) A MINIMUM OF ONE INCHES AND ANY EXPOSED FOUNDATION ON THE FRONT OF THE UNITS SHALL BE BRICK OR STONE.

k. ROOF MATERIALS SHALL BE COMPRISED OF ASPHALT SHINGLES. STANDING SEAM METAL ROOFS SHALL BE PERMITED ON PORCH ROOFS OR COVERED FRONT ENTRY ONLY.

l. FRONT EAVES SHALL PROJECT AT LEAST 2 INCHES FROM THE WALL OF THE STRUCTURE, SIDE EAVES SHALL PROJECT A MINIMUM OF 8 INCHES FROM THE WALL OF THE STRUCTURE. EAVES WILL BE ALLOWED TO ENCROACH INTO SETBACKS AS ALLOWED IN THE UDO.

6. A VARIED COLOR PALETTE SHALL BE UTILIZED ON BUILDINGS THROUGHOUT THE DEVELOPMENT TO INCLUDE A MINIMUM OF THREE COLOR FAMILIES FOR SIDING AND SHALL INCLUDE VARIED TRIM, SHUTTER, AND ACCENT COLORS COMPLIMENTING THE SIDING COLOR.

7. TRADITIONAL BUILDING SETBACKS AS OUTLINED IN TABLE 2.2.5. C. SHALL NOT BE APPLICABLE TO BUILDINGS SHOWN WITHIN THIS DEVELOPMENT. YARD REQUIREMENTS SHALL BE REQUIRED PER THE SITE DATA TABLE. SETBACKS AS SHOWN IN THE SITE DATA TABLE ARE AS FOLLOWS:

TRADITIONAL SINGLE FAMILY DWELLING (MINIMUM)		REAR LOADED SINGLE FAMILY DWELLING (MINIMUM)		REAR LOADED TOWNHOME DWELLING (MINIMUM)	
FRONT:	20'	FRONT:	5'	FRONT:	10'
SIDE:	5'	SIDE:	5'	SIDE:	5'
CORNER:	8'	CORNER:	8'	CORNER:	8'
REAR:	25'	REAR:	5'	REAR:	25'

8. FOR SINGLE FAMILY AND TOWNHOME DWELLINGS, AT LEAST 15% OF AREA OF EACH FAÇADE THAT FACES A STREET LOT LINE MUST BE WINDOWS OR MAIN ENTRANCE DOORS, AS MEASURED FROM THE FINISHED FLOOR ELEVATION TO THE EAVE.

9. ROOF MATERIALS: RESIDENTIAL ROOFS SHALL BE CLAD IN WOOD SHINGLES, STANDING SEAM METAL (PORCH ROOF OR COVERED ENTRY ONLY), TERNE, SLATE, ASPHALT SHINGLES, OR SYNTHETIC MATERIALS SIMILAR AND/OR SUPERIOR IN APPEARANCE AND DURABILITY, THE PRIMARY MATERIALS USED FOR ROOFS SHOULD REFLECT THE CONTEXT OF THE SURROUNDING AREA OR NEIGHBORHOOD.

10. ALL RESIDENTIAL LOTS WEST OF HORSE CREEK SHALL HAVE A MINIMUM LOT SIZE OF 30,000 SQUARE FEET.

11. IN ACCORDANCE WITH RESTRICTIVE CONVENANTS RECORDED IN WAKE COUNTY REGISTRY AT BOOK 4662, PAGE 0366, ADJCENT TO WAKE COUNTY PINS: 1832706809 AND 1832707851 A 160' BUFFER ZONE SHALL BE ESTABLISHED; ADJACENT TO WAKE COUNTY PINS: 1832709714 AND 1832800697 A 120' BUFFER ZONE SHALL BE ESTABLISHED.

12. AS NECESSARY TO MINMIZE ENVIRONMENTAL IMPACTS AND MAXIMIZE DEVELOPABLE AREA, "SIMPSON COURT" MAY EXCEED MAXIMUM BLOCK LENGTH REQUIREMENTS (SECTION 6.5.1.C).

13. DUE TO PRESCRIBED ALIGNMENT OF THE PROPOSED SERVICE ROAD, THE REQUIRED STREET BUFFERYARD SHALL BE REDUCED FROM 30' TO 10'. (SECTION 2.4.3.C.).

14. THE BUILDING SETBACK SHALL BE REDUCED FROM 100' TO 75' FROM THE PROPERTY LINE ABUTTING THE MAJOR ACCESS CORRIDOR (US-1 ROW) (SECTION 2.4.3. D.).

15. DEVELOPED PASSIVE PARK SAPCES SHALL CONTAIN A MINIMUM OF 3 OF THE FOLLOWING ELEMENTS, BUT NOT LIMITED TO: WALKING TRAILS; BUTTERFLY/POLLINATOR GARDENS; CUT FLOWER GARDENS; COMMUNITY GARDEN; DOG PARK; HAMMOCK LOUNGE; FIREPITS; CORNHOLE. THE PARK SPACES PROVIDED IN THE DEVELOPMENT SHALL BE A MINIMUM OF 2,000 SQUARE FEET.

16. DEVELOPED ACTIVE PARK SPACES SHALL CONTAIN A MINIMUM OF 3 OF THE FOLLOWING ELEMENTS, BUT NOT LIMITED TO: CLUBHOUSE; SWIMMING POOL; FITNESS CENTER; PLAYGROUND; VOLLEYBALL COURT; TENNIS/PICKLEBALL COURT. THE PARK SPACES PROVIDED IN THE DEVELOPMENT SHALL BE A MINIMUM OF 2,000 SQUARE FEET.

17. PARK #1 AS SHOWN WITHIN THE MASTER PLAN, SHALL BE CONSTRUCTED BY THE DEVELOPER AND THEN CONVEYED BY NON-WARRANTY THE FAIRWAY VILLAS AT WAKE FOREST GOLF CLUB AND CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB TOWNHOMES OWNERS ASSOCIATION, INC. THIS PARK SHALL NOT BE LESS THAN 90,000 SQUARE FEET IN SIZE. A MINIMUM OF THREE DECORATIVE BENCHES WILL BE INSTALLED IN THE PARK. A BERM AT LEAST 4' IN HEIGHT AND LANDSCAPED WITH A TOWN OF WAKE FOREST UDO TYPE A LANDSCAPE BUFFER (USING OPTION #2) SHALL BE INSTALLED ADJACENT TO THE PROPOSED SERVICE ROAD DEPICTED WITHIN THE MASTER PLAN THAT BORDER SAID PARK. PIN OAKS AND MAGNOLIAS SHALL BE PROHIBITED FROM THE BUFFER. SHRUBS ARE NOT BE EVERGREENS AND NON-FLOWERING. SECTION 7.5.5.A. SHALL BE PROVIDED EXCEPT FOR TRASH AND RECYCLING BINS IN SECTION 7.5.5.A.3.

18. THERE WILL NO NEW DEVELOPMENT SOUTH OF THE THREE EXISTING PONDS. THE LAND WILL REMAIN IN ITS CURRENT STATE AS A COMMUNITY OPEN SPACE. THE LAND SHALL BE DEEDED PRIOR TO FIRST PLAT APPROVAL, TO THE TOWN COUNTY, STATE, NON-PROFIT ORGANIZATION (UNAFFILIATED WITH THE DEVELOPER) OR HOA.

19. PRIOR TO ISSUANCE OF A GRADING PERMIT, THE DEVELOPER SHALL BE REQUIRED TO CONDUCT A PHASE 2 ENVIRONMENTAL SITE ASSESSMENT FOR THE ENTIRE TRACT. THE DATA FROM THE PHASE 2 ENVIRONMENTAL SITE ASSESSMENT SHALL BE SUBMITTED TO THE TOWN FOR REVIEW WITH INITIAL SUBMITTAL OF CONSTRUCTION DRAWINGS TO THE TOWN.

20. AT THE TIME OF INITIAL CONSTRUCTION DRAWING APPROVAL, THE DEVELOPER SHALL BE REQUIRED TO REQUEST THAT THE TOWN OF WAKE FOREST AND NCDOT DESIGNATE COUNTRY CLUB DRIVE AS "ONE WAY" ALONG THE EAST-WEST SEGMENT TO THE INTERSECTION WITH THE PROPOSED STREET "H" TO PROHIBIT ACCESS TO CHILLMARK AVENUE DIRECTLY FROM THE PROPOSED DEVELOPMENT OR THE PROPOSED SERVICE ROAD. THIS CONDITION SHALL BE SATISFIED UPON THE MAKING OF THE REQUEST REGARDLESS OF WHETHER SUCH REQUEST IS GRANTED.

21. A 20' TYPE B PERIMETER BUFFER SHALL BE PROVIDED AND SHALL BE PLANTED IN ACCORDANCE WITH LANDSCAPE DETAILS ONLY AS ALLOWED ON SHEET LS 5.00 WITHIN THE MASTER PLAN.

22. IN ORDER TO NOT INTERFERE WITH THE EXISTING BERM AND LANDSCAPING BETWEEN CLUB VILLAS DRIVE AND THE EXISTING TOWNHOMES; THE SIDEWALK, CURB, AND/OR UPGRADES MAY BE WAIVED ON THE SOUTH SIDE OF CLUB VILLAS DRIVE. THE DETERMINATION OF REQUIREMENTS SHALL BE MADE BY THE TOWN OF WAKE FOREST PLANNING DEPARTMENT AT TIME OF CONSTRUCTION PLANS.

23. IF ANY OF THE EXISTING PONDS ADJACENT TO LOTS 45-62 ARE DRAINED TAND ARE NOT RE-ESTABLISHED, THE ADJACENT PROPOSED LOTS TO THE NORTH WILL BE ALLOWED TO REMAIN AS SHOWN ON THE MASTER PLAN. IF THE EXISTING PONDS ARE NOT DRAINED, THE ADJACENT PROPOSED LOTS TO THE NORTH WILL EITHER BE ELIMINATED OR REVISED TO ENSURE THAT THE REQUIRED 100-FOOT BUFFER IS NOT ON ANY OF THE SINGLE-FAMILY DETACHED LOTS.

24. IF NCDOT DEEMS THAT THE EXISTING NORTHBOUND LEFT TURN MOVEMENT FROM CLUB VILLAS DRIVE TO CAPITAL BOULEVARD IS TO BE ELIMINATED, IN ORDER TO FACILITATE THIS DEVELOPMENT'S TRAFFIC TO PROCEED NORTHBOUND ON CAPITAL BOULEVARD, SUBJECT TO NCDOT APPROVAL AND ADEQUATE EXISTING RIGHT-OF-WAY, THE DEVELOPER SHALL SUBMIT CONSTRUCTION PLANS FOR THE U-TURN TO NCDOT WHEN ON-SITE CONSTRUCTION PLANS ARE SUBMITTED TO THE TOWN. CONSTRUCTION OF THE U-TURN WILL BE STARTED WITHIN 90 DAYS AND COMPLETED WITHIN ONE YEAR OF NCDOT APPROVAL OF THE U-TURN CONSTRUCTION PLANS.

CITY OF RALEIGH PUBLIC UTILITIES STANDARD UTILITY NOTES (AS APPLICABLE)

1. ALL MATERIALS & CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH CITY OF RALEIGH DESIGN STANDARDS, DETAILS & SPECIFICATIONS (REFERENCE: CORPUD HANDBOOK, CURRENT EDITION).

2. UTILITY SEPARATION REQUIREMENTS:

a) A DISTANCE OF 100' SHALL BE MAINTAINED BETWEEN SANITARY SEWER & ANY PRIVATE OR PUBLIC WATER SUPPLY SOURCE SUCH AS AN IMPOUNDED RESERVOIR USED AS A SOURCE OF DRINKING WATER. IF ADEQUATE LATERAL SEPARATION CANNOT BE ACHIEVED, FERROUS SANITARY SEWER PIPE SHALL BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS. HOWEVER, THE MINIMUM SEPARATION SHALL NOT BE LESS THAN 25' FROM A PRIVATE WELL OR 50' FROM A PUBLIC WELL.

b) WHEN INSTALLING WATER &/OR SEWER MAINS, THE HORIZONTAL SEPARATION BETWEEN UTILITIES SHALL BE 10'. IF THIS SEPARATION CANNOT BE MAINTAINED DUE TO EXISTING CONDITIONS, THE VARIATION ALLOWED IS THE WATER MAIN IN A SEPARATE TRENCH WITH THE ELEVATION OF THE WATER MAIN AT LEAST 18" ABOVE THE TOP OF THE SEWER & MUST BE APPROVED BY THE PUBLIC UTILITIES DIRECTOR. ALL DISTANCES ARE MEASURED FROM OUTSIDE DIAMETER TO OUTSIDE DIAMETER.

c) WHERE IT IS IMPOSSIBLE TO OBTAIN PROPER SEPARATION, OR ANYTIME A SANITARY SEWER PASSES OVER A WATERMAIN, DIP MATERIALS OR STEEL ENCASEMENT EXTENDED 10' ON EACH SIDE OF CROSSING MUST BE SPECIFIED & INSTALLED TO WATERLINE SPECIFICATIONS.

d) 5.0' MINIMUM HORIZONTAL SEPARATION IS REQUIRED BETWEEN ALL SANITARY SEWER & STORM SEWER FACILITIES, UNLESS DIP MATERIAL IS SPECIFIED FOR SANITARY SEWER.

e) MAINTAIN 18" MIN. VERTICAL SEPARATION AT ALL WATERMAIN & RCP STORM DRAIN CROSSINGS; MAINTAIN 18" MIN. VERTICAL SEPARATION AT ALL SANITARY SEWER & RCP STORM DRAIN CROSSINGS. WHERE ADEQUATE SEPARATIONS CANNOT BE ACHIEVED, SPECIFY DIP MATERIALS & A CONCRETE CRADLE HAVING 6" MIN. CLEARANCE (PER CORPUD DETAILS W-41 & S-49).

f) ALL OTHER UNDERGROUND UTILITIES SHALL CROSS WATER & SEWER FACILITIES WITH 18" MIN. VERTICAL SEPARATION REQUIRED.

3. ANY NECESSARY FIELD REVISIONS ARE SUBJECT TO REVIEW & APPROVAL OF AN AMENDED PLAN &/OR PROFILE BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT PRIOR TO CONSTRUCTION.

4. DEVELOPER SHALL PROVIDE 30 DAYS ADVANCE WRITTEN NOTICE TO OWNER FOR ANY WORK REQUIRED WITHIN AN EXISTING CITY OF RALEIGH UTILITY EASEMENT TRAVERSING PRIVATE PROPERTY.

5. CONTRACTOR SHALL MAINTAIN CONTINUOUS WATER & SEWER SERVICE TO EXISTING RESIDENCES & BUSINESSES THROUGHOUT CONSTRUCTION OF PROJECT. ANY NECESSARY SERVICE INTERRUPTIONS SHALL BE PRECEDED BY A 24 HOUR ADVANCE NOTICE TO THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT.

6. 3.0' MINIMUM COVER IS REQUIRED ON ALL WATER MAINS & SEWER FORCEMAINS. 4.0' MINIMUM COVER IS REQUIRED ON ALL REUSE MAINS.

7. IT IS THE DEVELOPER'S RESPONSIBILITY TO ABANDON OR REMOVE EXISTING WATER & SEWER SERVICES NOT BEING USED IN REDEVELOPMENT OF A SITE UNLESS OTHERWISE DIRECTED BY THE CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT. THIS INCLUDES ABANDONING TAP AT MAIN & REMOVAL OF SERVICE FROM ROW OR EASEMENT PER CORPUD HANDBOOK PROCEDURE.

8. INSTALL 3/4" COPPER WATER SERVICES WITH METERS LOCATED AT ROW OR WITHIN A 2'X2' WATERLINE EASEMENT IMMEDIATELY ADJACENT. NOTE: IT IS THE APPLICANT'S RESPONSIBILITY TO PROPERLY SIZE THE WATER SERVICE FOR EACH CONNECTION TO PROVIDE ADEQUATE FLOW & PRESSURE.

9. INSTALL 4" PVC SEWER SERVICES @ 1.0% MINIMUM GRADE WITH CLEANOUTS LOCATED AT ROW OR EASEMENT LINE & SPACED EVERY 75 LINEAR FEET MAXIMUM.

10. PRESSURE REDUCING VALVES ARE REQUIRED ON ALL WATER SERVICES EXCEEDING 80 PSI; BACKWATER VALVES ARE REQUIRED ON ALL SANITARY SEWER SERVICES HAVING BUILDING DRAINS LOWER THAN 1.0' ABOVE THE NEXT UPSTREAM MANHOLE.

11. ALL ENVIRONMENTAL PERMITS APPLICABLE TO THE PROJECT MUST BE OBTAINED FROM NCDWQ, USACE &/OR FEMA FOR ANY RIPARIAN BUFFER, WETLAND &/OR FLOODPLAIN IMPACTS (RESPECTIVELY) PRIOR TO CONSTRUCTION.

12. NCDOT / RAILROAD ENCROACHMENT AGREEMENTS ARE REQUIRED FOR ANY UTILITY WORK (INCLUDING MAIN EXTENSIONS & SERVICE TAPS) WITHIN STATE OR RAILROAD ROW PRIOR TO CONSTRUCTION.

13. GREASE INTERCEPTOR / OIL WATER SEPARATOR SIZING CALCULATIONS & INSTALLATION SPECIFICATIONS SHALL BE APPROVED BY THE RW FOG PROGRAM COORDINATOR PRIOR TO ISSUANCE OF A UC / BLDG PERMIT. CONTACT (919) 996-4516 OR FOG@RALEIGHNC.GOV FOR MORE INFORMATION.

14. CROSS-CONNECTION CONTROL PROTECTION DEVICES ARE REQUIRED BASED ON DEGREE OF HEALTH HAZARD INVOLVED AS LISTED IN APPENDIX-B OF THE RULES GOVERNING PUBLIC WATER SYSTEMS IN NORTH CAROLINA. THESE GUIDELINES ARE THE MINIMUM REQUIREMENTS. THE DEVICES SHALL MEET AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) STANDARDS OR BE ON THE UNIVERSITY OF SOUTHERN CALIFORNIA APPROVAL LIST. THE DEVICES SHALL BE INSTALLED AND TESTED (BOTH INITIAL AND PERIODIC TESTING THEREAFTER) IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS OR THE LOCAL CROSS-CONNECTION CONTROL PROGRAM, WHICHEVER IS MORE STRINGENT. A CERTIFICATE OF COMPLIANCE SHALL ALSO BE OBTAINED FROM THE RW CROSS-CONNECTION COORDINATOR FOR EACH DEVICE PRIOR TO ISSUANCE OF A UC / BLDG PERMIT. CONTACT (919) 996-5923 OR CROSS.CONNECTION@RALEIGHNC.GOV FOR MORE INFORMATION.

15. NOTICE FOR PROJECTS WITH REPLACED OR OVERSIZED MAINS: IF THE CITY'S REIMBURSEMENT FOR AN OVERSIZED MAIN OR URBAN MAIN REPLACEMENT PROJECT IS $250,000 OR GREATER - THE PROJECT MUST BE PUBLICLY BID

MASTER PLAN APPROVAL
BY THE TOWN OF WAKE FOREST
TECHNICAL REVIEW COMMITTEE
PLANNING: _____ DATE:_____
ENGINEERING: _____ DATE:_____
Subject to addressing outstanding conditions of approval within the issued comment letter. Plans are not released for construction. Approval is valid for two years from the date above.

MASTER PLAN APPROVAL
BY THE TOWN OF WAKE FOREST
TECHNICAL REVIEW COMMITTEE
BOARD OF COMMISSIONERS: _____ DATE:_____
Subject to addressing outstanding conditions of approval within the issued comment letter. Plans are not released for construction. Approval is valid for two years from the date above.

SHEET INDEX

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C1.02	EXISTING CONDITIONS
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C3.08	GRADING AND STORM DRAINAGE PLAN - AREA "H"
C3.09	GRADING AND STORM DRAINAGE PLAN - AREA "I"
C3.10	GRADING AND STORM DRAINAGE PLAN - AREA "J"
C3.11	GRADING AND STORM DRAINAGE PLAN - GREENWAY
C4.00	OVERALL UTILITY PLAN
C4.01	UTILITY PLAN - AREA "A"
C4.02	UTILITY PLAN - AREA "B"
C4.03	UTILITY PLAN - AREA "C"
C4.04	UTILITY PLAN - AREA "D"
C4.05	UTILITY PLAN - AREA "E"
C4.06	UTILITY PLAN - AREA "F"
C4.07	UTILITY PLAN - AREA "G"
C4.08	UTILITY PLAN - AREA "H"
C4.09	UTILITY PLAN - AREA "I"
C4.10	UTILITY PLAN - AREA "J"
L5.00	OVERALL LANDSCAPE PLAN
L5.01	LANDSCAPE PLAN - AREA "A"
L5.02	LANDSCAPE PLAN - AREA "B"
L5.03	LANDSCAPE PLAN - AREA "C"
L5.04	LANDSCAPE PLAN - AREA "D"
L5.05	LANDSCAPE PLAN - AREA "E"
L5.06	LANDSCAPE PLAN - AREA "F"
L5.07	LANDSCAPE PLAN - AREA "G"
L5.08	LANDSCAPE PLAN - AREA "H"
L5.09	LANDSCAPE PLAN - AREA "I"
L5.10	LANDSCAPE PLAN - AREA "J"
L5.11	LANDSCAPE NOTES AND SCHEDULE
L5.12	LANDSCAPE NOTES
L5.13	LANDSCAPE DETAILS
L5.14	SPECIMEN TREE MAP
L6.00	OVERALL OPEN SPACE PLAN
L7.00	LIGHTING PERFORMANCE PLAN

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
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fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CONTACT

LAURA HOLLOMAN
holloman@mcadamsco.com
PHONE: 919. 361. 5000

CLIENT

DRY TIMBER LLC
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

GREEN TIMBER FOUNDATION
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

CONTACT:
JAMES ADAMS
jmas@millridgeco.com
PHONE: 919. 556. 5418

PROJECT DIRECTORY

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

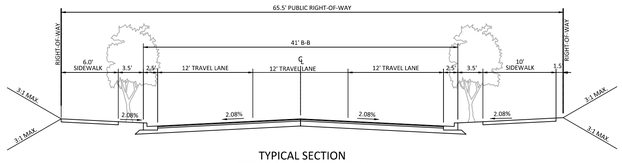
NO.	DATE

MASTER SITE PLAN FOR:

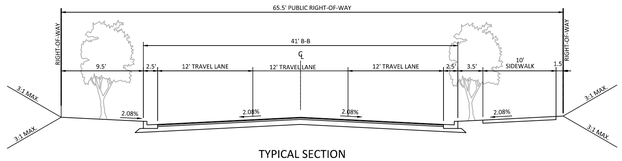
JOYNER PROPERTY
WAKE FOREST, NORTH CAROLINA
PROJECT NUMBER: 2021110197

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

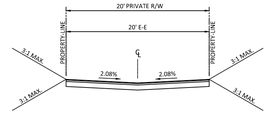
M:\Projects\TOL\2021\110197\04-Production\Engineering\Master Plan - Pricing Set\Current Drawings\2021110197-CS1.dwg, 9/7/2023 3:19:54 PM, Juan Montes



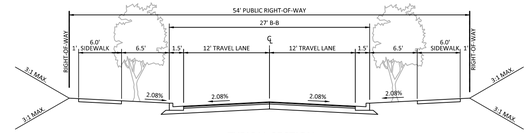
TYPICAL SECTION
SERVICE ROAD WITH
SIDEWALK ON BOTH SIDES
(65.5' R/W, 41' B-B)



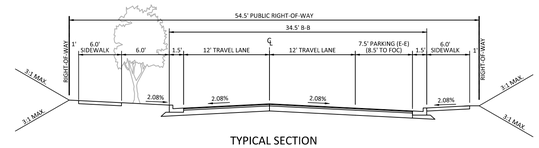
TYPICAL SECTION
SERVICE ROAD WITH
SIDEWALK ON ONE SIDE
(65.5' R/W, 41' B-B)



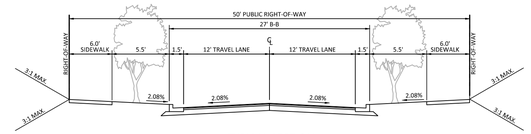
TYPICAL SECTION
PRIVATE ALLEY
(TWO-WAY)
(20' R/W, 20' E-E)



TYPICAL SECTION
YIELD STREET
(54' R/W, 27' B-B)



TYPICAL SECTION
YIELD STREET WITH
PARKING ON ONE SIDE
(54.5' R/W, 34.5' B-B)



TYPICAL SECTION
CLUB VILLAS DRIVE ENTRANCE STREET
(50' R/W, 27' B-B)

MCADAMS

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CLIENT

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GREEN TIMBER FOUNDATION
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

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jmas@millridgeco.com
PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-TS1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	N/A
DATE	08. 25. 2023

SHEET

TYPICAL SECTIONS

C0.00

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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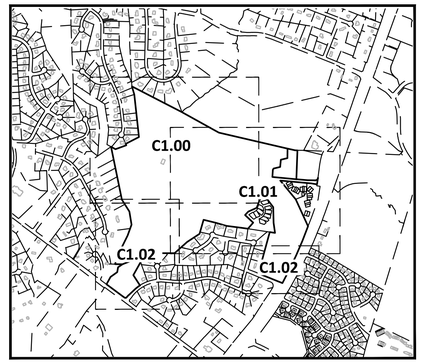
NC GRID NAD 83 (2011)

GRAPHIC SCALE
0 50 100 200
1 inch = 100 ft.



SHEET INDEX - NOT TO SCALE

SEE SHEET C1.02 FOR NOTES, LEGEND, LINE AND CURVE TABLE

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jmas@millridgeco.com
PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL L-3297 LAND SURVEYOR JOHN R. PIGGINS
08-09-2023

REVISIONS

NO.	DATE
1	

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-C1
CHECKED BY	EMC
DRAWN BY	EMC
SCALE	1"=100'
DATE	06. 07. 2021

SHEET

EXISTING CONDITIONS
C1.00

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

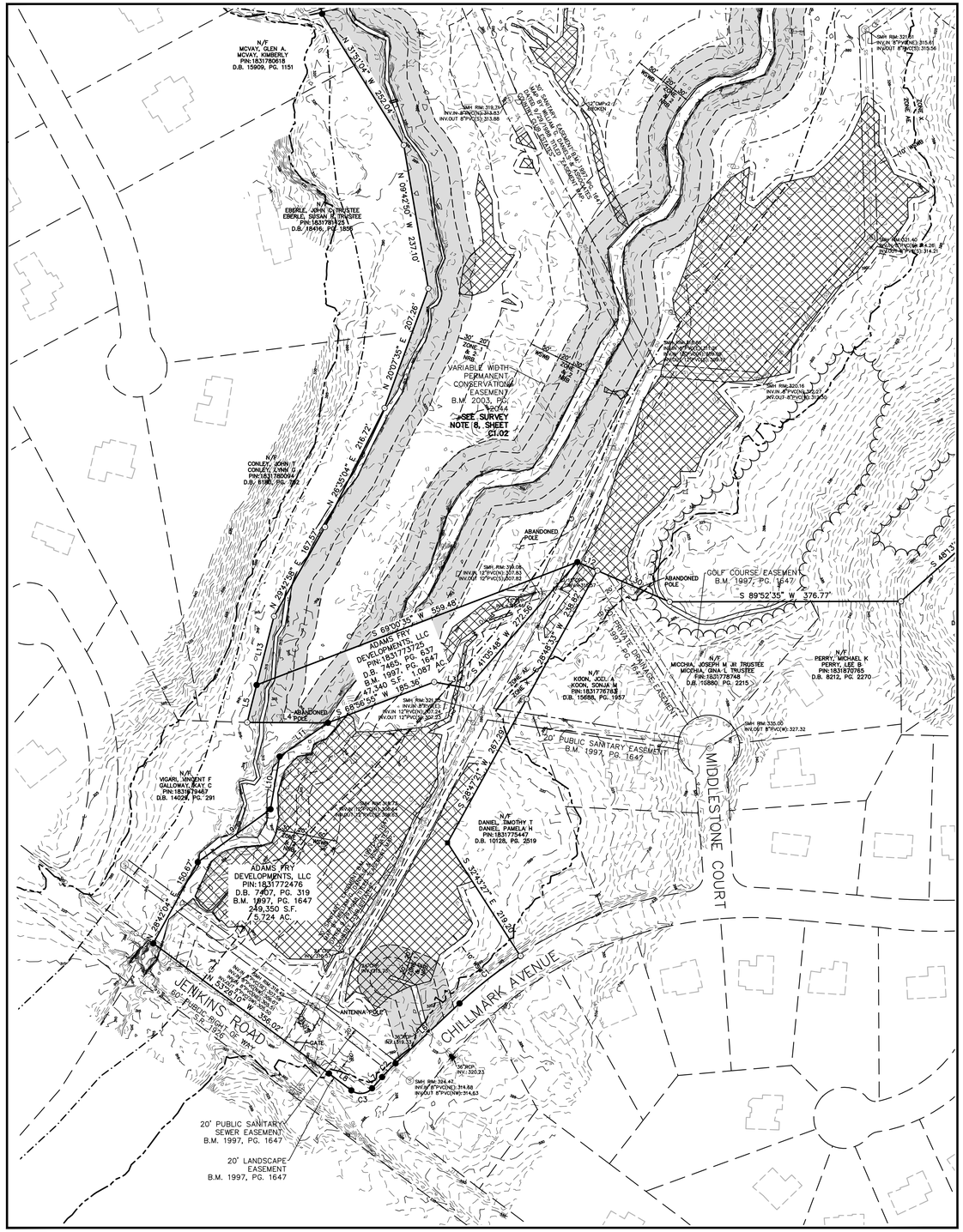

NGS "POWER"
NC STATE PLANE
GRID COORDINATES
N: 833,570.92
E: 2,149,639.43
NGS "T 217"
N 14°19'51" E
16,773.73'(GROUND)
S 14°19'18" W
16,772.59'(GRID) C.S.F.: 0.999950005
EIP
NC STATE PLANE GRID COORDINATES
N: 819,718.43
E: 2,140,182.24
S 76°56'27" E 1261.64'
ASPHALT CART PATH
ASPHALT CART PATH CONTINUES
ASPHALT CART PATH CONTINUES
ASPHALT CART PATH CONTINUES
SHED
WELLHOUSE
1-STORY TIMBER FRAME BLDG. ABANDONED
1-STORY BRICK BLDG. ABANDONED
ABANDONED TENNIS COURTS
ABANDONED POOL HOUSE
ABANDONED POOL
DRY TIMBER, LLC
PIN:1841091336
PORTION OF TRACT 1
D.B. 18284, PG. 2679
B.M. 2005, PG. 2113
154,819 S.F.
3.554 AC.
DRY TIMBER, LLC
PIN: 1831895139
PORTION OF TRACT 1 – D.B. 18284, PG. 2679
6,364,227 S.F.
146.103 AC.
S 01°11'44" W 170.04'
S 02°01'30" W 516.85'
S 84°46'08" E 431.33'
N 84°52'19" W 563.66'
S 85°04'42" E 202.37'
L16
L17
L18
L21
L23
L24
L25
L28
20' PRIVATE SANITARY SEWER EASEMENT B.M. 2003, PG. 1725
N/F WAKE UNION BAPTIST CHURCH PIN:1841095460 D.B. 12756, PG. 1431
50' ACCESS EASEMENT B.M. 1994, PG. 122
50' ACCESS EASEMENT B.M. 1994, PG. 1771
CLUB VILLAS DRIVE
50' ACCESS EASEMENT
B.M. 1994, PG. 122
NO PUBS. ASPHALT PAVEMENT
CLUB VILLAS DRIVE
50' ACCESS EASEMENT
B.M. 2000, PG. 757
FAIRWAYS VILLAS DRIVE
CAPPED VENT FOR PARCEL MARKER
TBM#305
COTTON SPINDLE
ELEV: 399.68
4' CONC. EDGE W/ BOULDER ROCKS
S 39°29'11" E 336.41'
ASPHALT CART PATH POTENTIAL ENCROACHMENT
ASPHALT CART PATH POTENTIAL ENCROACHMENT
ASPHALT CART PATH POTENTIAL ENCROACHMENT
N/F FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC PIN: 1841094004 D.B. 9050, PG. 136
N/F FAIRWAY VILLAS AT WF GOLF CLUB & PIN:1841085635 D.B. 10962, PG. 817
N/F CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB HOA, INC PIN:1831988381 D.B. 16814, PG. 2913
U.S. HIGHWAY 1 CAPITAL BOULEVARD
200' PUBLIC RIGHT OF WAY
N 07°48'44" W 181.25'
N 07°06'06" W 289.39'
S 24°33'19" E 592.08'
S 21°22'06" W 256.59'
S 66°28'38" W 161.76'
S 47°27'51" E 178.25'
N 75°52'57" W 222.71'
N 74°11'42" W 199.94'
N 82°44'06" W 267.10'
S 16°03'08" W 283.19'
S 56°42'09" W 269.17'
S 48°13'28" W 299.67'
POND
WATER ELEV:334.9
(4/13/2021)
POND
WATER ELEV:348.5
(4/09/2021)
POND
WATER ELEV:357.2
(4/09/2021)
BIRD HOUSE
COUNTRY CLUB DRIVE
N/F UPTON, KEVIN C UPTON, MITZI M PIN:1831867301 D.B. 7658, PG. 925
N/F LESTER, JEFFREY A LESTER, JO ANNE PIN:1831889265 D.B. 10527, PG. 1658
N/F FREEMAN, JAMES LOUIS JR FREEMAN, JOAN OUTLAND PIN:1831983135 D.B. 17994, PG. 1725
N/F GRUMMETT, ANDREW O WRIGHT, ANGELA M PIN:1831893136 D.B. 17994, PG. 1725
N/F BARR, ARNOLD L DARR, CHIDRENE L PIN:1834881177 D.B. 2596, PG. 773
N/F WILLIAMS, PATRICK EUGENE WILLIAMS, CHELSEA FAIRCLOTH PIN:1837880151 D.B. 19244, PG. 964
N/F JOYNER, SAMUEL T JOYNER, PATRICIA S PIN:1831884051 D.B. 16867, PG. 2193
N/F FICHERA, JOAN L FICHERA, WENDY M PIN:1831987003 D.B. 10379, PG. 2092
N/F
PIPE INVERT BURIED
PIPE INVERT BURIED
PIPE INVERT BURIED
CONC. PLUMP WINGS
SMH RIM: 329.9 INV.IN: 8"PVC(N): 320.48 INV.OUT: 8"PVC(S): 320.44
SMH RIM: 324.51 INV.IN: 8"PVC(NE): 310.61 INV.OUT: 8"PVC(S): 310.56
SMH RIM: 321.40 INV.IN: 8"PVC(NE): 314.26 INV.OUT: 8"PVC(S): 314.21
SMH RIM: 350.06 INV.IN: 8"PVC(E): 343.53 INV.OUT: 8"PVC(W): 343.43
SMH RIM: 364.52 INV.IN: 8"PVC(E): 356.21 INV.OUT: 8"PVC(S): 356.16
SMH RIM: 368.77 INV.IN: 8"PVC(E): 387.68 INV.OUT: 8"PVC(W): 387.53
SMH RIM: 353.71 INV.IN: 8"PVC(N): 383.63 INV.OUT: 8"PVC(S): 383.50
SMH RIM: 381.29 INV.IN: 8"PVC(N): 375.36 INV.OUT: 8"PVC(S): 375.26
SMH RIM: 366.39 INV.IN: 8"PVC(SE): 358.74 INV.OUT: 8"PVC(NW): 358.70
SMH RIM: 406.35 INV.IN: 8"PVC(E): 388.63 INV.IN: 8"PVC(S): 388.53 INV.OUT: 8"PVC(W): 388.45
SMH RIM: 406.35 INV.IN: 8"PVC(E): 398.65 INV.OUT: 8"PVC(W): 398.55
12"CMP INV:=411.43
12"CMP INV:=411.39
12"CMP INV:=319.22
12"CMP INV:=318.34
12"CMP INV:=317.87
12"CMP INV:=317.82
12"CMP INV:=317.78
12"CMP INV:=312.6
12"CMP INV:=316.57
12"CMP INV:=316.54
12"CMP INV:=316.73
24"CMP INV:=316.57
24"CMP INV:=316.52
24"CMP INV:=316.47
24"CMP INV:=316.42
24"CMP INV:=316.37
24"CMP INV:=316.32
24"CMP INV:=316.27
24"CMP INV:=316.22
24"CMP INV:=316.17
24"CMP INV:=316.12
24"CMP INV:=316.07
24"CMP INV:=316.02
24"CMP INV:=315.97
24"CMP INV:=315.92
24"CMP INV:=315.87
24"CMP INV:=315.82
24"CMP INV:=315.77
24"CMP INV:=315.72
24"CMP INV:=315.67
24"CMP INV:=315.62
24"CMP

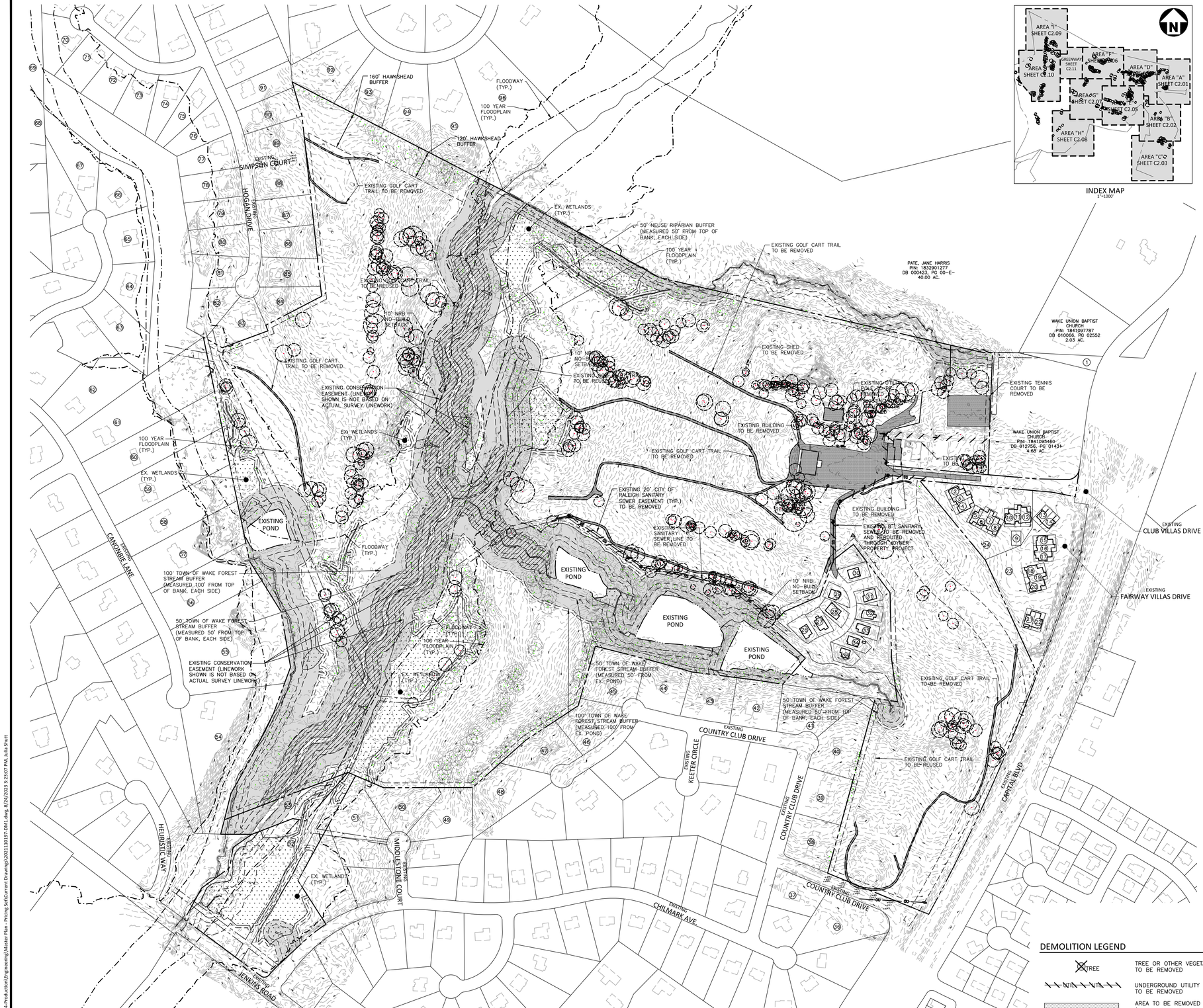
I, JOHN R. PICKENS, CERTIFY THAT THIS PROJECT WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY PERFORMED UNDER MY SUPERVISION; THAT THIS GROUND/AERIAL SURVEY WAS PERFORMED AT THE 95 PERCENT CONFIDENCE LEVEL TO MEET FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS; THAT THIS SURVEY WAS PERFORMED TO MEET THE REQUIREMENTS FOR A TOPOGRAPHIC/PLANIMETRIC SURVEY TO THE ACCURACY OF CLASS A AND VERTICAL ACCURACY WHEN APPLICABLE TO THE CLASS A STANDARD, AND THAT THE SURVEY WAS COMPLETED ON JUNE 6, 2021; AND ALL ELEVATIONS ARE BASED ON NAVD 88.

NORTH CAROLINA PROFESSIONAL SEAL L-3297 LAND SURVEYOR JOHN R. PICKENS

John R. Pickens 08-09-2023

JOHN R. PICKENS, PLS L-3297


N/F
MCVAY, GLEN A.
MCVAY, KIMBERLY
PIN:1831780618
D.B. 15909, PG. 1151
N 37°51'04" W 252.04'
N/F
EBERLE, JOHN Q TRUSTEE
EBERLE, SUSAN T. TRUSTEE
PIN:1831781231
D.B. 18416, PG. 1855
N 09°42'56" W 237.10'
N 20°07'35" E 207.86'
N 29°35'04" E 216.72'
N 29°42'58" E 157.57'
VARIABLE WIDTH PERMANENT CONSERVATION EASEMENT B.M. 2003, PG. 12044
SEE SURVEY NOTE 8, SHEET C1.02
N/F
CONLEY, JOHN T
CONLEY, LYNN G
PIN:1831780044
D.B. 8180, PG. 782
S 68°09'35" W 559.46'
S 68°56'55" W 185.36'
ADAMS FRY DEVELOPMENTS, LLC PIN:1831772476 D.B. 7907, PG. 319 B.M. 1997, PG. 1647 249,350 S.F. 5.724 AC.
ADAMS FRY DEVELOPMENTS, LLC PIN:1831731725 D.B. 7465, PG. 657 B.M. 1997, PG. 1647 47,340 S.F. 1.087 AC.
S 41°35'48" W 272.06'
S 29°42'58" W 218.62'
S 32°43'27" E 219.20'
S 48°13'
S 89°52'35" W 376.77'
GOLF COURSE EASEMENT B.M. 1997, PG. 1647
ABANDONED POLE
ABANDONED
N/F
VIGARI, VINCENT F
GALLOWAY, KAY C
PIN:1831979457
D.B. 14029, PG. 291
N/F
DANIEL, TIMOTHY T
DANIEL, PAMELA H
PIN:1831775447
D.B. 10128, PG. 2519
N/F
KOON, JOEL A
KOON, SONJA M
PIN:1831776763
D.B. 15686, PG. 1957
N/F
MICHNA, JOSEPH M JR TRUSTEE
MICHNA, GINA L TRUSTEE
PIN:1831778748
D.B. 16860, PG. 2215
N/F
PERRY, MICHAEL K
PERRY, LEE E
PIN:1831870765
D.B. 8212, PG. 2270
20' PUBLIC SANITARY EASEMENT B.M. 1997, PG. 1647
20' PRIVATE DRAINAGE EASEMENT B.M. 1997, PG. 1647
MIDDLESTONE COURT
CHILLMARK AVENUE
JENKINS ROAD
60' PUBLIC RIGHT OF WAY
20' PUBLIC SANITARY SEWER EASEMENT B.M. 1997, PG. 1647
20' LANDSCAPE EASEMENT B.M. 1997, PG. 1647
ANTENNA
GATE
SMH: RIM=319.75' INV.IN 8"PVC(N)=313.83' INV.OUT 8"PVC(S)=313.88
SMH: RIM=320.16' INV.IN 8"PVC(N)=314.27' INV.OUT 8"PVC(S)=314.32
SMH: RIM=320.09' INV.IN 12"PVC(N)=307.83' INV.OUT 12"PVC(S)=307.83
SMH: RIM=321.81' INV.IN 8"PVC(NE)=315.61' INV.OUT 8"PVC(S)=315.66
SMH: RIM=321.40' INV.IN 8"PVC(NW)=314.06' INV.OUT 8"PVC(SE)=314.21
SMH: RIM=320.00' INV.IN 8"PVC(N)=314.08' INV.OUT 8"PVC(W)=314.13
SMH: RIM=335.00' INV.OUT 8"PVC(W)=327.32
SMH: RIM=324.47' INV.IN 8"PVC(NE)=314.88' INV.OUT 8"PVC(W)=314.63
SMH: RIM=320.23' INV.IN 8"PVC(NW)=312.73' INV.OUT 8"PVC(SE)=312.78



ADJACENT PROPERTY OWNERS

1. WAKE UNION BAPTIST CHURCH PIN: 1841097615 DB 010066, PG 02552 0.26 AC.
2. HORTON, ROBIN RANDALL SR HORTON, MARY HOLLAND PIN: 1841092100 DB 016834, PG 00534 0.08 AC.
3. FINNEGAN, JOSEPH T FINNEGAN, LESLEY E PIN: 1841092027 DB 015001, PG 02043 0.06 AC.
4. CARTER, TERRY W CARTER, SUSAN S PIN: 1841092033 DB 015849, PG 01361 0.08 AC.
5. BRUNKHORST, WILLIAM PIN: 1841082989 DB 14~E, PG 3763 0.07 AC.
6. DOMINICK, JOHN M DOMINICK, BETSY S PIN: 1841083918 DB 016125, PG 00408 0.06 AC.
7. GRADY, DOUGLAS H GRADY, MARTHA S PIN: 1841083947 DB 009563, PG 00022 0.06 AC.
8. CORBETT, MICHAEL P CORBETT, VIRGINIA L PIN: 1841083975 DB 011992, PG 02542 0.07 AC.
9. OAKMARK DEVELOPMENT CO LLC PIN: 1841084950 DB 008579, PG 00285 0.08 AC.
10. BYRNE, THOMAS J JR BYRNE, MARY COLLINS PIN: 1841084928 DB 013727, PG 02265 0.07 AC.
11. PRUITT, DELORES PIN: 1841084969 DB 009228, PG 00583 0.06 AC.
12. ROUSSEAU, CHERYLL E PIN: 1841084999 0.08 AC.
13. NEISES, GAIL ELAINE PIN: 1841085969 DB 017776, PG 00544 0.08 AC.
14. HEATH, CHARLES LARRY HEATH, MARY EDITH PIN: 1841086908 DB 016073, PG 01026 0.08 AC.
15. WALSH, DONNA L PIN: 1841085879 DB 010897, PG 00588 0.09 AC.
16. BONE, MALCOLM BONE, ELIZABETH PIN: 1841085875 DB 013245, PG 01171 0.06 AC.
17. LOVING, JOHN C LOVING, LENNIS F PIN: 1841085572 DB 010355, PG 00066 0.08 AC.
18. MATZKEVICH, DYANNE M PIN: 1841085736 DB 017937, PG 02774 0.09 AC.
19. ROGGE, BEVERLY J TRUSTEE GAIL E AND BEVERLY J ROGGE TRUST PIN: 1841085743 DB 016159, PG 02584 0.06 AC.
20. VOLLMER, CHARLES B VOLLMER, STELLA PIN: 1841085649 DB 014287, PG 00672 0.08 AC.
21. MAIOLO, THOMAS PIN: 1841085516 DB 017711, PG 02381 0.08 AC.
22. ZELVIS, MICHELE HOFFMAN PIN: 1841085545 DB 016929, PG 00340 0.08 AC.
23. FAIRWAY VILLAS AT WF GOLF CLUB PIN: 1841085635 DB 010962, PG 00817 2.87 AC.
24. FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC PIN: 1841094004 DB 009050, PG 00136 1.39 AC.
25. CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB HOA, INC PIN: 1831986381 DB 016814, PG 02513 1.17 AC.
26. BIELIK, EDWARD A PACE, KAYLA N PIN: 1831985552 DB 017423, PG 02305 0.19 AC.
27. ZHAO, BAIRU PIN: 1831986524 DB 017010, PG 01441 0.18 AC.
28. HIGGINS, JOHN W III PIN: 1831986589 DB 017055, PG 00072 0.19 AC.
29. REITMANN, ROBERT PIN: 1831986696 DB 017165, PG 00638 0.16 AC.
30. GOK, KEN Y AYUN, H, LIM PIN: 1831987775 DB 016844, PG 00697 0.18 AC.
31. RAMSARAN, MICHAEL RAMSARAN, CHARMAINE PIN: 1831988635 DB 015098, PG 00453 0.15 AC.
32. JALLORINA, CLAUDE H HABON, LORNA D PIN: 1831988538 DB 017656, PG 00904 0.17 AC.
33. SIMS, YVONNE M PIN: 1831988511 DB 017009, PG 02679 0.17 AC.
34. KING, JOHN C JR KING, NETANIS E PIN: 1831987466 DB 016902, PG 01921 0.18 AC.
35. RUPSKY, MARK J RUPSKY, PENNY L PIN: 1831987430 DB 016903, PG 02026 0.17 AC.
36. CIMA, DAVID A CIMA, CINDY PIN: 1831977217 DB 013688, PG 02375 1.25 AC.
37. GOSSETT, LINDA M PIN: 1831975411 DB 016391, PG 00784 0.70 AC.
38. REDMAN, J MICHEAL PIN: 1831975681 DB 013569, PG 01957 0.91 AC.
39. BOWERS, JAMES S BOWERS, DELIA B PIN: 1831976841 DB 008747, PG 00299 0.91 AC.
40. FICHERA, JOHN L FICHERA, WENDY M PIN: 1831987003 DB 010374, PG 02097 1.20 AC.
41. BARR, ARNOLD L BARR, CHORENE L PIN: 1831985177 DB 002596, PG 00773 1.14 AC.
42. GRIMMETT, ANDREW O WRIGHT, ANGELA M PIN: 1831983138 DB 017994, PG 01725 0.91 AC.
43. FREEMAN, JAMES LOUIS JR FREEMAN, JOAN OUTLAND PIN: 1831981282 DB 010889, PG 00559 0.90 AC.
44. LESTER, JEFFREY A LESTER, JO ANNE D PIN: 1831889265 DB 010527, PG 01658 0.88 AC.
45. UPTON, KEVIN C UPTON, MITZI M PIN: 1831897351 DB 007686, PG 00928 1.13 AC.
46. WILLIAMS, PATRICK EUGENE WILLIAMS, CHELSEA FAIRCLOTH PIN: 1831886151 DB 018244, PG 00964 0.92 AC.
47. JOYNER, SAMUEL H JOYNER, PATRICIA S PIN: 1831884051 DB 016867, PG 02193 0.93 AC.
48. FISHER, C P JR PIN: 1831873802 DB 002417, PG 00449 1.30 AC.
49. PERRY, MICHAEL K PERRY, LEE E PIN: 1831870765 DB 008212, PG 02270 1.10 AC.
50. MICCHIA, JOSEPH M JR TRUSTEE MICCHIA, GINA L TRUSTEE PIN: 1831778748 DB 016880, PG 02215 0.95 AC.
51. KOON, JOEL A KOON, SONJA M PIN: 1831776783 DB 015688, PG 01957 0.96 AC.
52. ADAMS FRY DEVELOPMENTS LLC PIN: 1831772476 DB 007407, PG 00319 5.70 AC.
53. ADAMS FRY DEVELOPMENTS LLC PIN: 1831773725 DB 007465, PG 00637 1.10 AC.
54. CONLEY, JOHN T CONLEY, LYNN G PIN: 1831780094 DB 006180, PG 00702 3.43 AC.
55. EBERLE, JOHN C EBERLE, SUSAN R PIN: 1831781425 DB 015507, PG 00718 3.80 AC.
56. MCVAY, GLEN A. MCVAY, KIMBERLY PIN: 1831780618 DB 015909, PG 01151 1.76 AC.
57. MASSEY, GEORGE DENNIS MASSEY, CHIKAKO S PIN: 1831689865 DB 017878, PG 01999 1.92 AC.
58. O'DELL, MARK A O'DELL, BETH M PIN: 1831699001 DB 007918, PG 00377 1.81 AC.
59. POWELL, ANNE H PIN: 1831688166 DB 012820, PG 00944 1.96 AC.
60. WENNINGER, STEPHAN FRIEDRICH WENNINGER, SARAH LESLIE PIN: 1831698311 DB 015044, PG 01065 2.12 AC.
61. DURHAM, MICHAEL J DURHAM, CAROL I PIN: 1831697456 DB 014730, PG 00924 2.78 AC.
62. MEYER, ROGER P MEYER, KATHLEEN F PIN: 1831695532 DB 006223, PG 00200 1.65 AC.
63. BEASLEY, DARYL BERNARD BEASLEY, CUBE T PIN: 1831698861 DB 017181, PG 02551 1.04 AC.
64. SUCHER, AARON SUCHER, SOU PIN: 1831697924 DB 014805, PG 01066 0.92 AC.
65. HODGES, THOMAS R HODGES, SUSAN C PIN: 1832607117 DB 016741, PG 01362 0.94 AC.
66. BARKLEY, HUBERT MERRILL III BARKLEY, MONICA NABORS PIN: 1832606377 DB 017355, PG 01588 0.98 AC.
67. GIORDANO, GLENN E GIORDANO, JOHNNA D PIN: 1832605408 DB 006833, PG 00871 1.11 AC.
68. LEARY, CHRISTOPHER R LEARY, SHARON L PIN: 1832602646 DB 012850, PG 01160 0.86 AC.
69. FAIRLAKE COMMUNITY ASSOCIATION PIN: 1832610591 DB 016932, PG 00579 8.65 AC.
70. GRAFF, JOSEPH N GRAFF, BARBARA A PIN: 1832614001 DB 017097, PG 01191 0.69 AC.
71. DINGBAUM, THOMAS W DINGBAUM, JUDITH ANNE PIN: 1832605934 DB 007917, PG 00070 0.69 AC.
72. MOFFATTE, IAN M MOFFATTE, MICHELLE L PIN: 1832606833 DB 016164, PG 01583 0.69 AC.
73. JACKSON, DAVID E PIN: 1832607746 DB 007273, PG 00186 0.69 AC.
74. CARLE, JACQUELINE D PIN: 1832608775 DB 017342, PG 01960 0.69 AC.
75. HORNER, WESLEY HORNER, MIKAYLA PIN: 1832609761 DB 018368, PG 01295 0.69 AC.
76. GERLITZ, KYLE A TRUSTEE GERLITZ, ANN M TRUSTEE PIN: 1832700611 DB 018153, PG 01396 0.69 AC.
77. HORNBUCKLE, CASSANDRA HORNBUCKLE, KENFIN: 1832700540 DB 016163, PG 00500 0.69 AC.
78. KENNEDY, JANET A PIN: 1832700368 DB 15~E, PG 1815 0.69 AC.
79. YAROSH, DANIEL YAROSH, LORI PIN: 1832700288 DB 015023, PG 01164 0.69 AC.
80. BAGWELL, CAITLIN ELIZABETH PIN: 1832700196 DB 017418, PG 01644 0.69 AC.
81. PORTER, RYAN S PORTER, JESSICA E PIN: 1832700073 DB 015618, PG 01860 0.72 AC.
82. SAPP, ANDREW J SAPP, JO ANN PIN: 1831790960 DB 005582, PG 00544 0.71 AC.
83. PALMERTON, JEFFREY DALE PALMERTON, ELIZABETH PIN: 1831791891 DB 007468, PG 00414 0.75 AC.
84. LEAVENGOOD, EUGENE L LEAVENGOOD, TERI L PIN: 1831793941 DB 008598, PG 00333 0.69 AC.
85. MAYO, RICHARD E MAYO, DEDRE LYNN PIN: 1832703074 DB 008850, PG 00855 0.69 AC.
86. JOHNSON, RAYMOND JR PIN: 1832703175 DB 016464, PG 00905 0.69 AC.
87. WU, THUAN WU, MINH LUU PIN: 1832703268 DB 006648, PG 00731 0.69 AC.
88. CARLETON, BETH A CARLETON, JOHN M PIN: 1832703441 DB 017957, PG 00350 0.69 AC.
89. LERNER, MICHELLE GOLDBERG PIN: 1832703518 DB 00644, PG 00644 0.69 AC.
90. WALLACE, MARK FRANKLIN WALLACE, NICOLE J PIN: 1832703700 DB 018282, PG 02793 0.69 AC.
91. HARKLEY, JOSEPH LEE HARKLEY, MARA J PIN: 1832702850 DB 014916, PG 01240 0.73 AC.
92. OSTERGARD, RICHARD A OSTERGARD, YONG S PIN: 1832706809 DB 016272, PG 01652 1.30 AC.
93. VAN, ORDEN JOHN E VAN, ORDEN AMARILIS PIN: 1832707851 DB 015884, PG 02301 1.15 AC.
94. KUMAR, DHRUVA KUMAR, USHA PIN: 1832709714 DB 007590, PG 00661 1.23 AC.
95. MOSELEY, THEORIC JACKSON MOSELEY, KAREN HARRIS PIN: 1832800697 DB 017863, PG 02357 2.06 AC.
96. PACKETT, MITCHELL G PACKETT, ANNE APIN: 1832803702 DB 008302, PG 02159 3.63 AC.

DEMOLITION LEGEND

- TREE — TREE OR OTHER VEGETATION TO BE REMOVED
- W/A W/A W/A — UNDERGROUND UTILITY TO BE REMOVED
- AREA TO BE REMOVED (SIDEWALK, CURB AND GUTTER, STRUCTURES, ASPHALT, CONCRETE PAVING, ETC.)

NOTE: SEE PLAN FOR DETAILED DEMOLITION PROCEDURES, SEQUENCING AND SPECIFICATIONS.

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

M:\Projects\TOL\2021110197\04-Production\Engineering\Master Plan - Pricing Set\Current Drawings\2021110197-DM1.dwg, 8/24/2023 3:23:07 PM, Julia Shutt

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

DRY TIMBER LLC
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

GREEN TIMBER FOUNDATION
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YOUNGSVILLE, NC 27596-9698

CONTACT:
JAMES ADAMS
jmas@millridgeco.com
PHONE: 919. 556. 5418

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

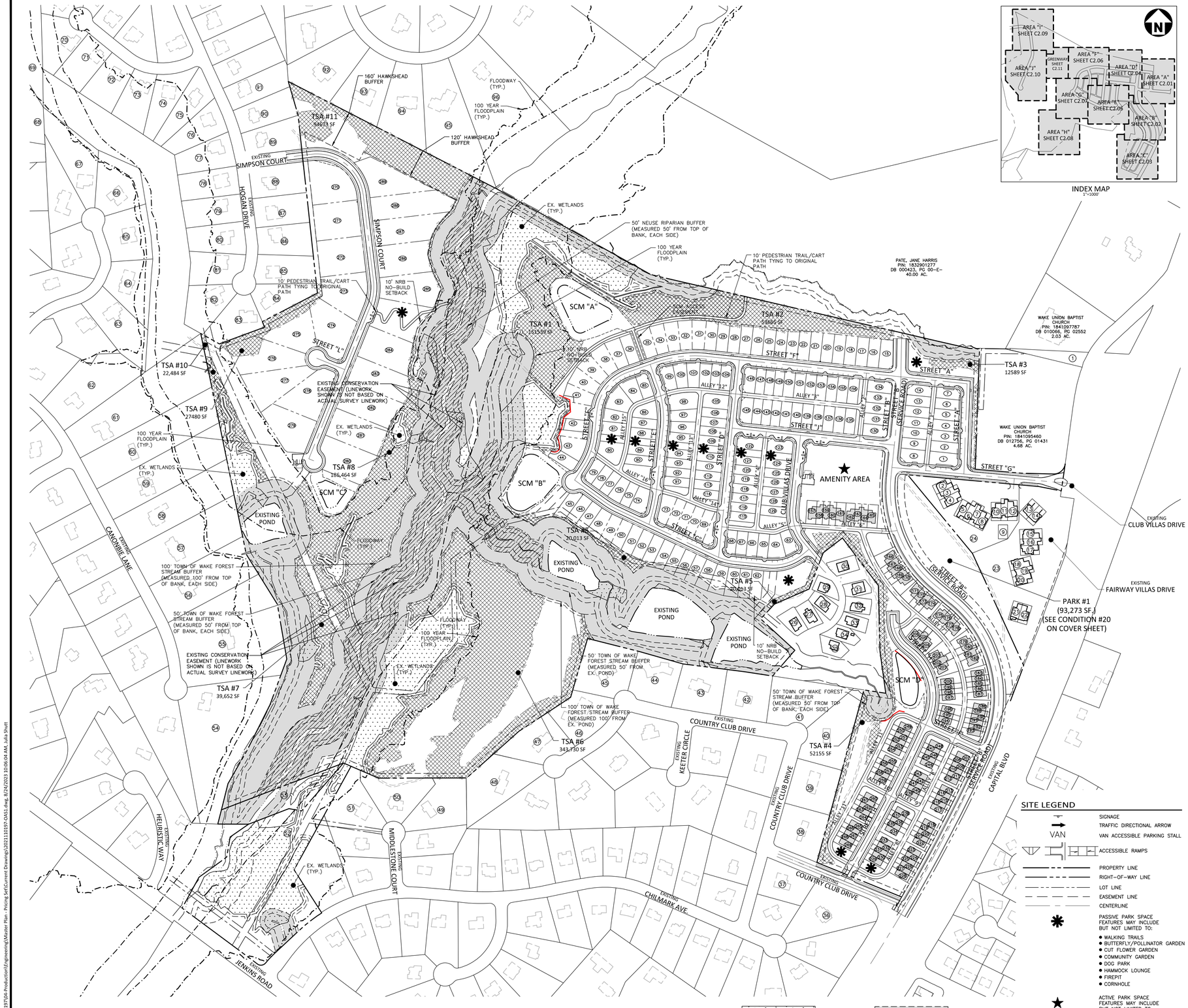
PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-DM1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=200'
DATE	08. 25. 2023

SHEET

OVERALL DEMOLITION PLAN

C1.03



INDEX MAP
1"=1000'

ADJACENT PROPERTY OWNERS

1. WAKE UNION BAPTIST CHURCH PIN: 1841097615 DB 010066, PG 02552 0.26 AC.
2. HORTON, ROBIN RANDALL SR HORTON, MARY HOLLAND PIN: 1841092100 DB 016834, PG 00534 0.08 AC.
3. FINNEGAN, JOSEPH T FINNEGAN, LESLEY E PIN: 1841092027 DB 015001, PG 02043 0.06 AC.
4. CARTER, TERRY W CARTER, SUSAN S PIN: 1841092033 DB 015849, PG 01361 0.08 AC.
5. BRUNKHORST, WILLIAM PIN: 1841082989 DB 14-E, PG 3763 0.07 AC.
6. DOMINICK, JOHN M DOMINICK, BETSY S PIN: 1841083918 DB 016125, PG 00408 0.06 AC.
7. GRADY, DOUGLAS H GRADY, MARTHA S PIN: 1841083947 DB 009563, PG 00022 0.06 AC.
8. CORBETT, MICHAEL P CORBETT, VIRGINIA L PIN: 1841083975 DB 011992, PG 02542 0.07 AC.
9. OAKMARK DEVELOPMENT CO LLC PIN: 1841084950 DB 008579, PG 00285 0.08 AC.
10. BYRNE, THOMAS J JR BYRNE, MARY COLLINS PIN: 1841084928 DB 013727, PG 02265 0.07 AC.
11. PRUITT, DELORES PIN: 1841084969 DB 009228, PG 00583 0.06 AC.
12. ROUSSEAU, CHERYLL E PIN: 1841084999 0.08 AC.
13. NEISES, GAIL ELAINE PIN: 1841085969 DB 017776, PG 00544 0.08 AC.
14. HEATH, CHARLES LARRY HEATH, MARY EDITH PIN: 1841086908 DB 016073, PG 01026 0.08 AC.
15. WALSH, DONNA L PIN: 1841085879 DB 010897, PG 00588 0.09 AC.
16. BONE, MALCOLM BONE, ELIZABETH PIN: 1841085875 DB 013245, PG 01171 0.06 AC.
17. LOVING, JOHN C LOVING, LENNIS T PIN: 1841085572 DB 010355, PG 00066 0.08 AC.
18. MATZKEVICH, DYANNE M PIN: 1841085736 DB 017937, PG 02774 0.09 AC.
19. ROGGE, BEVERLY J TRUSTEE, GAIL E AND BEVERLY J ROGGE TRUST PIN: 1841085743 DB 016159, PG 02584 0.06 AC.
20. VOLLMER, CHARLES B VOLLMER, STELLA PIN: 1841085649 DB 014287, PG 00672 0.08 AC.
21. MAIOLO, THOMAS PIN: 1841085516 DB 017711, PG 02381 0.08 AC.
22. ZELVIS, MICHELE HOFFMAN PIN: 1841085545 DB 016929, PG 00340 0.08 AC.
23. FAIRWAY VILLAS AT WF GOLF CLUB PIN: 1841085635 DB 010962, PG 00817 2.87 AC.
24. FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC PIN: 1841094004 DB 009050, PG 00136 1.39 AC.
25. CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB HOA, INC PIN: 1831986381 DB 016814, PG 02513 3.17 AC.
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72. MOFFATTE, IAN M MOFFATTE, MICHELLE L PIN: 1832606833 DB 016164, PG 01583 0.69 AC.
73. JACKSON, DAVID E PIN: 1832607746 DB 007273, PG 00186 0.69 AC.
74. CARLE, JACQUELINE D PIN: 1832608775 DB 017342, PG 01960 0.69 AC.
75. HORNER, WESLEY HORNER, MIKAYLA PIN: 1832609761 DB 018368, PG 01295 0.69 AC.
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96. PACKETT, MITCHELL G PACKETT, ANNE APIN: 1832803702 DB 008362, PG 02159 3.63 AC.

SITE LEGEND

- SIGNAGE
- TRAFFIC DIRECTIONAL ARROW
- VAN ACCESSIBLE PARKING STALL
- ACCESSIBLE RAMPS
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- PASSIVE PARK SPACE FEATURES MAY INCLUDE BUT NOT LIMITED TO:
  - WALKING TRAILS
  - BUTTERFLY/POLLINATOR GARDEN
  - CUT FLOWER GARDEN
  - COMMUNITY GARDEN
  - DOG PARK
  - HAMMOCK LOUNGE
  - FIREPIT
  - CORNHOLE
- ACTIVE PARK SPACE FEATURES MAY INCLUDE BUT NOT LIMITED TO:
  - CLUBHOUSE
  - SWIMMING POOL
  - FITNESS CENTER
  - PLAYGROUND
  - VOLLEYBALL COURT
  - TENNIS/PICKLEBALL COURT
- WETLAND
- STREAM BUFFER
- TREE SAVE AREA
- CONSERVATION EASEMENT

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
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phone 919. 361. 5000
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license number: C-0293, C-187

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CLIENT

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GREEN TIMBER FOUNDATION
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YOUNGSVILLE, NC 27596-9698

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NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-OAS1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=200'
DATE	08. 25. 2023

SHEET

OVERALL SITE PLAN

C2.00

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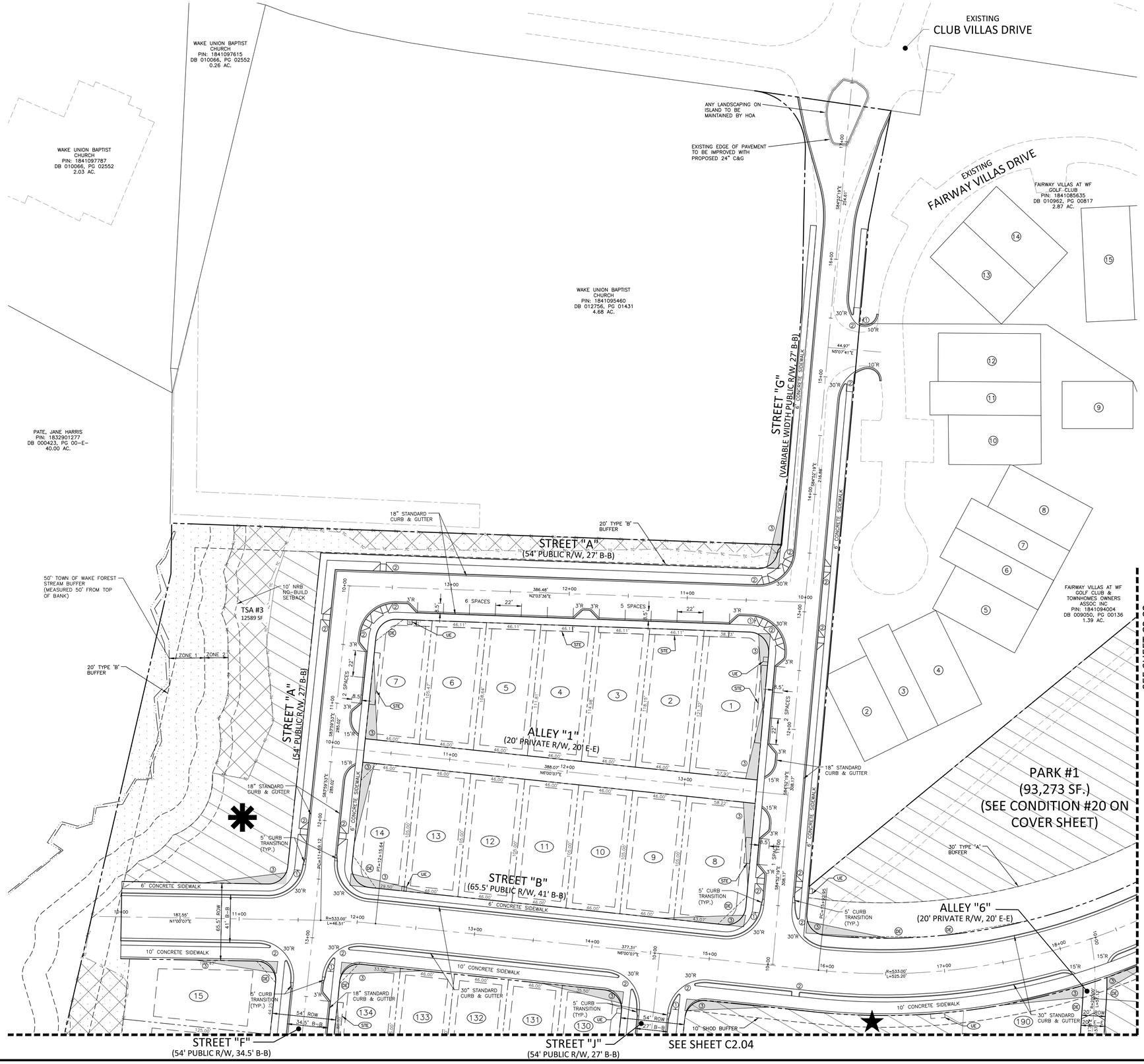

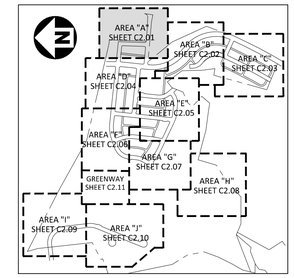

INDEX MAP
1"=1000'

SITE LEGEND

- SIGNAGE
- TRAFFIC DIRECTIONAL ARROW
- VAN ACCESSIBLE PARKING STALL
- ACCESSIBLE RAMPS
- PROPERTY LINE
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- CENTERLINE
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- PARK SPACE
- CONSERVATION EASEMENT

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- (UE) UTILITY EASEMENT
- (STE) 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
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CLIENT

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William T O'Daniel
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2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-S1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

SITE PLAN
AREA "A"
C2.01

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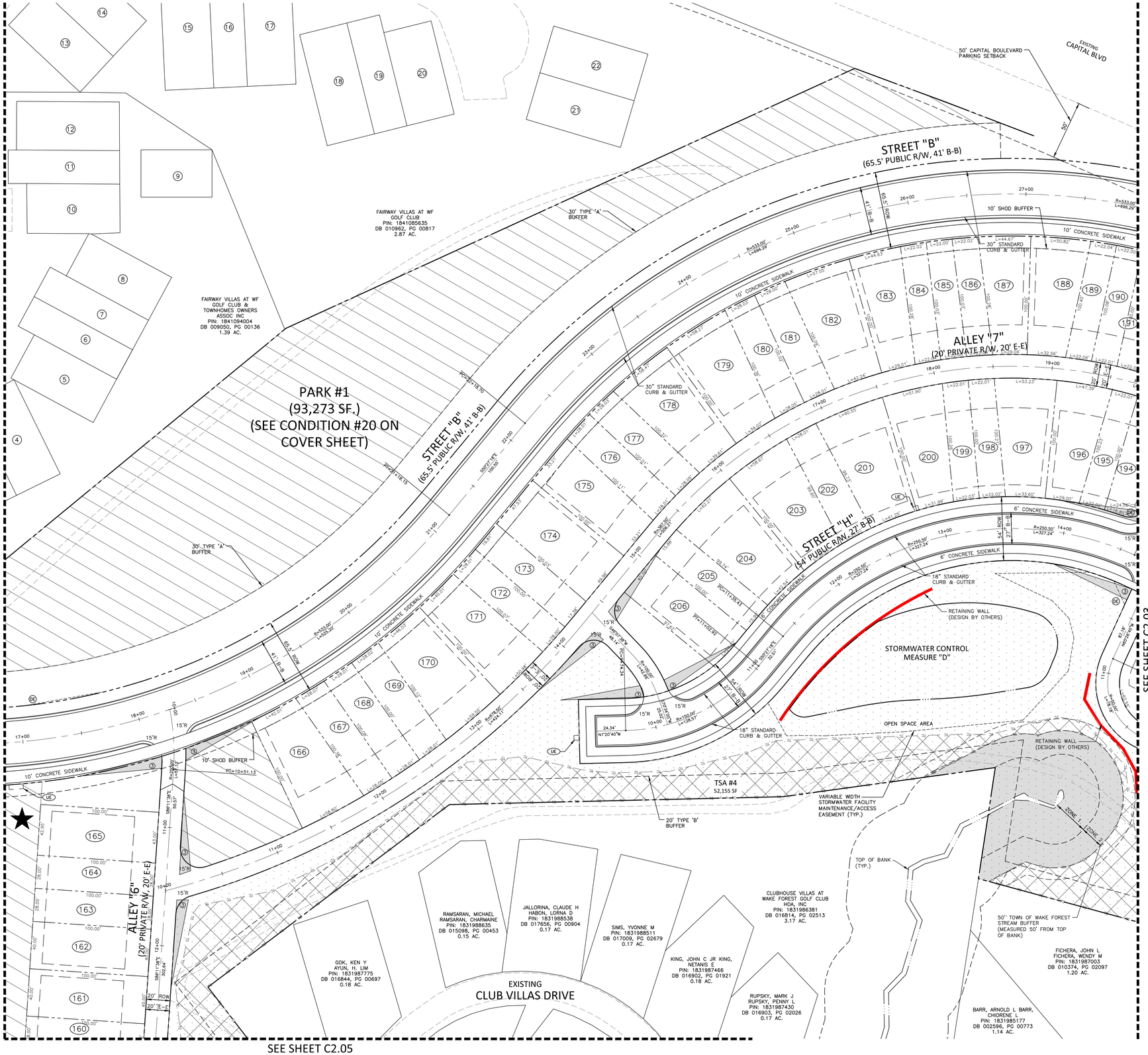



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2023.08.24 16:41:33 -04'00'

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SHEET

SITE PLAN
AREA "B"
C2.02

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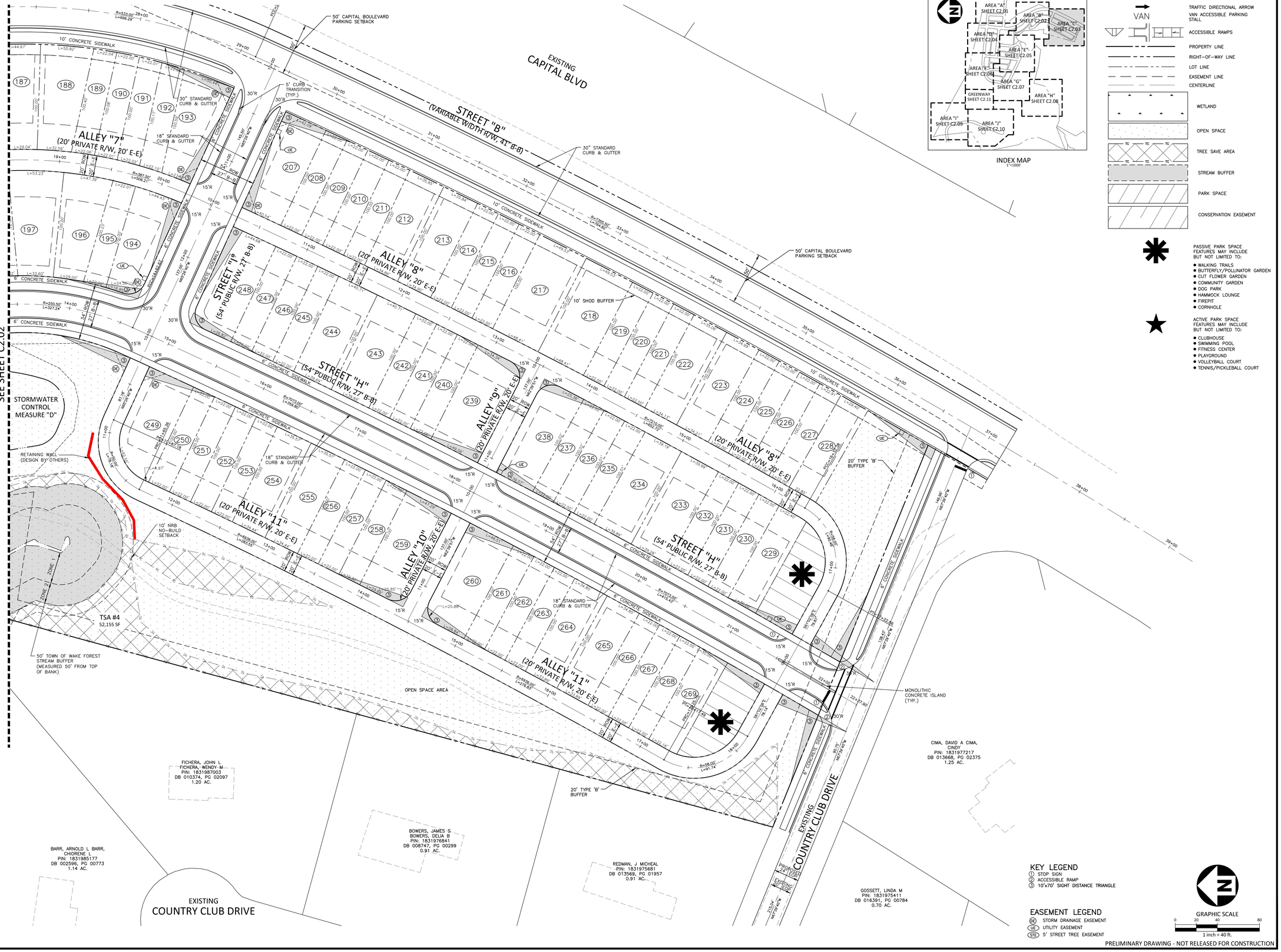

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SHEET

SITE PLAN
AREA "C"
C2.03

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INDEX MAP
1"=1000'

STREET "A"
(54' PUBLIC R/W, 27' B-B)

SEE SHEET C2.01

STREET "B"
(65.5' PUBLIC R/W, 41' B-B)

AMENITY AREA

ALLEY "2"
(20' PRIVATE R/W, 20' E-E)

ALLEY "3"
(20' PRIVATE R/W, 20' E-E)

ALLEY "4"
(20' PRIVATE R/W, 20' E-E)

ALLEY "5"
(20' PRIVATE R/W, 20' E-E)

ALLEY "6"
(20' PRIVATE R/W, 20' E-E)

ALLEY "7"
(20' PRIVATE R/W, 20' E-E)

ALLEY "12"
(20' PRIVATE R/W, 20' E-E)

STREET "D"
(54' PUBLIC R/W, 34.5' B-B)

STREET "E"
(54' PUBLIC R/W, 34.5' B-B)

STREET "I"
(54' PUBLIC R/W, 27' B-B)

CLUB VILLAS DRIVE
(54' PUBLIC R/W, 27' B-B)

SEE SHEET C2.05

SEE SHEET C2.06

PATE, JANE HARRIS
PIN: 1832901277
DB 000423, PG 00-E-
40.00 AC.

TSA #2
53665 SF

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

TOP OF BANK (TYP.)

ZONE 1

ZONE 2

10' NRB NO-BUILD SETBACK

20' TYPE 'B' BUFFER

30' TYPE 'A' BUFFER

10' PEDESTRIAN TRAIL/CART PATH TYING TO ORIGINAL PATH

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SHEET

SITE PLAN
AREA "D"

C2.04

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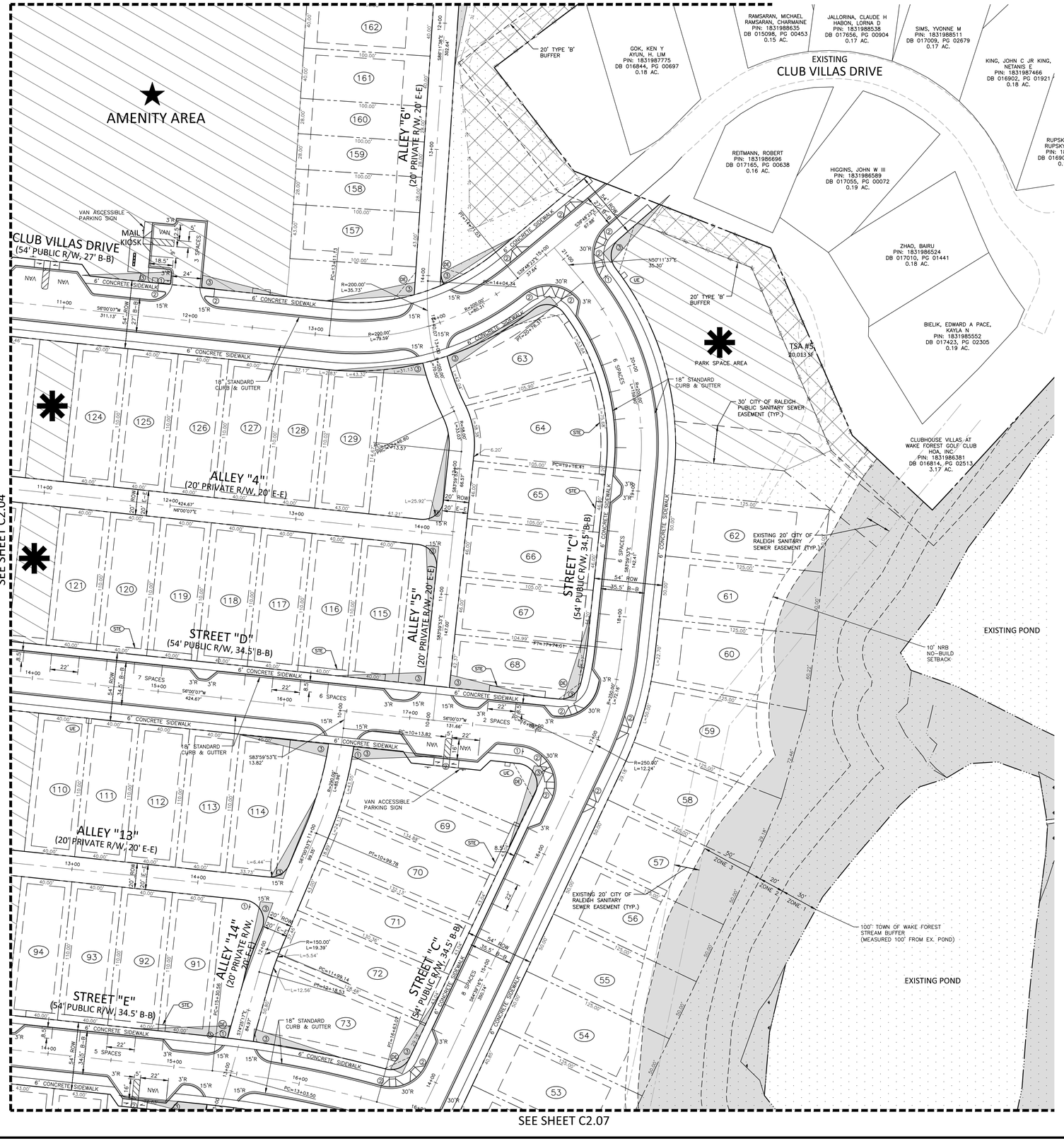

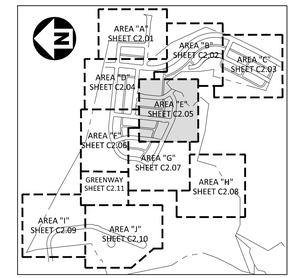

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SHEET

SITE PLAN
AREA "E"
C2.05

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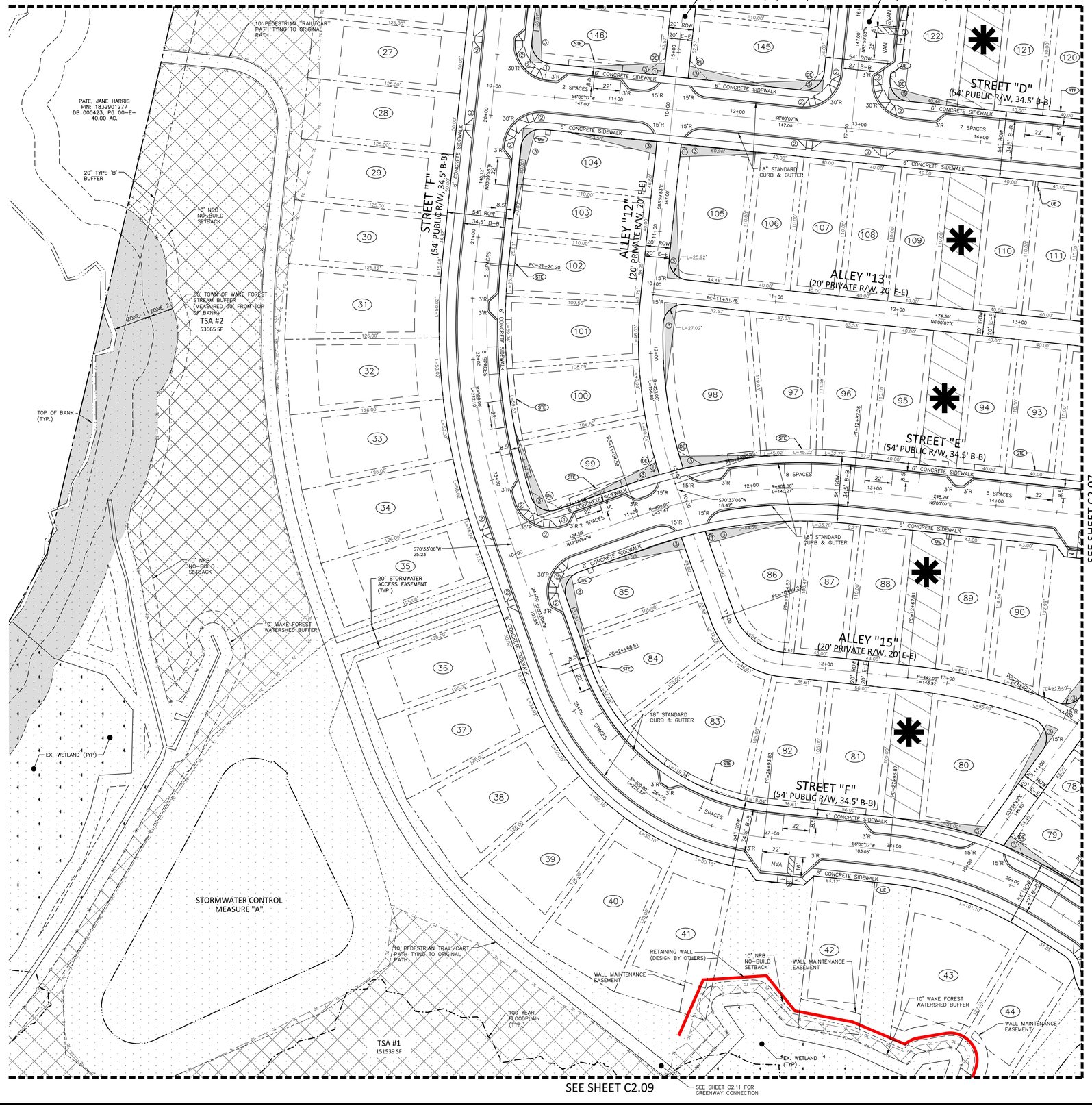



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SHEET

SITE PLAN
AREA "F"
C2.06

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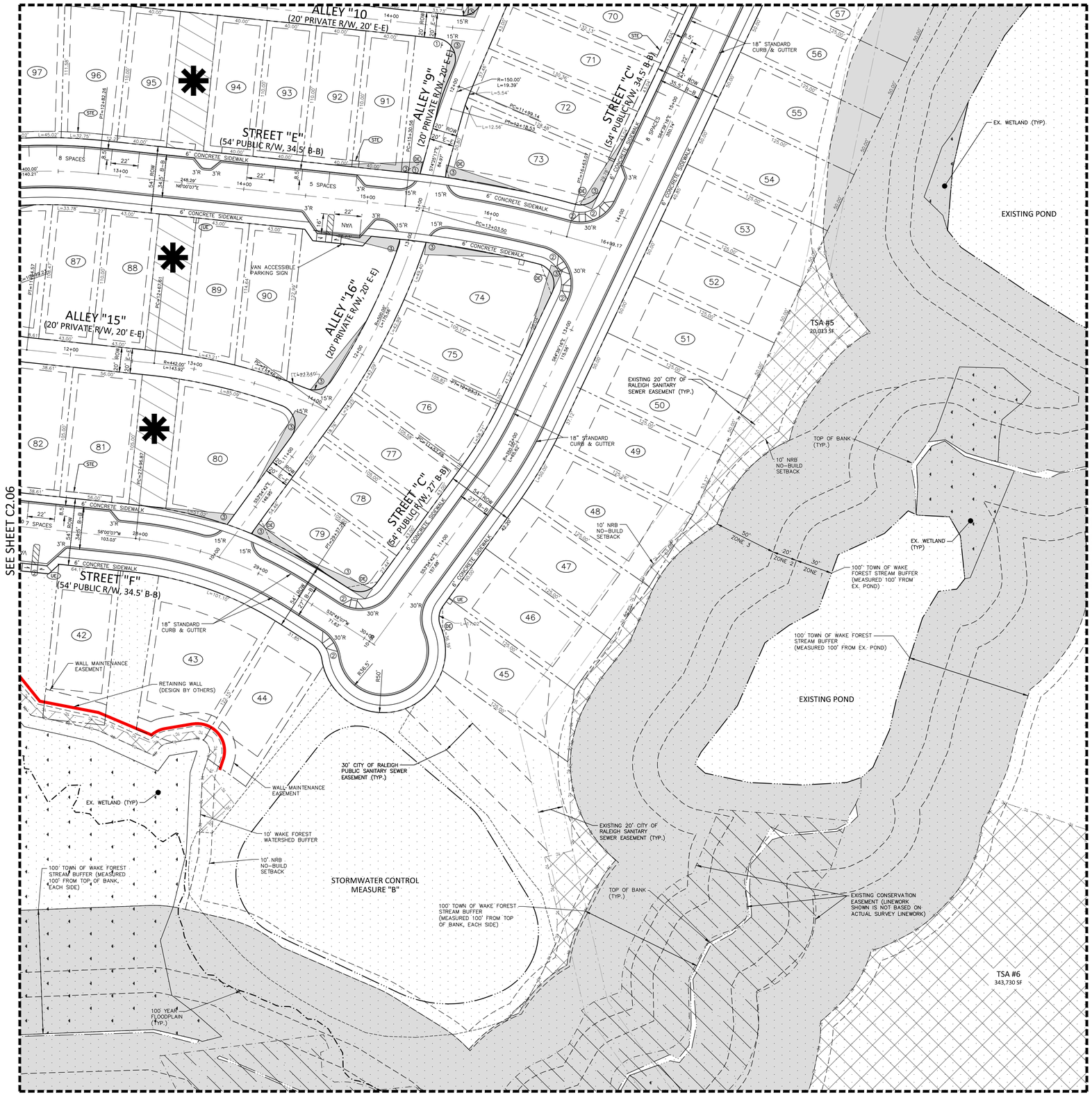

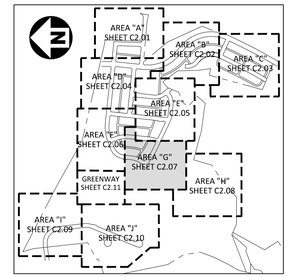

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SHEET

SITE PLAN AREA "G"

C2.07

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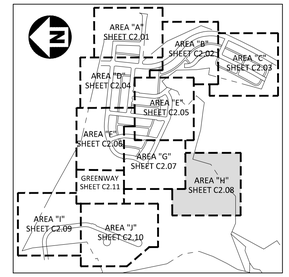
SEE SHEET C2.05

SEE SHEET C2.07



MATCH LINE 1-2, SEE THIS SHEET

INSET "B"
SCALE: 1" = 40'



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SITE LEGEND

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- TRAFFIC DIRECTIONAL ARROW
- VAN ACCESSIBLE PARKING STALL
- ACCESSIBLE RAMPS
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- WETLAND
- OPEN SPACE
- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- CONSERVATION EASEMENT

PASSIVE PARK SPACE FEATURES MAY INCLUDE BUT NOT LIMITED TO:

- WALKING TRAILS
- BUTTERFLY/POLLINATOR GARDEN
- CUT FLOWER GARDEN
- COMMUNITY GARDEN
- DOG PARK
- HAMMOCK LOUNGE
- FIREPIT
- CORNHOLE

ACTIVE PARK SPACE FEATURES MAY INCLUDE BUT NOT LIMITED TO:

- CLUBHOUSE
- SWIMMING POOL
- FITNESS CENTER
- PLAYGROUND
- VOLLEYBALL COURT
- TENNIS/PICKLEBALL COURT

KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND

- (SDE) STORM DRAINAGE EASEMENT
- (UE) UTILITY EASEMENT
- (STE) 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-S1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

SITE PLAN AREA "H"

C2.08

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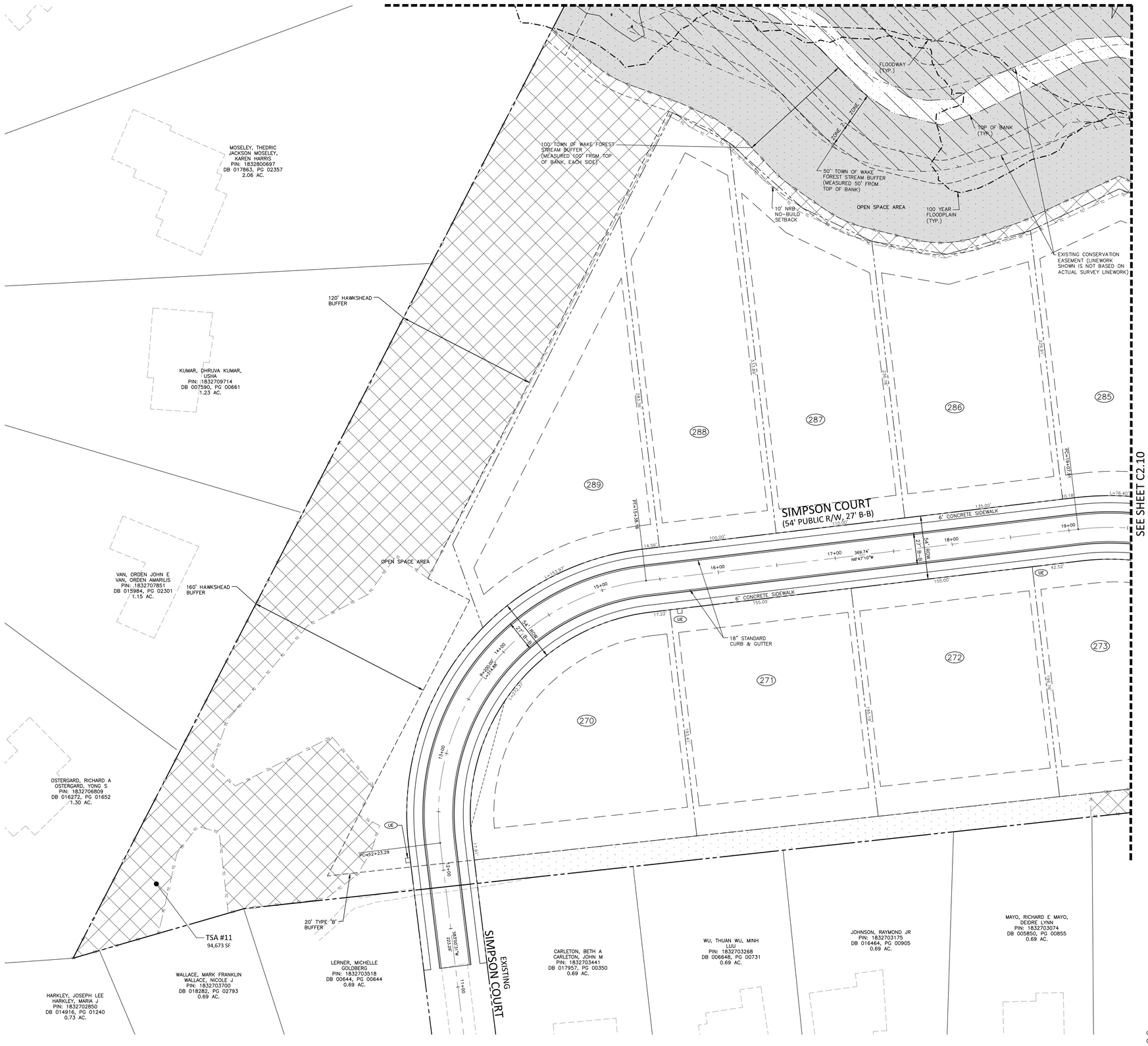

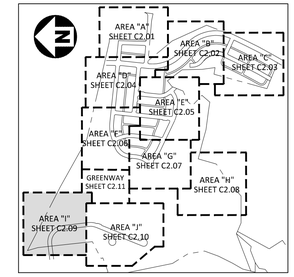

INDEX MAP
1"=1000'

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KEY LEGEND

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EASEMENT LEGEND

- SDE — STORM DRAINAGE EASEMENT
- UE — UTILITY EASEMENT
- STE — 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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SHEET

SITE PLAN AREA "I"

C2.09

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SEE SHEET C2.07

SEE SHEET C2.09

SEE SHEET C2.11 FOR GREENWAY CONNECTION

100' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 100' FROM TOP OF BANK, EACH SIDE)

EX. WETLAND (TYP.)

100 YEAR FLOODPLAIN (TYP.)

OPEN SPACE AREA

10' NRB NO-BUILD SETBACK

10' WAKE FOREST WATERSHED BUFFER

TOP OF BANK (TYP.)

ZONE A

ZONE X

EXISTING CONSERVATION EASEMENT (LINEWORK SHOWN IS NOT BASED ON ACTUAL SURVEY LINEWORK)

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

TSA #8
186,464 SF

FLOODWAY (TYP.)

VAN ACCESSIBLE PARKING SIGN

SIMPSON COURT
(54' PUBLIC R/W, 27' B-B)

6' CONCRETE SIDEWALK

STREET "L"
(54' PUBLIC R/W, 27' B-B)

18" STANDARD CURB & GUTTER

STORMWATER CONTROL MEASURE "C"

MAIL KIOSK

3 SPACES

VAN

30' CITY OF RALEIGH PUBLIC SANITARY SEWER EASEMENT (TYP.)

20' TYPE 'B' BUFFER

MAYO, RICHARD E MAYO, DEIDRE LYNN
PIN: 1832703074
DB 005850, PG 00855
0.69 AC.

LEAVENGOOD, EUGENE L LEAVENGOOD, TERI L
PIN: 1831793941
DB 008598, PG 00333
0.69 AC.

PALMERTON, JEFFREY DALE PALMERTON, ELIZABETH
PIN: 1831791891
DB 007468, PG 00414
0.75 AC.

EXISTING HOGAN DRIVE

10' WAKE FOREST WATERSHED BUFFER

10' NO-BUILD SETBACK

EXISTING 30' CITY OF RALEIGH PUBLIC SANITARY SEWER EASEMENT (TYP.)

TSA #9
27,480 SF

INDEX MAP
1"=1000'

AREA "A" SHEET C2.01
AREA "B" SHEET C2.02
AREA "C" SHEET C2.03
AREA "D" SHEET C2.04
AREA "E" SHEET C2.05
AREA "F" SHEET C2.06
AREA "G" SHEET C2.07
AREA "H" SHEET C2.08
AREA "I" SHEET C2.09
AREA "J" SHEET C2.10
GREENWAY SHEET C2.11

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SHEET

SITE PLAN
AREA "J"

C2.10

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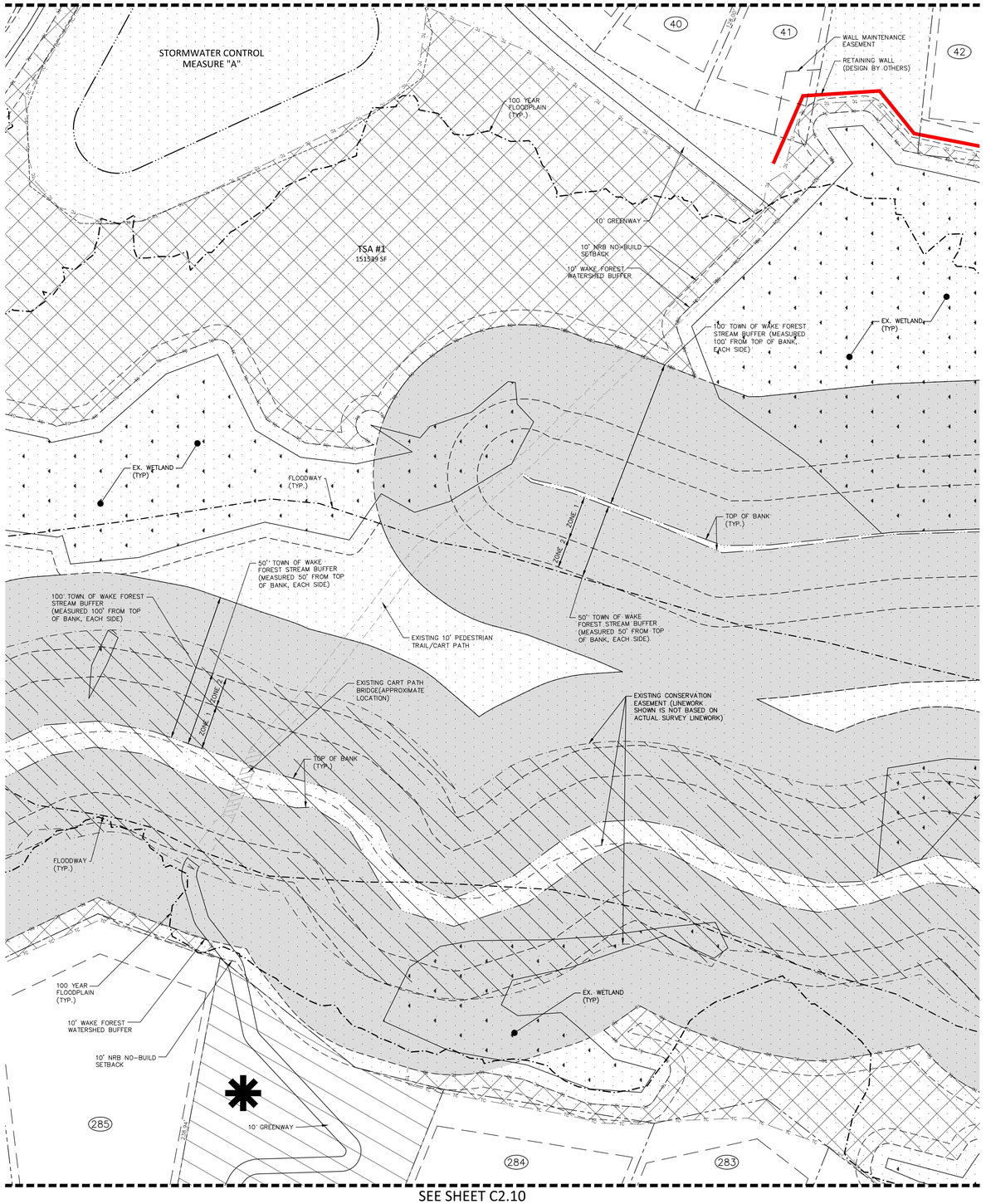
SEE SHEET C2.06



SEE SHEET C2.10



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SHEET

SITE PLAN GREENWAY

C2.11

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INDEX MAP
1"=1000'

ADJACENT PROPERTY OWNERS

1. WAKE UNION BAPTIST CHURCH PIN: 1841097615 DB 010066, PG 02552 0.26 AC.
2. HORTON, ROBIN RANDALL SR HORTON, MARY HOLLAND PIN: 1841092100 DB 016834, PG 00534 0.08 AC.
3. FINNEGAN, JOSEPH T FINNEGAN, LESLEY E PIN: 1841092027 DB 015001, PG 02043 0.06 AC.
4. CARTER, TERRY W CARTER, SUSAN S PIN: 1841092033 DB 015849, PG 01361 0.08 AC.
5. BRUNKHORST, WILLIAM PIN: 1841082989 DB 14-E, PG 3763 0.07 AC.
6. DOMINICK, JOHN M DOMINICK, BETSY S PIN: 1841083918 DB 016125, PG 00408 0.06 AC.
7. GRADY, DOUGLAS H GRADY, MARTHA S PIN: 1841083947 DB 009563, PG 00022 0.06 AC.
8. CORBETT, MICHAEL P CORBETT, VIRGINIA L PIN: 1841083975 DB 011992, PG 02542 0.07 AC.
9. OAKMARK DEVELOPMENT CO LLC PIN: 1841084950 DB 008579, PG 00285 0.08 AC.
10. BYRNE, THOMAS J JR BYRNE, MARY COLLINS PIN: 1841084928 DB 013727, PG 02265 0.07 AC.
11. PRUITT, DELORES PIN: 1841084969 DB 009228, PG 00583 0.06 AC.
12. ROUSSEAU, CHERYLL E PIN: 1841084999 0.08 AC.
13. NEISES, GAIL ELAINE PIN: 1841085969 DB 017776, PG 00544 0.08 AC.
14. HEATH, CHARLES LARRY HEATH, MARY EDITH PIN: 1841086908 DB 016073, PG 01026 0.08 AC.
15. WALSH, DONNA L PIN: 1841085879 DB 010897, PG 00588 0.09 AC.
16. BONE, MALCOLM BONE, ELIZABETH PIN: 1841085875 DB 013245, PG 01171 0.06 AC.
17. LOVING, JOHN C LOVING, LENNIS T PIN: 1841085872 DB 010355, PG 00066 0.08 AC.
18. MATZKEVICH, DYANNE M PIN: 1841085736 DB 017937, PG 02774 0.09 AC.
19. ROGGE, BEVERLY J TRUSTEE, GAIL E AND BEVERLY J ROGGE TRUST PIN: 1841085743 DB 016159, PG 02584 0.06 AC.
20. VOLLMER, CHARLES B VOLLMER, STELLA PIN: 1841085649 DB 014287, PG 00672 0.08 AC.
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22. ZELVIS, MICHELE HOFFMAN PIN: 1841085545 DB 016926, PG 00340 0.08 AC.
23. FAIRWAY VILLAS AT WF GOLF CLUB PIN: 1841085635 DB 010962, PG 00817 2.87 AC.
24. FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC. PIN: 1841094004 DB 009050, PG 00136 1.39 AC.
25. CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB HOA, INC. PIN: 1831986381 DB 016814, PG 02513 3.17 AC.
26. BIELIK, EDWARD A PACE, KAYLA N PIN: 1831985552 DB 017423, PG 02305 0.19 AC.
27. ZHAO, BAIRU PIN: 1831986524 DB 017010, PG 01441 0.18 AC.
28. HIGGINS, JOHN W III PIN: 1831986589 DB 017055, PG 00072 0.19 AC.
29. REITMANN, ROBERT PIN: 1831986696 DB 017165, PG 00638 0.16 AC.
30. GOK, KEN Y AYGN, H LIM PIN: 1831987775 DB 016844, PG 00697 0.18 AC.
31. RAMSARAN, MICHAEL RAMSARAN, CHARMAINE PIN: 1831988635 DB 015098, PG 00453 0.15 AC.
32. JALLORINA, CLAUDE H HABON, LORNA D PIN: 1831988538 DB 017656, PG 00904 0.17 AC.
33. SIMS, YVONNE M PIN: 1831988511 DB 017099, PG 02679 0.17 AC.
34. KING, JOHN C JR KING, NITANIS E PIN: 1831987466 DB 016902, PG 01921 0.18 AC.
35. RUPSKY, MARK J RUPSKY, PENNY L PIN: 1831987430 DB 016903, PG 02026 0.17 AC.
36. CIMA, DAVID A CIMA, CINDY PIN: 1831977217 DB 013668, PG 02375 1.25 AC.
37. GOSSETT, LINDA M PIN: 1831975411 DB 016391, PG 00784 0.70 AC.
38. REDMAN, J MICHEAL PIN: 1831975681 DB 013569, PG 01957 0.91 AC.
39. BOWERS, JAMES S BOWERS, DELIA B PIN: 1831976841 DB 008747, PG 00299 0.91 AC.
40. FICHERA, JOHN L FICHERA, WENDY M PIN: 1831987003 DB 010374, PG 02097 1.20 AC.
41. BARR, ARNOLD L BARR, CHORENE L PIN: 1831985177 DB 002596, PG 00773 1.14 AC.
42. GRIMMETT, ANDREW O WRIGHT, ANGELA M PIN: 1831983138 DB 017994, PG 01725 0.91 AC.
43. FREEMAN, JAMES LOUIS JR FREEMAN, JOAN OUTLAND PIN: 1831981282 DB 010889, PG 00559 0.90 AC.
44. LESTER, JEFFREY A LESTER, JO ANNE D PIN: 1831889265 DB 010527, PG 01658 0.88 AC.
45. UPTON, KEVIN C UPTON, MITZI M PIN: 1831887351 DB 007686, PG 00928 1.13 AC.
46. WILLIAMS, PATRICK EUGENE WILLIAMS, CHELSEA FAIRCLOTH PIN: 1831886151 DB 018244, PG 00964 0.92 AC.
47. JOYNER, SAMUEL H JOYNER, PATRICIA S PIN: 1831884051 DB 016867, PG 02193 0.93 AC.
48. FISHER, C P JR PIN: 1831873802 DB 002417, PG 00449 1.30 AC.
49. PERRY, MICHAEL K PERRY, LEE E PIN: 1831870765 DB 008212, PG 02270 1.10 AC.
50. MICCHIA, JOSEPH M JR TRUSTEE MICCHIA, GINA L TRUSTEE PIN: 1831778748 DB 016880, PG 02215 0.95 AC.
51. KOON, JOEL A KOON, SONJA M PIN: 1831776783 DB 015686, PG 01957 0.96 AC.
52. ADAMS FRY DEVELOPMENTS LLC PIN: 1831772476 DB 007407, PG 00319 5.70 AC.
53. ADAMS FRY DEVELOPMENTS LLC PIN: 1831773725 DB 007465, PG 00637 1.10 AC.
54. CONLEY, JOHN T CONLEY, LYNN G PIN: 1831780094 DB 009180, PG 00702 3.43 AC.
55. EBERLE, JOHN C EBERLE, SUSAN R PIN: 1831781425 DB 015507, PG 00718 3.80 AC.
56. MCVAY, GLEN A. MCVAY, KIMBERLY PIN: 1831780618 DB 015909, PG 01151 1.76 AC.
57. MASSEY, GEORGE DENNIS MASSEY, CHIKAKO S PIN: 1831698865 DB 017878, PG 01999 1.92 AC.
58. O'DELL, MARK A O'DELL, BETH M PIN: 1831699001 DB 007918, PG 00377 1.81 AC.
59. POWELL, ANNE H PIN: 1831698106 DB 012820, PG 00944 1.96 AC.
60. WENNINGER, STEPHAN FRIEDRICH WENNINGER, SARAH LESLIE PIN: 1831698311 DB 015044, PG 01065 2.12 AC.
61. DURHAM, MICHAEL J DURHAM, CAROL J PIN: 1831697456 DB 014730, PG 00924 2.78 AC.
62. MEYER, ROGER P MEYER, KATHLEEN F PIN: 1831695532 DB 006223, PG 00200 1.63 AC.
63. BEASLEY, DARYL BERNARD BEASLEY, CUBE T PIN: 1831696861 DB 017181, PG 02551 1.04 AC.
64. SUCHER, AARON SUCHER, SOU PIN: 1831697924 DB 014805, PG 01066 0.92 AC.
65. HODGES, THOMAS R HODGES, SUSAN C PIN: 1832607117 DB 016741, PG 01362 0.94 AC.
66. BARKLEY, HUBERT MERRILL III BARKLEY, MONICA NABORS PIN: 1832606377 DB 017355, PG 01588 0.98 AC.
67. GIORDANO, GLENN E GIORDANO, JOHNNA D PIN: 1832605408 DB 006833, PG 00871 1.11 AC.
68. LEARY, CHRISTOPHER R LEARY, SHARON L PIN: 1832602446 DB 012850, PG 01160 0.86 AC.
69. FAIRLAKE COMMUNITY ASSOCIATION PIN: 1832610591 DB 016932, PG 00579 8.65 AC.
70. GRAFF, JOSEPH N GRAFF, BARBARA A DB 017097, PG 01191 0.69 AC.
71. DINGBAUM, THOMAS W DINGBAUM, JUDITH ANNE PIN: 1832605934 DB 007917, PG 00070 0.69 AC.
72. MOFFATTE, IAN M MOFFATTE, MICHELLE L PIN: 1832606833 DB 016164, PG 01583 0.69 AC.
73. JACKSON, DAVID E PIN: 1832607746 DB 007273, PG 00186 0.69 AC.
74. CARLE, JACQUELINE D PIN: 1832608775 DB 017342, PG 01960 0.69 AC.
75. HORNER, WESLEY HORNER, MIKAYLA PIN: 1832609761 DB 018368, PG 01295 0.69 AC.
76. GERLITZ, KYLE A TRUSTEE GERLITZ, ANN M TRUSTEE PIN: 1832700611 DB 018153, PG 01396 0.69 AC.
77. HORNBUCKLE, CASSANDRA HORNBUCKLE, KENFIN: 1832700540 DB 016163, PG 00500 0.69 AC.
78. KENNEDY, JANET A PIN: 1832700368 DB 15-E, PG 1815 0.69 AC.
79. YAROSH, DANIEL YAROSH, LORI PIN: 1832700288 DB 015023, PG 01164 0.69 AC.
80. BAGWELL, CAITLIN ELIZABETH PIN: 1832700196 DB 017418, PG 01644 0.69 AC.
81. PORTER, RYAN S PORTER, JESSICA E PIN: 1832700073 DB 015618, PG 01860 0.72 AC.
82. SAPP, ANDREW J SAPP, JO ANN PIN: 1831790960 DB 005582, PG 00544 0.71 AC.
83. PALMERTON, JEFFREY DALE PALMERTON, ELIZABETH PIN: 1831791891 DB 007468, PG 00414 0.75 AC.
84. LEAVENGOOD, EUGENE L LEAVENGOOD, TERI L PIN: 1831793941 DB 008598, PG 00333 0.69 AC.
85. MAYO, RICHARD E MAYO, DEIDRE LYNN PIN: 1832703074 DB 009850, PG 00855 0.69 AC.
86. JOHNSON, RAYMOND JR PIN: 1832703175 DB 016464, PG 00905 0.69 AC.
87. WU, THUAN WU, MINH LUU PIN: 1832703268 DB 006648, PG 00731 0.69 AC.
88. CARLETON, BETH A CARLETON, JOHN M PIN: 1832703441 DB 017957, PG 00350 0.69 AC.
89. LERNER, MICHELLE GOLDBERG PIN: 1832703518 DB 00644, PG 00644 0.69 AC.
90. WALLACE, MARK FRANKLIN WALLACE, NICOLE J PIN: 1832703700 DB 018282, PG 02793 0.69 AC.
91. HARKLEY, JOSEPH LEE HARKLEY, MARIA J PIN: 1832702850 DB 014916, PG 01240 0.73 AC.
92. OSTERGARD, RICHARD A OSTERGARD, YONG S PIN: 1832706809 DB 016272, PG 01652 1.30 AC.
93. VAN, ORDEN JOHN E VAN, ORDEN AMARILIS PIN: 1832702851 DB 015984, PG 02301 1.15 AC.
94. KUMAR, DHRUVA KUMAR, USHA PIN: 1832709714 DB 007590, PG 00661 1.23 AC.
95. MOSELEY, THEDRIC JACKSON MOSELEY, KAREN HARRIS PIN: 1832800697 DB 017863, PG 02357 2.09 AC.
96. PACKETT, MITCHELL G PACKETT, ANNE APIN: 1832803702 DB 008362, PG 02159 3.63 AC.

GRADING LEGEND

- FLARED END SECTION
- ENDWALL SECTION
- CATCH BASIN
- DROP INLET
- STORM SERVICE INLET
- STORM SERVICE ROOF-DRAIN
- JUNCTION BOX
- STORM DRAINAGE
- TREE PROTECTION FENCE (TP — TP — TP)
- LIMITS OF DISTURBANCE (LD — LD — LD)
- WOODED AREA
- MAJOR CONTOUR (250)
- MINOR CONTOUR (252)
- EXISTING MAJOR CONTOUR (250)
- EXISTING MINOR CONTOUR (252)
- EASEMENT LINE
- ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
- RETAINING WALL

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

M:\Projects\TOL\2021\110197\04-Production\Engineering\Master Plan - Pricing Set\Current Drawing\2021110197-OAG1.dwg, 9/7/2023 1:40:17 PM, Juan Montes

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William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

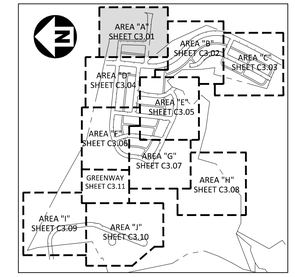
PROJECT NO.	2021110197
FILENAME	2021110197-OAG1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=200'
DATE	08. 25. 2023

SHEET

OVERALL GRADING AND STORM DRAINAGE PLAN

C3.00





INDEX MAP
1"=1000'

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- (STE) STREET TREE EASEMENT

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GRAPHIC SCALE
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PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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SCALE	1"=40'
DATE	08. 25. 2023

SHEET

GRADING AND STORM DRAINAGE PLAN AREA "A"

C3.01

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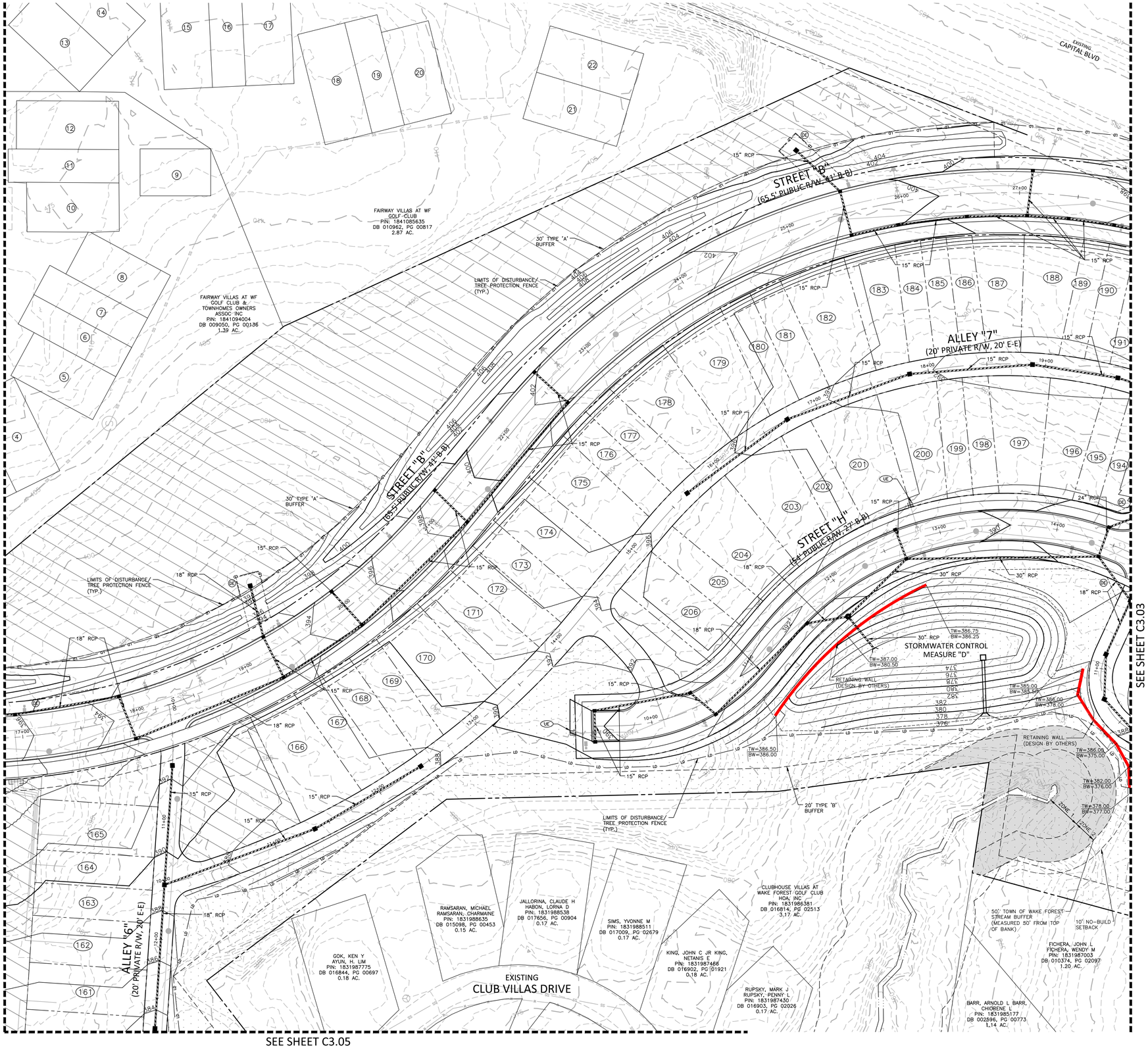



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SHEET

GRADING AND STORM DRAINAGE PLAN AREA "B"

C3.02

M:\Projects\TOD\2021110197\04-Production\Engineering\Master Plan - Pricing Set\Current Drawings\2021110197-G1.dwg, 9/7/2023 1:38:55 PM, Juan Montes

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- EASEMENT LINE
- ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
- RETAINING WALL



INDEX MAP
1"=1000'

SEE SHEET C3.02

EXISTING CAPITAL BLVD

STREET "B" (VARIABLE WIDTH R/W, 41' B-B)

ALLEY "7" (20' PRIVATE R/W, 20' E-E)

STREET "I" (54' PUBLIC R/W, 27' B-B)

ALLEY "8" (20' PRIVATE R/W, 20' E-E)

STREET "H" (54' PUBLIC R/W, 27' B-B)

ALLEY "9" (20' PRIVATE R/W, 20' E-E)

ALLEY "8" (20' PRIVATE R/W, 20' E-E)

ALLEY "11" (20' PRIVATE R/W, 20' E-E)

ALLEY "10" (20' PRIVATE R/W, 20' E-E)

STREET "H" (54' PUBLIC R/W, 27' B-B)

ALLEY "11" (20' PRIVATE R/W, 20' E-E)

LIMITS OF DISTURBANCE (TYP.)

STORMWATER CONTROL MEASURE "D"

TW=385.00 BW=374.00

TW=386.00 BW=378.00

TW=386.08 BW=375.00

TW=382.00 BW=376.00

TW=378.00 BW=377.00

RETAINING WALL (DESIGN BY OTHERS)

10' NO–BUILD SETBACK

ZONE 1

ZONE 2

LIMITS OF DISTURBANCE / TREE PROTECTION FENCE (TYP.)

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

OPEN SPACE AREA

20' TYPE 'B' BUFFER

EXISTING COUNTRY CLUB DRIVE

EXISTING COUNTRY CLUB DRIVE

FICHERA, JOHN L
FICHERA, WENDY M
PIN: 1831987003
DB 010374, PG 02097
1.20 AC.

BARR, ARNOLD L BARR, CHIORENE L
PIN: 1831985177
DB 002596, PG 00773
1.14 AC.

BOWERS, JAMES S
BOWERS, DELIA B
PIN: 1831976841
DB 008747, PG 00299
0.91 AC.

REDMAN, J MICHEAL
PIN: 1831975681
DB 013569, PG 01957
0.91 AC.

CIMA, DAVID A CIMA, CINDY
PIN: 1831977217
DB 013668, PG 02375
1.25 AC.

GOSSETT, LINDA M
PIN: 1831975411
DB 016391, PG 00784
0.70 AC.

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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2023.08.24 16:41:33 -04'00'

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DRAWN BY	JPM
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SHEET

GRADING AND STORM DRAINAGE PLAN AREA "C"

C3.03

M:\Projects\TOL\2021110197\04-Production\Engineering\Master Plan- Pricing Set\Current Drawings\2021110197-G1.dwg, 9/7/2023 11:17:01 AM, Brandon Birdsall



INDEX MAP
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- EASEMENT LINE
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- RETAINING WALL

SEE SHEET C3.01

STREET "A"
(54' PUBLIC R/W, 27' B-B)

STREET "B"
(65.5' PUBLIC R/W, 41' B-B)

ALLEY "2"
(20' PRIVATE R/W, 20' E-E)

ALLEY "3"
(20' PRIVATE R/W, 20' E-E)

ALLEY "4"
(20' PRIVATE R/W, 20' E-E)

ALLEY "5"
(20' PRIVATE R/W, 20' E-E)

ALLEY "6"
(20' PRIVATE R/W, 20' E-E)

ALLEY "7"
(20' PRIVATE R/W, 20' E-E)

ALLEY "12"
(20' PRIVATE R/W, 20' E-E)

STREET "D"
(54' PUBLIC R/W, 34.5' B-B)

STREET "E"
(54' PUBLIC R/W, 34.5' B-B)

STREET "F"
(54' PUBLIC R/W, 34.5' B-B)

CLUB VILLAS DRIVE
(54' PUBLIC R/W, 27' B-B)

AMENITY AREA

MAIL KIOSK

30' TYPE 'A' BUFFER

PATE, JANE HARRIS
PIN: 1832901277
DB 000423, PG 00–E–
40.00 AC.

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

ZONE 1

ZONE 2

20' TYPE 'B' BUFFER

LIMITS OF DISTURBANCE/ TREE PROTECTION FENCE (TYP.)

SEE SHEET C3.05

SEE SHEET C3.06

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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SHEET

GRADING AND STORM DRAINAGE PLAN AREA "D"

C3.04

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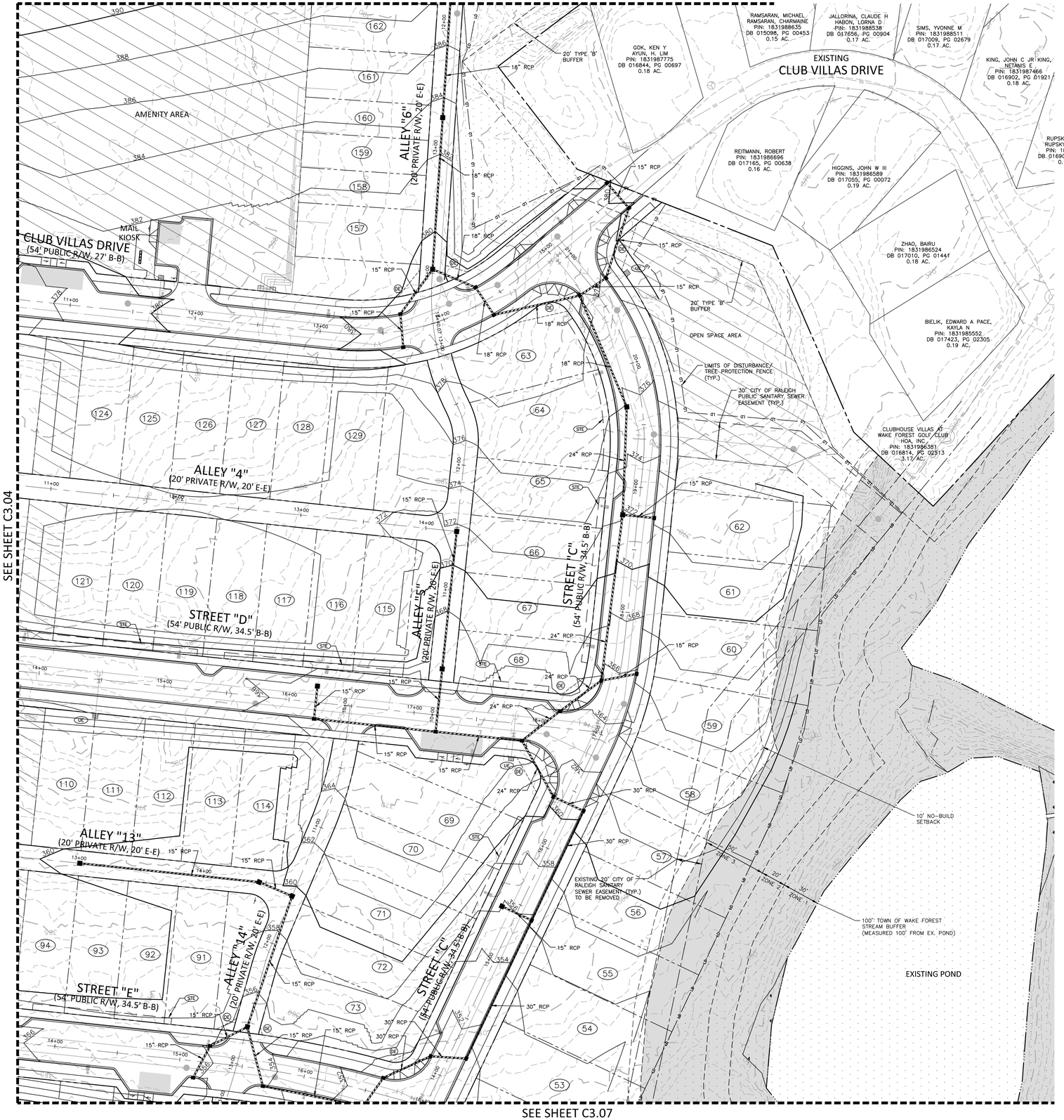

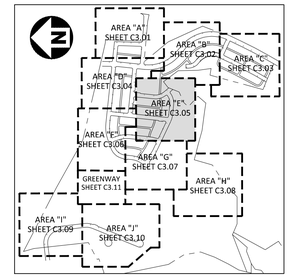

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SHEET

GRADING AND STORM DRAINAGE PLAN AREA "E"

C3.05

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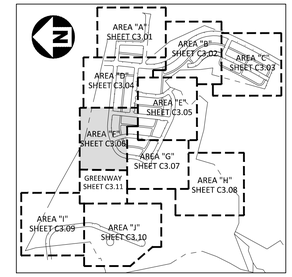

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NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=edaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-G1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

GRADING AND STORM DRAINAGE PLAN AREA "F"

C3.06

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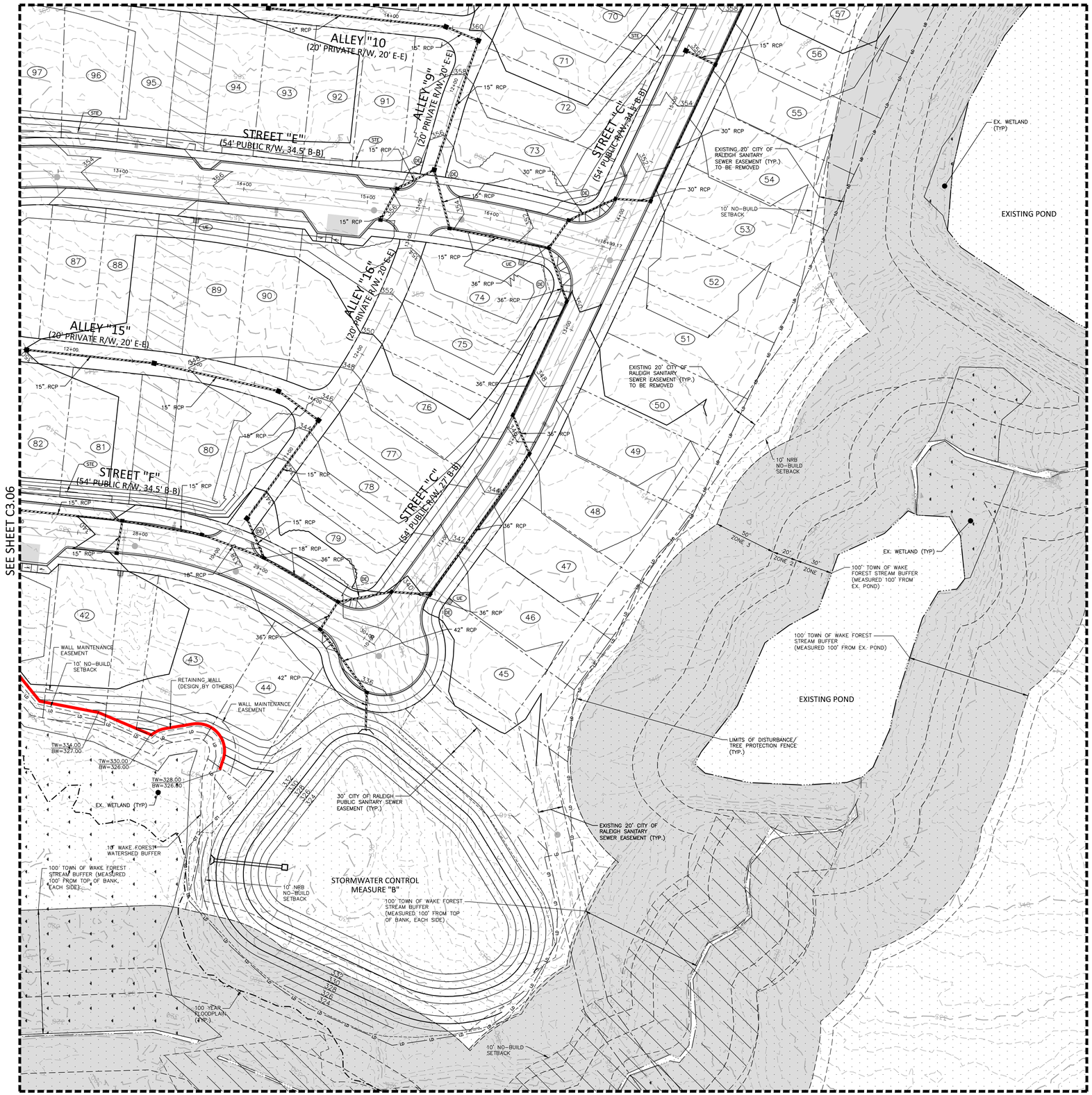

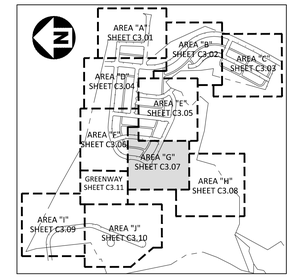

INDEX MAP
1"=1000'

EASEMENT LEGEND

- (DE) STORM DRAINAGE EASEMENT
- (UE) UTILITY EASEMENT
- (STE) STREET TREE EASEMENT

GRADING LEGEND

- FLARED END SECTION
- ENDWALL SECTION
- CATCH BASIN
- DROP INLET
- STORM SERVICE INLET
- STORM SERVICE ROOF-DRAIN
- JUNCTION BOX
- DRAINAGE FLOW ARROW
- LINE BREAK SYMBOL
- 250.50 / 250.00 — TOP & BOTTOM CURB ELEVATIONS
- TW=223.00 / BW=213.00 — TOP OF WALL ELEVATION / BOTTOM OF WALL ELEVATION (NOTE: BOTTOM OF WALL IS GROUND ELEVATION NOT WALL FOUNDATION)
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- 252 — MINOR CONTOUR
- 250 — EXISTING MAJOR CONTOUR
- 252 — EXISTING MINOR CONTOUR
- EASEMENT LINE
- ACCESSIBLE PARKING AREA (2% MAX. SLOPE IN ALL DIRECTIONS)
- RETAINING WALL

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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Durham, NC 27713

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GRADING AND STORM DRAINAGE PLAN AREA "G"

C3.07

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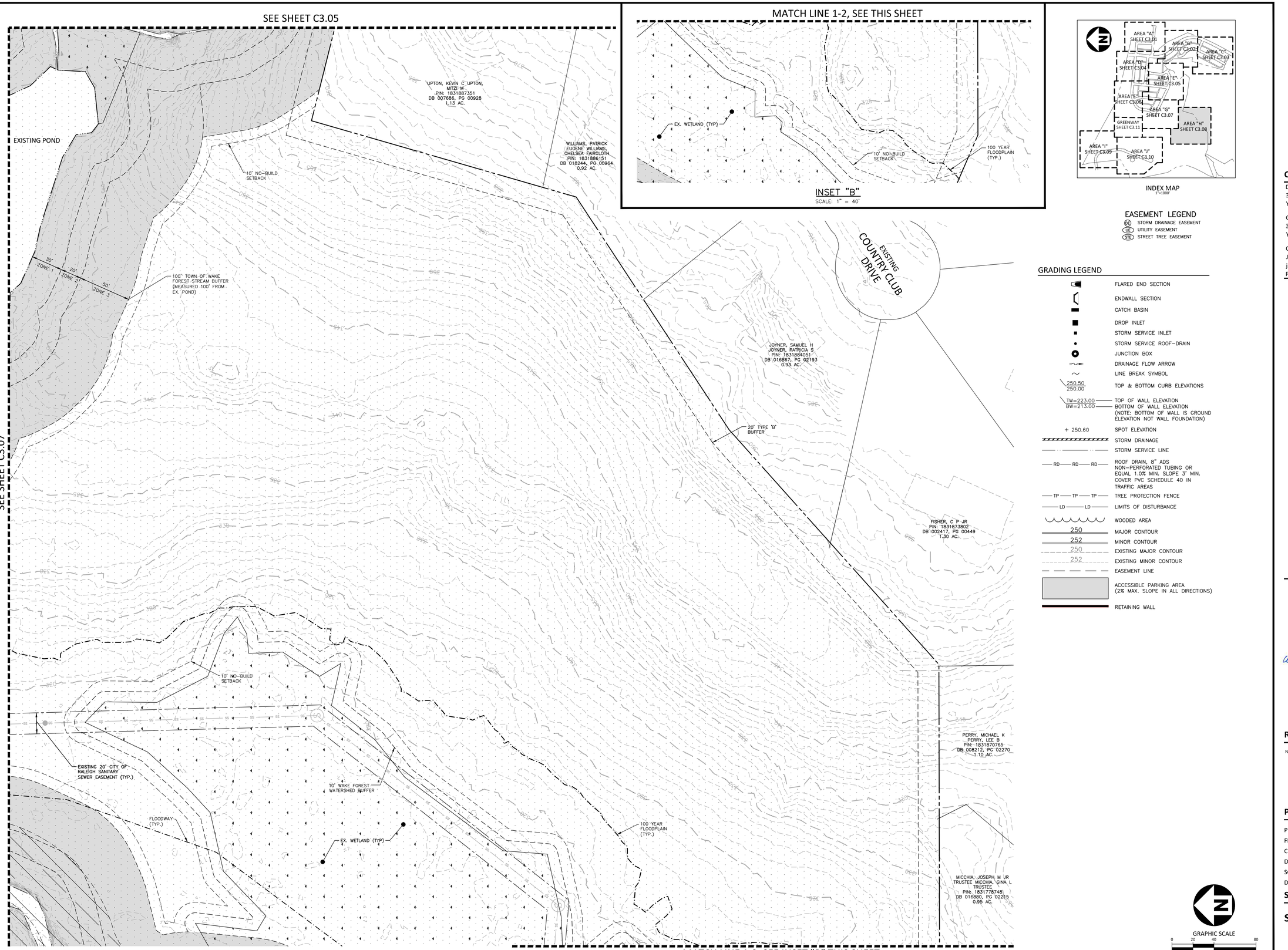

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GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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SHEET

GRADING AND STORM DRAINAGE PLAN AREA "H"

C3.08

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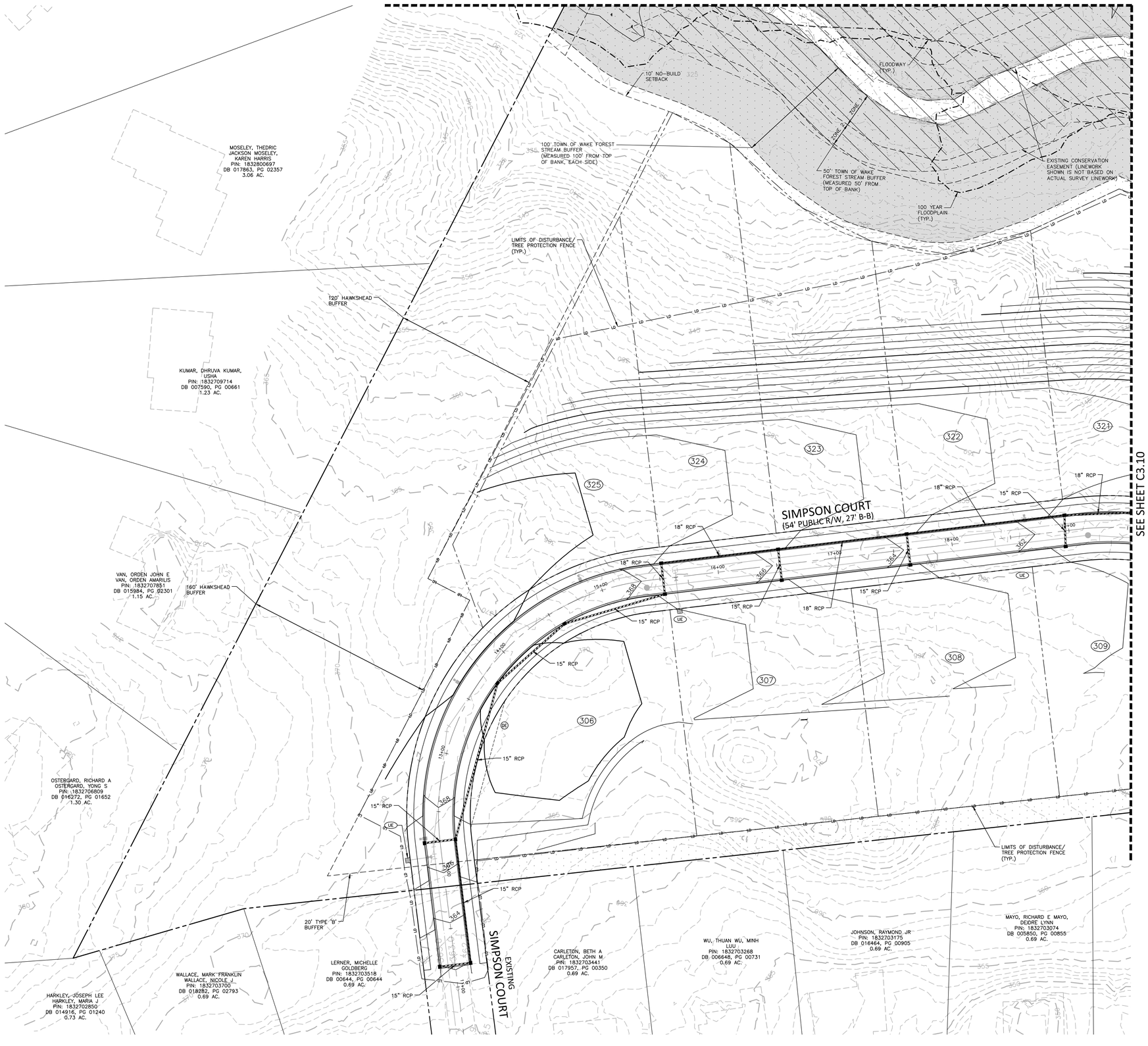

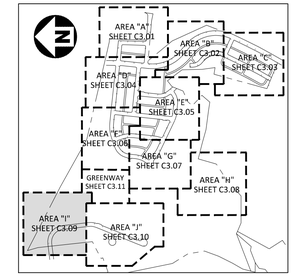

INDEX MAP
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GRADING AND STORM DRAINAGE PLAN AREA "I"

C3.09

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SEE SHEET C3.07

SEE SHEET C3.09

SEE SHEET C3.11 FOR GREENWAY CONNECTION

10' GREENWAY

100' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 100' FROM TOP OF BANK, EACH SIDE)

EX. WETLAND (TYP.)

100 YEAR FLOODPLAIN (TYP.)

OPEN SPACE AREA

10' NRB NO-BUILD SETBACK

10' WAKE FOREST WATERSHED BUFFER

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

ZONE R-4

10' NO-BUILD SETBACK

FLOODWAY (TYP.)

LIMITS OF DISTURBANCE/ TREE PROTECTION FENCE (TYP.)

SIMPSON COURT
(54' PUBLIC R/W, 27' B-B)

STREET "L"
(54' PUBLIC R/W, 27' B-B)

STORMWATER CONTROL MEASURE "C"

18" RCP

24" RCP

15" RCP

30" RCP

MAIL KIOSK

30' CITY OF RALEIGH PUBLIC SANITARY SEWER EASEMENT (TYP.)

EXISTING 30' CITY OF RALEIGH PUBLIC SANITARY SEWER EASEMENT (TYP.)

20' TYPE 'B' BUFFER

EXISTING HOGAN DRIVE

MAYO, RICHARD E MAYO, DEIDRE LYNN
PIN: 1832703074
DB 008850, PG 00855
0.69 AC.

LEAVENGOOD, EUGENE L
LEAVENGOOD, TERI L
PIN: 1831793941
DB 008598, PG 00333
0.69 AC.

PALMERTON, JEFFREY DALE PALMERTON, ELIZABETH
PIN: 1831791891
DB 007468, PG 00414
0.75 AC.



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GRADING AND STORM DRAINAGE PLAN AREA "J"

C3.10

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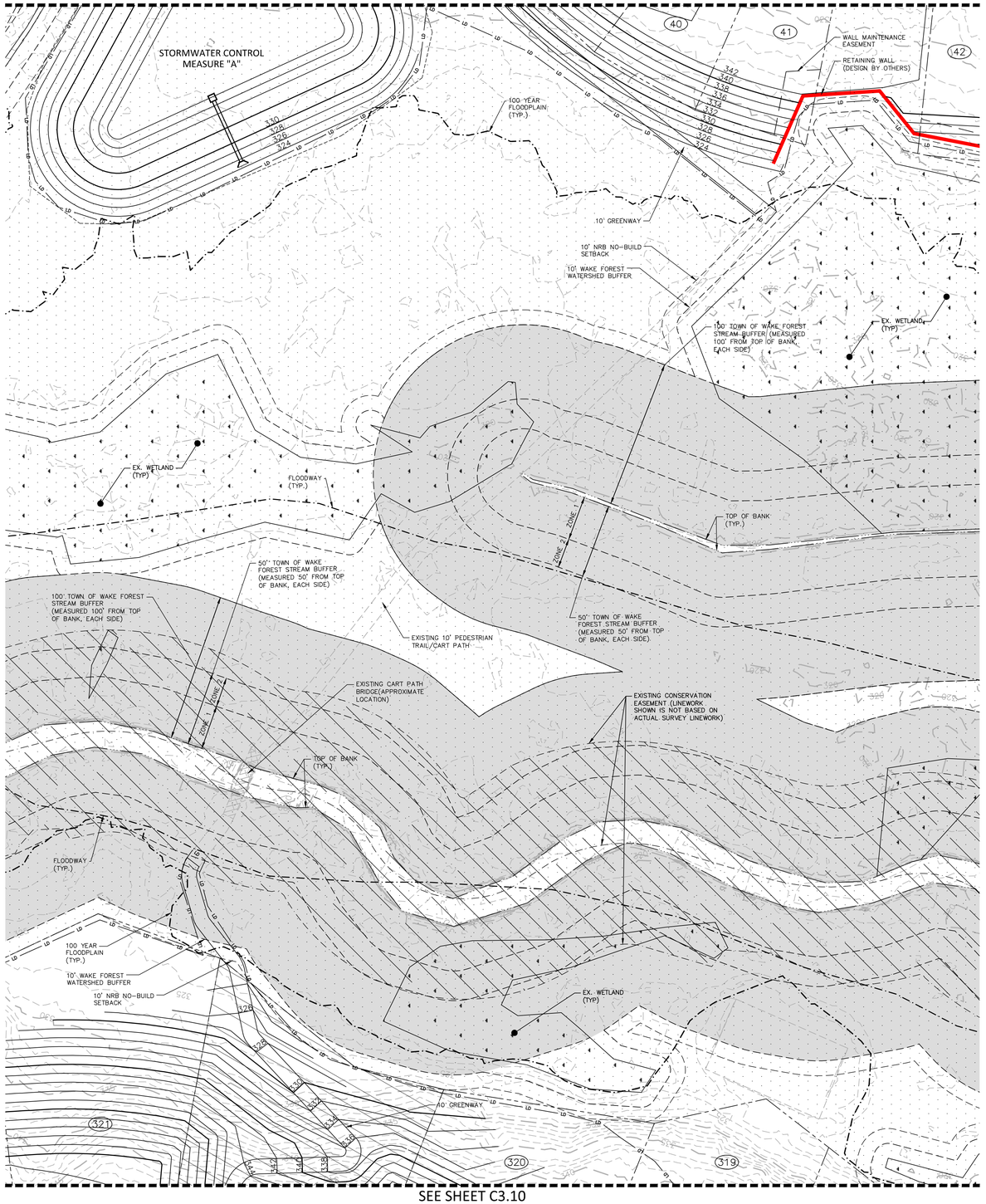
SEE SHEET C3.06



SEE SHEET C3.10



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KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

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GRADING AND STORM DRAINAGE PLAN GREENWAY

C3.11

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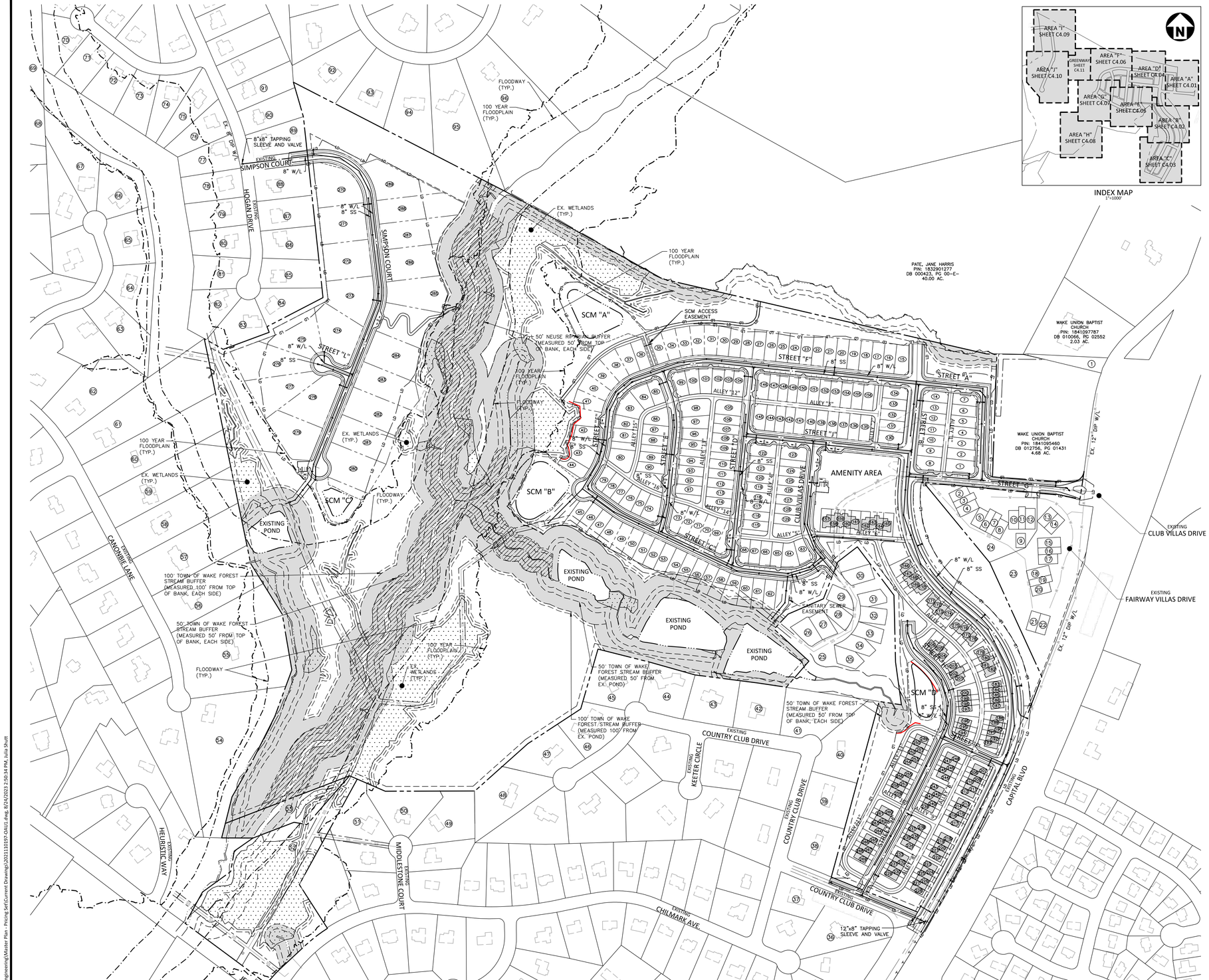

INDEX MAP
1"=1000'

ADJACENT PROPERTY OWNERS

1. WAKE UNION BAPTIST CHURCH PIN: 1841097615 DB 010066, PG 02552 0.26 AC.
2. HORTON, ROBIN RANDALL SR HORTON, MARY HOLLAND PIN: 1841092100 DB 016834, PG 00534 0.08 AC.
3. FINNEGAN, JOSEPH T FINNEGAN, LESLEY E PIN: 1841092027 DB 015001, PG 02043 0.06 AC.
4. CARTER, TERRY W CARTER, SUSAN S PIN: 1841092033 DB 015849, PG 01361 0.08 AC.
5. BRUNKHORST, WILLIAM PIN: 1841082989 DB 14-E, PG 3763 0.07 AC.
6. DOMINICK, JOHN M DOMINICK, BETSY S PIN: 1841083918 DB 016125, PG 00408 0.06 AC.
7. GRADY, DOUGLAS H GRADY, MARTHA S PIN: 1841083947 DB 009563, PG 00022 0.06 AC.
8. CORBETT, MICHAEL P CORBETT, VIRGINIA L PIN: 1841083975 DB 011992, PG 02542 0.07 AC.
9. OAKMARK DEVELOPMENT CO LLC PIN: 1841084950 DB 008579, PG 00285 0.08 AC.
10. BYRNE, THOMAS J JR BYRNE, MARY COLLINS PIN: 1841084928 DB 013727, PG 02265 0.07 AC.
11. PRUITT, DELORES PIN: 1841084969 DB 009228, PG 00583 0.06 AC.
12. ROUSSEAU, CHERYLL E PIN: 1841084999 0.08 AC.
13. NEISES, GAIL ELAINE PIN: 1841085969 DB 017776, PG 00544 0.08 AC.
14. HEATH, CHARLES LARRY HEATH, MARY EDITH PIN: 1841086908 DB 016073, PG 01026 0.08 AC.
15. WALSH, DONNA L PIN: 1841085879 DB 010897, PG 00588 0.09 AC.
16. BONE, MALCOLM BONE, ELIZABETH PIN: 1841085875 DB 013245, PG 01171 0.06 AC.
17. LOVING, JOHN C LOVING, LENNIS T PIN: 1841085872 DB 010355, PG 00066 0.08 AC.
18. MATZKEVICH, DYANNE M PIN: 1841085736 DB 017937, PG 02774 0.09 AC.
19. ROGGE, BEVERLY J TRUSTEE, GAIL E AND BEVERLY J ROGGE TRUST PIN: 1841085743 DB 016159, PG 02584 0.06 AC.
20. VOLLMER, CHARLES B VOLLMER, STELLA PIN: 1841085649 DB 014287, PG 00672 0.08 AC.
21. MAIOLO, THOMAS PIN: 1841085516 DB 017711, PG 02381 0.08 AC.
22. ZELVIS, MICHELE HOFFMAN PIN: 1841085545 DB 016929, PG 00340 0.08 AC.
23. FAIRWAY VILLAS AT WF GOLF CLUB PIN: 1841085635 DB 010962, PG 00817 2.87 AC.
24. FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC PIN: 1841094004 DB 009050, PG 00136 1.39 AC.
25. CLUBHOUSE VILLAS AT WAKE FOREST GOLF CLUB HOA, INC. PIN: 1831986381 DB 016814, PG 02513 3.17 AC.
26. BIELIK, EDWARD A PACE, KAYLA N PIN: 1831985552 DB 017423, PG 02305 0.19 AC.
27. ZHAO, BAIRU PIN: 1831986524 DB 017010, PG 01441 0.18 AC.
28. HIGGINS, JOHN W III PIN: 1831986589 DB 017055, PG 00072 0.19 AC.
29. REITMANN, ROBERT PIN: 1831986696 DB 017165, PG 00638 0.16 AC.
30. GOK, KEN Y AYGN, H. LIM PIN: 1831987775 DB 016844, PG 00697 0.18 AC.
31. RAMSARAN, MICHAEL RAMSARAN, CHARMAINE PIN: 1831988635 DB 015098, PG 00453 0.15 AC.
32. JALLORINA, CLAUDE H HABON, LORNA D PIN: 1831988538 DB 017656, PG 00904 0.17 AC.
33. SIMS, YVONNE M PIN: 1831988511 DB 017009, PG 02679 0.17 AC.
34. KING, JOHN C JR KING, NETANIS E PIN: 1831987466 DB 016902, PG 01921 0.18 AC.
35. RUPSKY, MARK J RUPSKY, PENNY L PIN: 1831987430 DB 016903, PG 02026 0.17 AC.
36. CIMA, DAVID A CIMA, CINDY PIN: 1831977217 DB 013668, PG 02375 1.25 AC.
37. GOSSETT, LINDA M PIN: 1831975411 DB 016391, PG 00784 0.70 AC.
38. REDMAN, J MICHEAL PIN: 1831975681 DB 013569, PG 01957 0.91 AC.
39. BOWERS, JAMES S BOWERS, DELIA B PIN: 1831976841 DB 008747, PG 00299 0.91 AC.
40. FICHERA, JOHN L FICHERA, WENDY M PIN: 1831987003 DB 010374, PG 02097 1.20 AC.
41. BARR, ARNOLD L BARR, CHORENE L PIN: 1831985177 DB 002596, PG 00773 1.14 AC.
42. GRIMMETT, ANDREW O WRIGHT, ANGELA M PIN: 1831983138 DB 017994, PG 01725 0.91 AC.
43. FREEMAN, JAMES LOUIS JR FREEMAN, JOAN OUTLAND PIN: 1831981282 DB 010889, PG 00559 0.90 AC.
44. LESTER, JEFFREY A LESTER, JO ANNE D PIN: 1831889265 DB 010527, PG 01658 0.88 AC.
45. UPTON, KEVIN C UPTON, MITZI M PIN: 1831887351 DB 007686, PG 00928 1.13 AC.
46. WILLIAMS, PATRICK EUGENE WILLIAMS, CHELSEA FAIRCLOTH PIN: 1831886151 DB 018244, PG 00964 0.92 AC.
47. JOYNER, SAMUEL H JOYNER, PATRICIA S PIN: 1831884051 DB 016867, PG 02193 0.93 AC.
48. FISHER, C. P. JR PIN: 1831873802 DB 002417, PG 00449 1.30 AC.
49. PERRY, MICHAEL K PERRY, LEE B PIN: 1831870765 DB 008212, PG 02270 1.10 AC.
50. MICCHIA, JOSEPH M JR TRUSTEE MICCHIA, GINA L TRUSTEE PIN: 1831778748 DB 016880, PG 02215 0.95 AC.
51. KOON, JOEL A KOON, SONJA M PIN: 1831776783 DB 015686, PG 01957 0.96 AC.
52. ADAMS FRY DEVELOPMENTS LLC PIN: 1831772476 DB 007407, PG 00319 5.70 AC.
53. ADAMS FRY DEVELOPMENTS LLC PIN: 1831773725 DB 007465, PG 00637 1.10 AC.
54. CONLEY, JOHN T CONLEY, LYNN G PIN: 1831780094 DB 006180, PG 00702 3.43 AC.
55. EBERLE, JOHN C EBERLE, SUSAN R PIN: 1831781425 DB 015507, PG 00718 3.80 AC.
56. MCVAY, GLEN A. MCVAY, KIMBERLY PIN: 1831780618 DB 015909, PG 01151 1.76 AC.
57. MASSEY, GEORGE DENNIS MASSEY, CHIKAKO S PIN: 1831689865 DB 017878, PG 01999 1.02 AC.
58. O'DELL, MARK A O'DELL, BETH M PIN: 1831699001 DB 007918, PG 00377 1.81 AC.
59. POWELL, ANNE H PIN: 1831698106 DB 012820, PG 00944 1.96 AC.
60. WENNINGER, STEPHAN FRIEDRICH WENNINGER, SARAH LESLIE PIN: 1831698311 DB 015044, PG 01065 2.12 AC.
61. DURHAM, MICHAEL J DURHAM, CAROL I PIN: 1831697456 DB 014730, PG 00924 2.78 AC.
62. MEYER, ROGER P MEYER, KATHLEEN F PIN: 1831695532 DB 006223, PG 00200 1.63 AC.
63. BEASLEY, DARYL BERNARD BEASLEY, CUBE T PIN: 1831696886 DB 017181, PG 02551 1.04 AC.
64. SUCHER, AARON SUCHER, SOU PIN: 1831697924 DB 014805, PG 01066 0.92 AC.
65. HODGES, THOMAS R HODGES, SUSAN C PIN: 1832607117 DB 016741, PG 01362 0.94 AC.
66. BARKLEY, HUBERT MERRILL III BARKLEY, MONICA NABORS PIN: 1832606377 DB 017355, PG 01588 0.98 AC.
67. GIORDANO, GLENN E GIORDANO, JOHNNA D PIN: 1832605408 DB 006833, PG 00871 1.11 AC.
68. LEARY, CHRISTOPHER R LEARY, SHARON L PIN: 1832602446 DB 012850, PG 01160 0.86 AC.
69. FAIRLAKE COMMUNITY ASSOCIATION PIN: 1832610591 DB 016932, PG 00579 8.65 AC.
70. GRAFF, JOSEPH N GRAFF, BARBARA A PIN: 1832614001 DB 017097, PG 01191 0.69 AC.
71. DINGBAUM, THOMAS W DINGBAUM, JUDITH ANNE PIN: 1832605934 DB 007917, PG 00070 0.69 AC.
72. MOFFATTE, IAN M MOFFATTE, MICHELLE L PIN: 1832606833 DB 016164, PG 01583 0.69 AC.
73. JACKSON, DAVID E PIN: 1832607746 DB 007273, PG 00186 0.69 AC.
74. CARLE, JACQUELINE D PIN: 1832608775 DB 017342, PG 01960 0.69 AC.
75. HORNER, WESLEY HORNER, MIKAYLA PIN: 1832609761 DB 018368, PG 01295 0.69 AC.
76. GERLITZ, KYLE A TRUSTEE GERLITZ, ANN M TRUSTEE PIN: 1832700611 DB 018153, PG 01396 0.69 AC.
77. HORNBUCKLE, CASSANDRA HORNBUCKLE, KENFIN: 1832700540 DB 016816, PG 00500 0.69 AC.
78. KENNEDY, JANET A PIN: 1832700368 DB 15--E, PG 1815 0.69 AC.
79. YAROSH, DANIEL YAROSH, LORI PIN: 1832700288 DB 015023, PG 01164 0.69 AC.
80. BAGWELL, CAITLIN ELIZABETH PIN: 1832700196 DB 017418, PG 01644 0.69 AC.
81. PORTER, RYAN S PORTER, JESSICA E PIN: 1832700073 DB 015618, PG 01860 0.72 AC.
82. SAPP, ANDREW J SAPP, JO ANN PIN: 1831790960 DB 005582, PG 00544 0.71 AC.
83. PALMERTON, JEFFREY DALE PALMERTON, ELIZABETH PIN: 1831791891 DB 007468, PG 00414 0.75 AC.
84. LEAVENGOOD, EUGENE L LEAVENGOOD, TERI L PIN: 1831793941 DB 008598, PG 00333 0.69 AC.
85. MAYO, RICHARD E MAYO, DEIDRE LYNN PIN: 1832703074 DB 008850, PG 00855 0.69 AC.
86. JOHNSON, RAYMOND JR PIN: 1832703175 DB 016464, PG 00905 0.69 AC.
87. WU, THUAN WU, MINH LUU PIN: 1832703268 DB 006648, PG 00731 0.69 AC.
88. CARLETON, BETH A CARLETON, JOHN M PIN: 1832703441 DB 017957, PG 00350 0.69 AC.
89. LERNER, MICHELLE GOLDBERG PIN: 1832703518 DB 00644, PG 00644 0.69 AC.
90. WALLACE, MARK FRANKLIN WALLACE, NICOLE J PIN: 1832703700 DB 018282, PG 02793 0.69 AC.
91. HARKLEY, JOSEPH LEE HARKLEY, MARIA J PIN: 1832702850 DB 014916, PG 01240 0.73 AC.
92. OSTERGARD, RICHARD A OSTERGARD, YONG S PIN: 1832706809 DB 016272, PG 01652 1.30 AC.
93. VAN, ORDEN JOHN E VAN, ORDEN AMARILIS PIN: 1832707851 DB 015984, PG 02301 1.15 AC.
94. KUMAR, DHRUVA KUMAR, USHA PIN: 1832709714 DB 007590, PG 00661 1.23 AC.
95. MOSELEY, THEDRIC JACKSON MOSELEY, KAREN HARRIS PIN: 1832800697 DB 017863, PG 02357 2.09 AC.
96. PACKETT, MITCHELL G PACKETT, ANNE APIN: 1832803702 DB 008362, PG 02159 3.63 AC.

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T O'DANIEL

William T O'Daniel
William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-OAU1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=200'
DATE	08. 25. 2023

SHEET

OVERALL UTILITY PLAN

C4.00

JOYNER PROPERTY

MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

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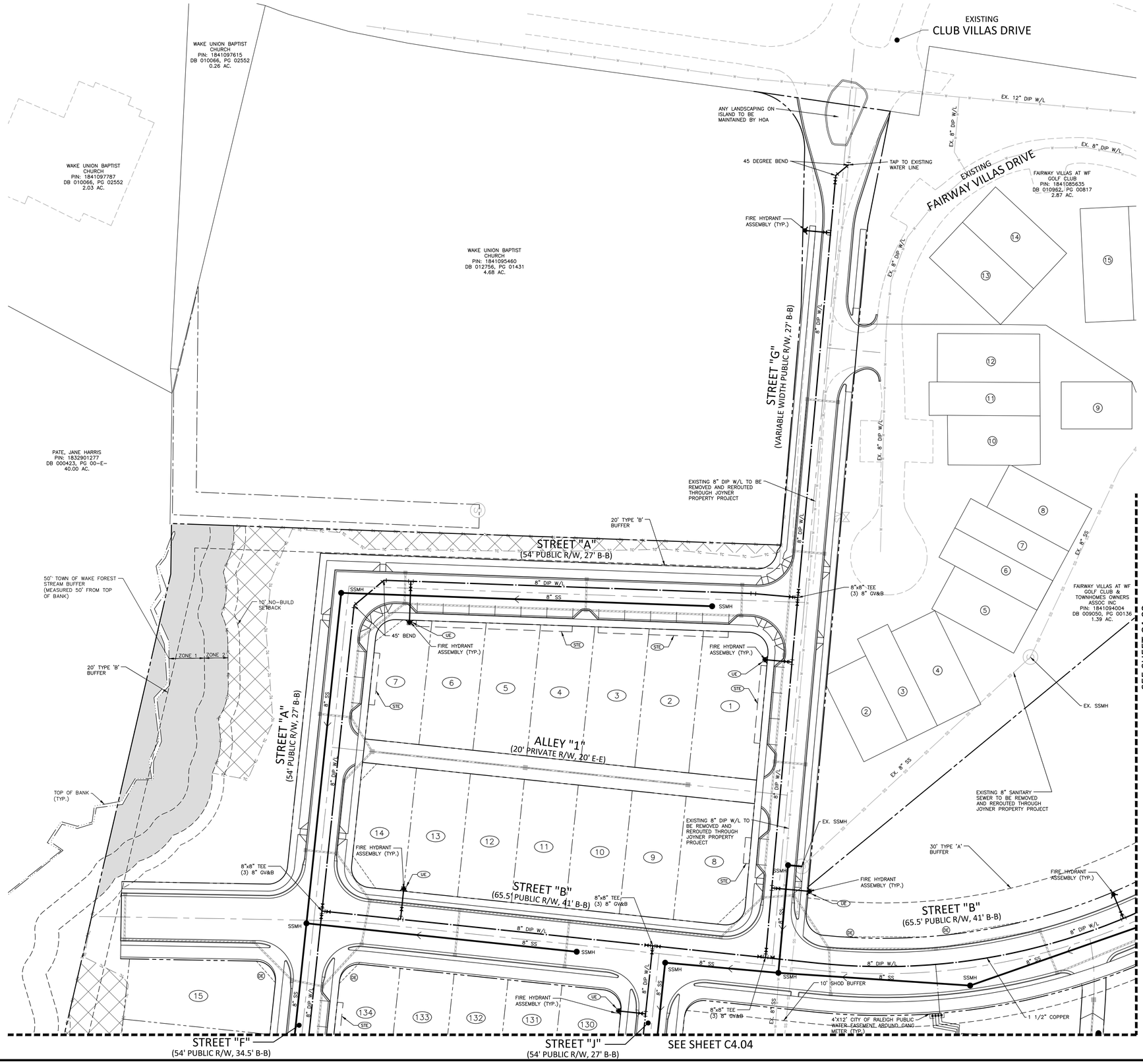

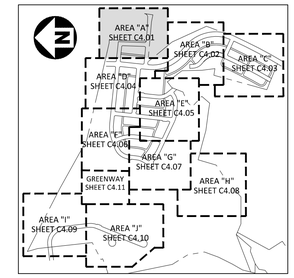

INDEX MAP
1"=1000'

EASEMENT LEGEND
- (DE) STORM DRAINAGE EASEMENT
- (UE) UTILITY EASEMENT
- (STE) STREET TREE EASEMENT

UTILITY LEGEND
- FIRE HYDRANT ASSEMBLY
- WATER VALVE
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- SANITARY SEWER MANHOLE
- SEWER FLOW DIRECTION ARROW
- WATERLINE
- SANITARY SEWER
- EASEMENT LINE

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JOYNER PROPERTY
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WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN
AREA "A"
C4.01

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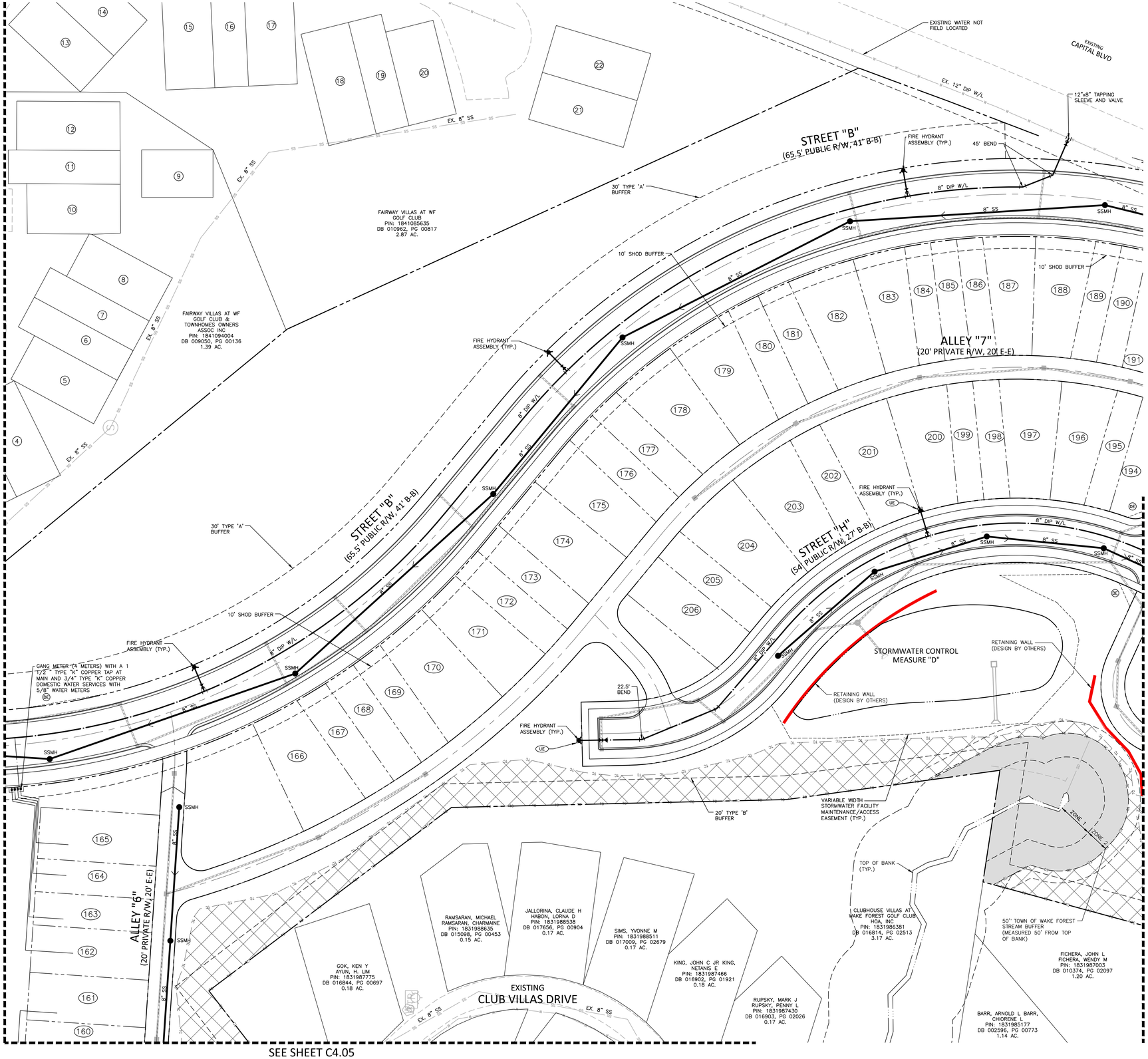



INDEX MAP
1"=1000'

EASEMENT LEGEND

- DE — STORM DRAINAGE EASEMENT
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UTILITY LEGEND

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- SEWER FLOW DIRECTION ARROW
- WATERLINE
- SANITARY SEWER
- EASEMENT LINE

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN
AREA "B"

C4.02

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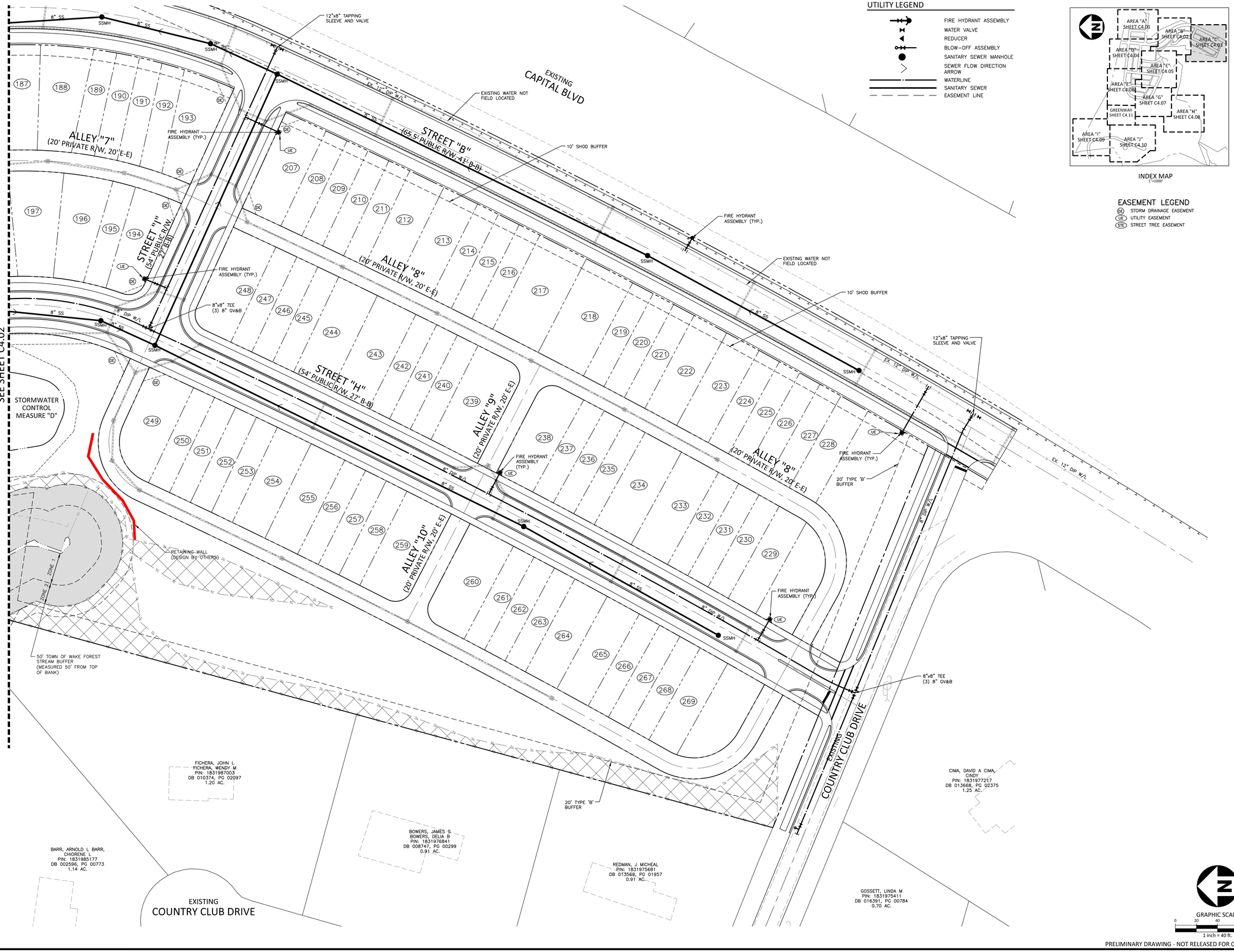

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PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
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DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN AREA "C"

C4.03

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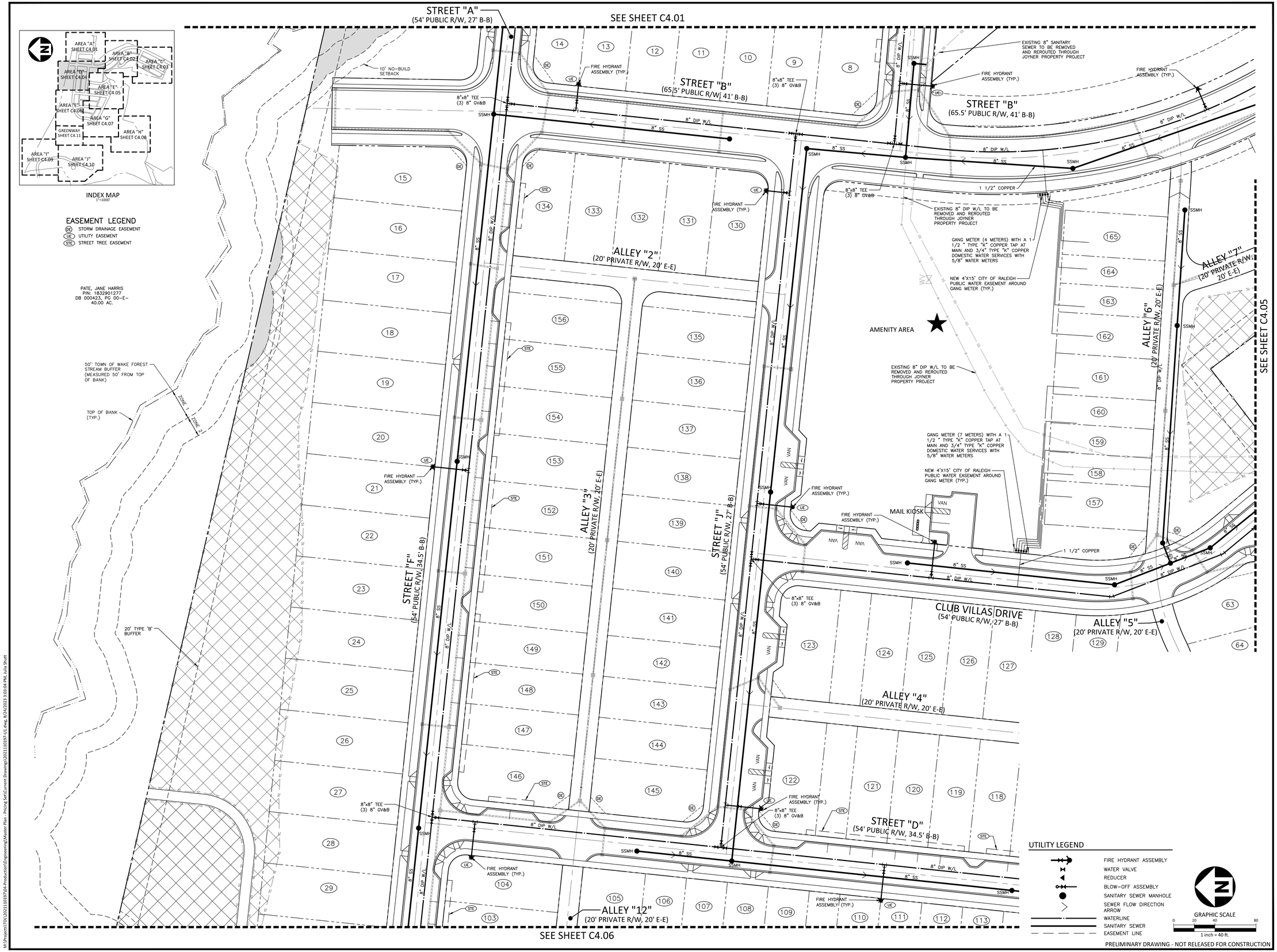

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PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
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DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN AREA "D"

C4.04

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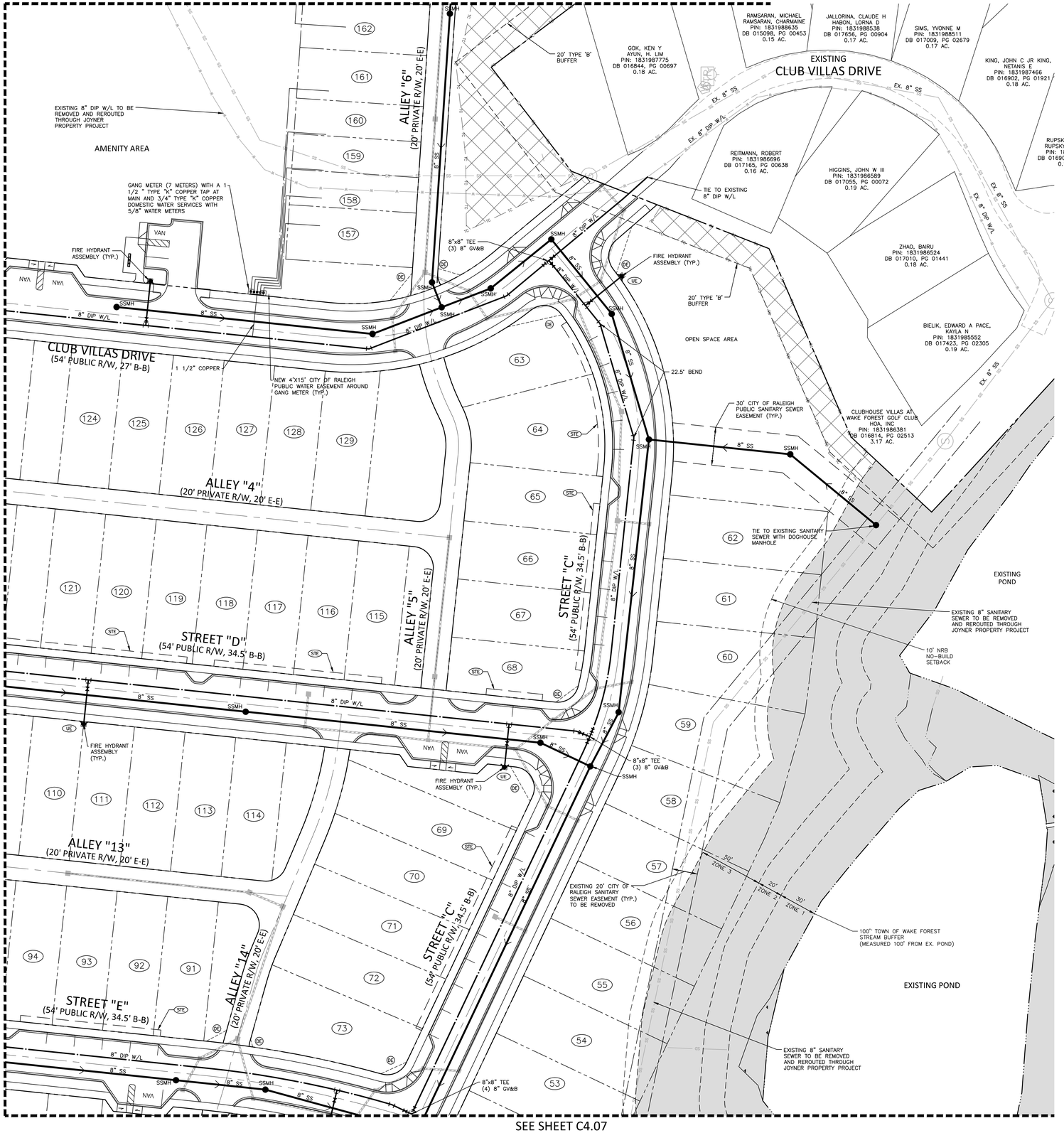

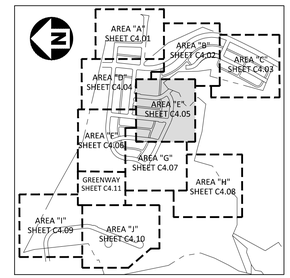

INDEX MAP
1"=1000'

EASEMENT LEGEND

- DE — STORM DRAINAGE EASEMENT
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- STE — STREET TREE EASEMENT

UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
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- SANITARY SEWER MANHOLE
- SEWER FLOW DIRECTION ARROW
- WATERLINE
- SANITARY SEWER
- EASEMENT LINE

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
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DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN
AREA "E"

C4.05

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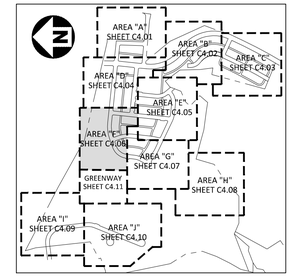

INDEX MAP
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- EASEMENT LINE

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN
AREA "F"

C4.06

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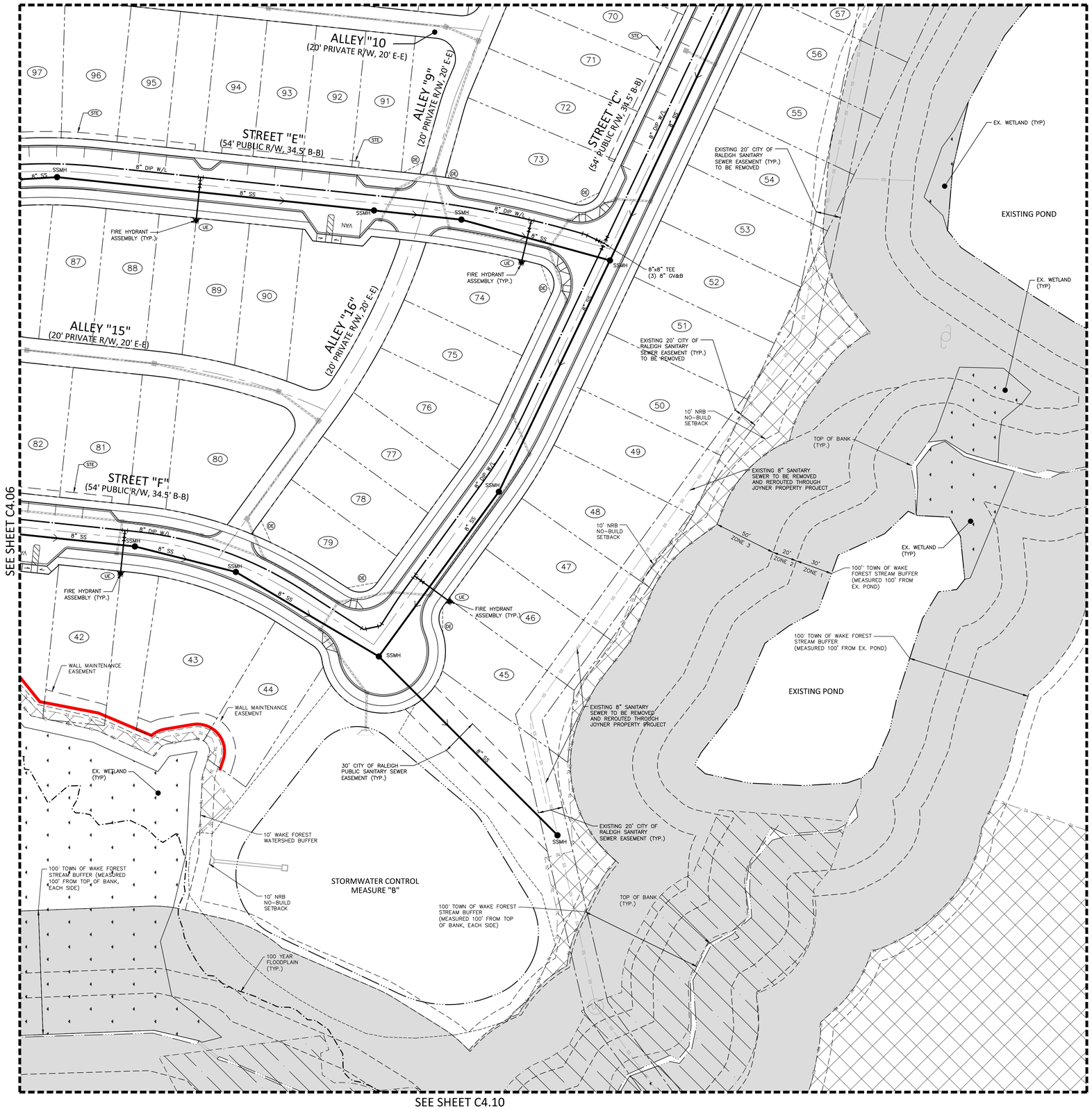

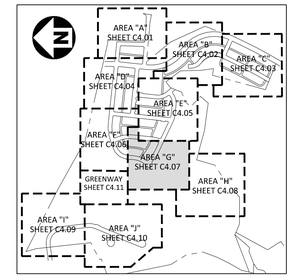

INDEX MAP
1"=1000'

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UTILITY LEGEND

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- WATERLINE
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- EASEMENT LINE

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN
AREA "G"

C4.07

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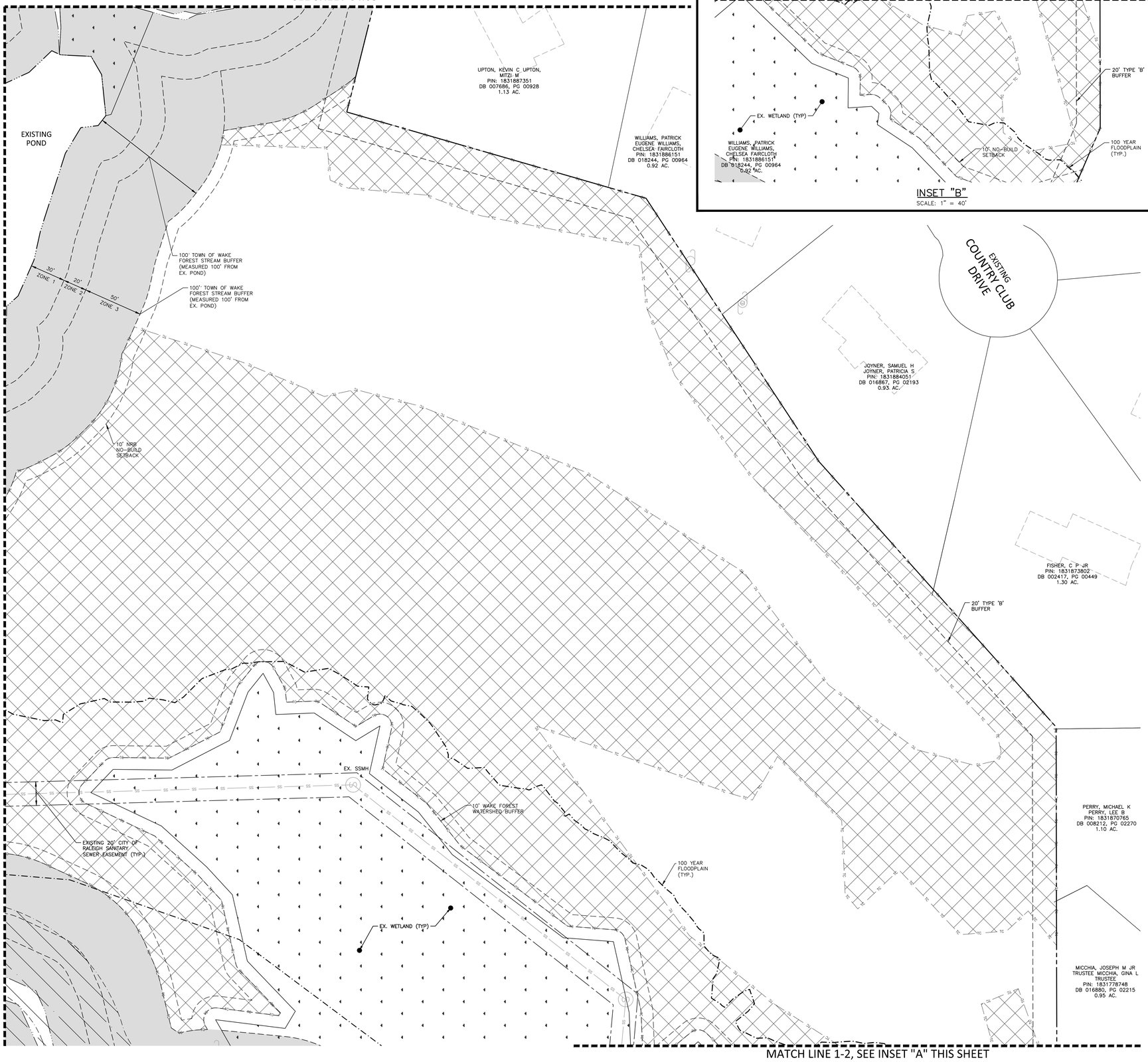
SEE SHEET C4.05

SEE SHEET C4.07

MATCH LINE 1-2, SEE THIS SHEET



MATCH LINE 1-2, SEE INSET "A" THIS SHEET

INSET "B"
SCALE: 1" = 40'



INDEX MAP
1"=1000'

EASEMENT LEGEND

- (SDE) STORM DRAINAGE EASEMENT
- (UE) UTILITY EASEMENT
- (STE) STREET TREE EASEMENT

UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- WATER VALVE
- REDUCER
- BLOW-OFF ASSEMBLY
- SANITARY SEWER MANHOLE
- SEWER FLOW DIRECTION ARROW
- WATERLINE
- SANITARY SEWER
- EASEMENT LINE

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
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YOUNGSVILLE, NC 27596-9698

GREEN TIMBER FOUNDATION
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

CONTACT:
JAMES ADAMS
jmas@millridgeco.com
PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN
AREA "H"

C4.08

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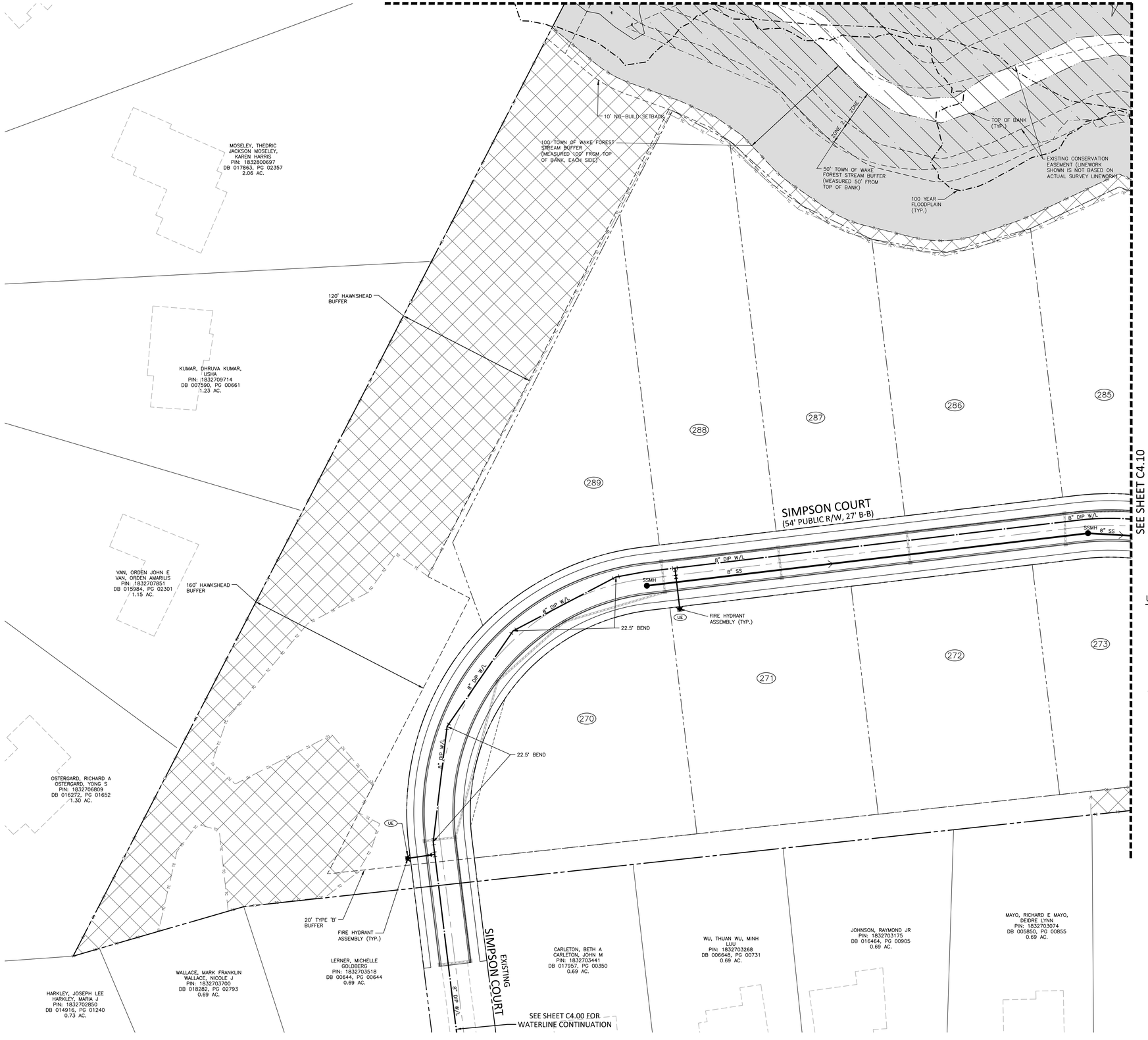
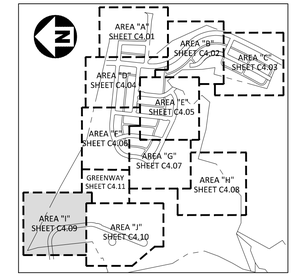
SEE SHEET C4.06





INDEX MAP
1"=1000'

EASEMENT LEGEND

- (DE) STORM DRAINAGE EASEMENT
- (UE) UTILITY EASEMENT
- (STE) STREET TREE EASEMENT

UTILITY LEGEND

- FIRE HYDRANT ASSEMBLY
- WATER VALVE
- REDUCER
- BLOW-OFF ASSEMBLY
- SANITARY SEWER MANHOLE
- SEWER FLOW DIRECTION ARROW
- WATERLINE
- SANITARY SEWER
- EASEMENT LINE

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

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FILENAME	2021110197-U1
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DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN AREA "I"

C4.09

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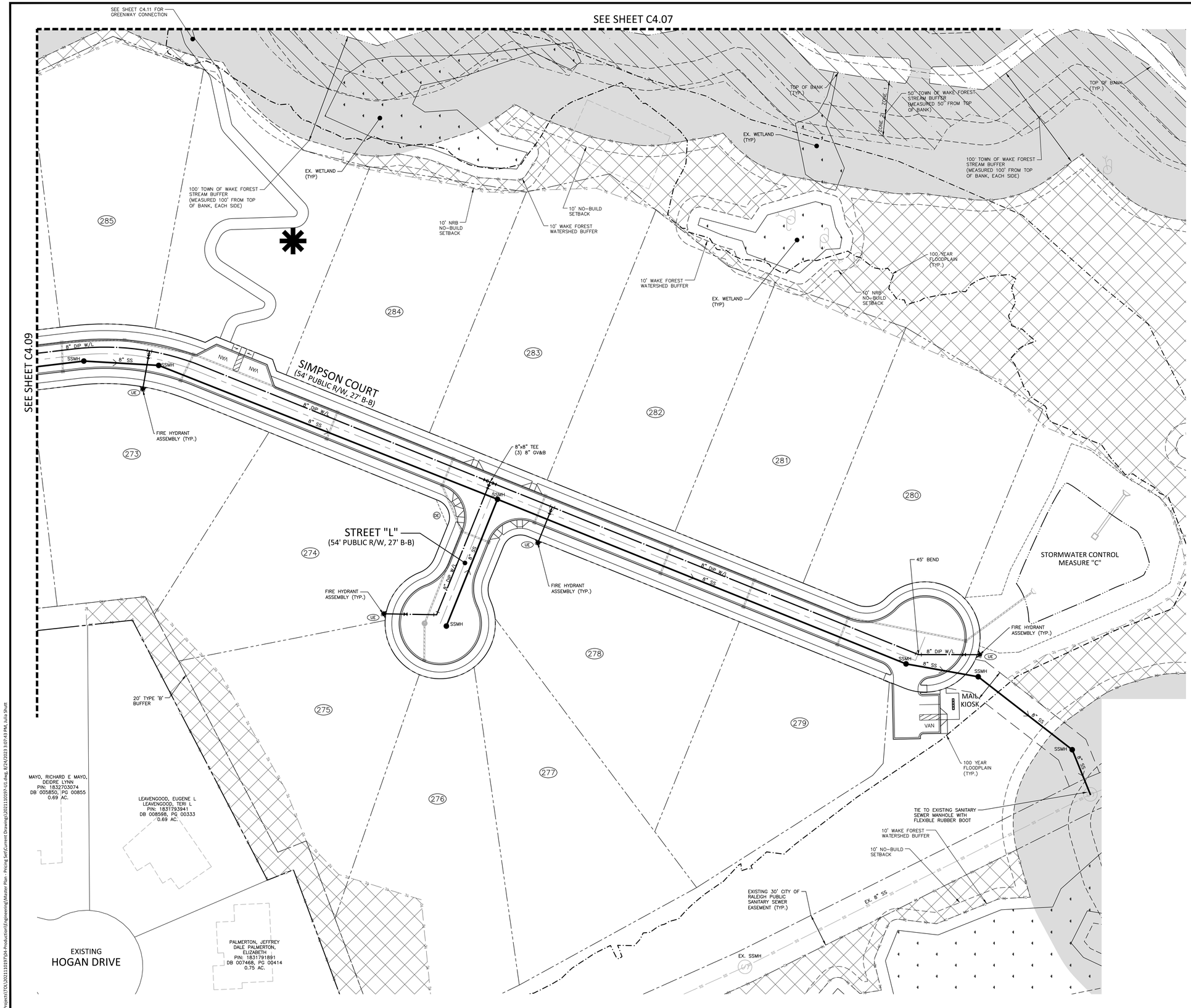

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 22630 ENGINEER WILLIAM T. O'DANIEL

William T O'Daniel
cn=William T O'Daniel, c=US, o=North Carolina, email=odaniel@mcadamsco.com
2023.08.24 16:41:33 -04'00'

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-U1
CHECKED BY	WTO
DRAWN BY	JPM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

UTILITY PLAN AREA "J"

C4.10



CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4

PLANT SCHEDULE

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT1	Canopy Tree 1	Canopy Tree 1
	CNT10	Canopy Tree 10	Canopy Tree 10
	CNT11	Canopy Tree 11	Canopy Tree 11
	CNT12	Canopy Tree 12	Canopy Tree 12
	CNT13	Canopy Tree 13	Canopy Tree 13
	CNT14	Canopy Tree 14	Canopy Tree 14
	CNT15	Canopy Tree 15	Canopy Tree 15
	CNT16	Canopy Tree 16	Canopy Tree 16
	CNT2	Canopy Tree 2	Canopy Tree 2
	CNT3	Canopy Tree 3	Canopy Tree 3
	CNT4	Canopy Tree 4	Canopy Tree 4
	CNT5	Canopy Tree 5	Canopy Tree 5
	CNT6	Canopy Tree 6	Canopy Tree 6
	CNT7	Canopy Tree 7	Canopy Tree 7
	CNT8	Canopy Tree 8	Canopy Tree 8
	CNT9	Canopy Tree 9	Canopy Tree 9
SHRUBS	CODE	COMMON NAME	BOTANICAL NAME
	EVS1	Evergreen Shrub 1	Evergreen Shrub 1



INDEX MAP
1"=1000'

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
- XX — PARKING SPACE COUNT
- TYPE A / TYPE B / TYPE C — ACCESSIBLE RAMPS
- ACCESSIBLE ROUTE
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- WETLAND
- STREAM BUFFER
- TREE SAVE AREA
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN
- 25' TYPE 'B' BUFFER
- 20' TYPE 'B' BUFFER

NOTES:

1. REFER TO SHEET C2.00 FOR ADJACENT PROPERTY LEGEND AND OWNER INFORMATION.
2. STREET TREE LOCATIONS TO BE FINALIZED AT CONSTRUCTION DRAWINGS WITH FINALIZED DRIVEWAY AND UTILITY SERVICE LOCATIONS

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA



REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	1"=200'
DATE	08. 25. 2023

SHEET

OVERALL LANDSCAPE PLAN

L5.00

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PLANT SCHEDULE AREA A

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT1	Canopy Tree 1	Canopy Tree 1
	CNT14	Canopy Tree 14	Canopy Tree 14
	CNT16	Canopy Tree 16	Canopy Tree 16
	CNT2	Canopy Tree 2	Canopy Tree 2
	CNT3	Canopy Tree 3	Canopy Tree 3
	CNT4	Canopy Tree 4	Canopy Tree 4
	CNT8	Canopy Tree 8	Canopy Tree 8

CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4

EXISTING CLUB VILLAS DRIVE

EXISTING FAIRWAY VILLAS DRIVE

WAKE UNION BAPTIST CHURCH
PIN: 1841095460
DB 012756, PG 01431
4.68 AC.

FAIRWAY VILLAS AT WF GOLF CLUB
PIN: 1841085635
DB 010962, PG 00817
2.87 AC.

PATE, JANE HARRIS
PIN: 1832901277
DB 000423, PG 00-E-
40.00 AC.

STREET "G"
(VARIABLE WIDTH PUBLIC R/W, 27' B-B)

STREET "A"
(54' PUBLIC R/W, 27' B-B)

20' TYPE 'B' BUFFER

10' NRB NO-BUILD SETBACK

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

TSA #3
12589 SF

ZONE 1 ZONE 2

25' TYPE 'B' BUFFER

STREET "A"
(54' PUBLIC R/W, 27' B-B)

ALLEY "1"
(20' PRIVATE R/W, 20' E-E)

STREET "B"
(65.5' PUBLIC R/W, 41' B-B)

PARK #1
(93,273 SF.)
(SEE CONDITION #20 ON COVER SHEET)

30' TYPE 'A' BUFFER

ALLEY "6"
(20' PRIVATE R/W, 20' E-E)

FAIRWAY VILLAS AT WF GOLF CLUB & TOWNHOMES OWNERS ASSOC INC
PIN: 1841094004
DB 009050, PG 00136
1.39 AC.

SEE SHEET L5.02

10' SHOD BUFFER

STREET "F"
(54' PUBLIC R/W, 34.5' B-B)

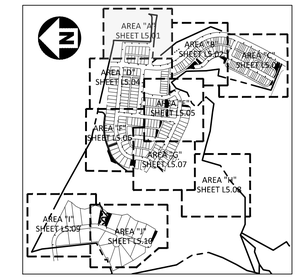
STREET "J"
(54' PUBLIC R/W, 27' B-B)

SEE SHEET L5.04

KEY LEGEND
1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND
DE STORM DRAINAGE EASEMENT
UE UTILITY EASEMENT
STE 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.



INDEX MAP
1"=1000'

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- ACCESSIBLE ROUTE
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- LOT LINE
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- CENTERLINE
- WETLAND
- OPEN SPACE
- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

CARL ANDERSON 044644 REGISTERED LANDSCAPE ARCHITECT 08.25.2023 MATTHEW P. TRIPP

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

LANDSCAPE PLAN
AREA "A"
L5.01

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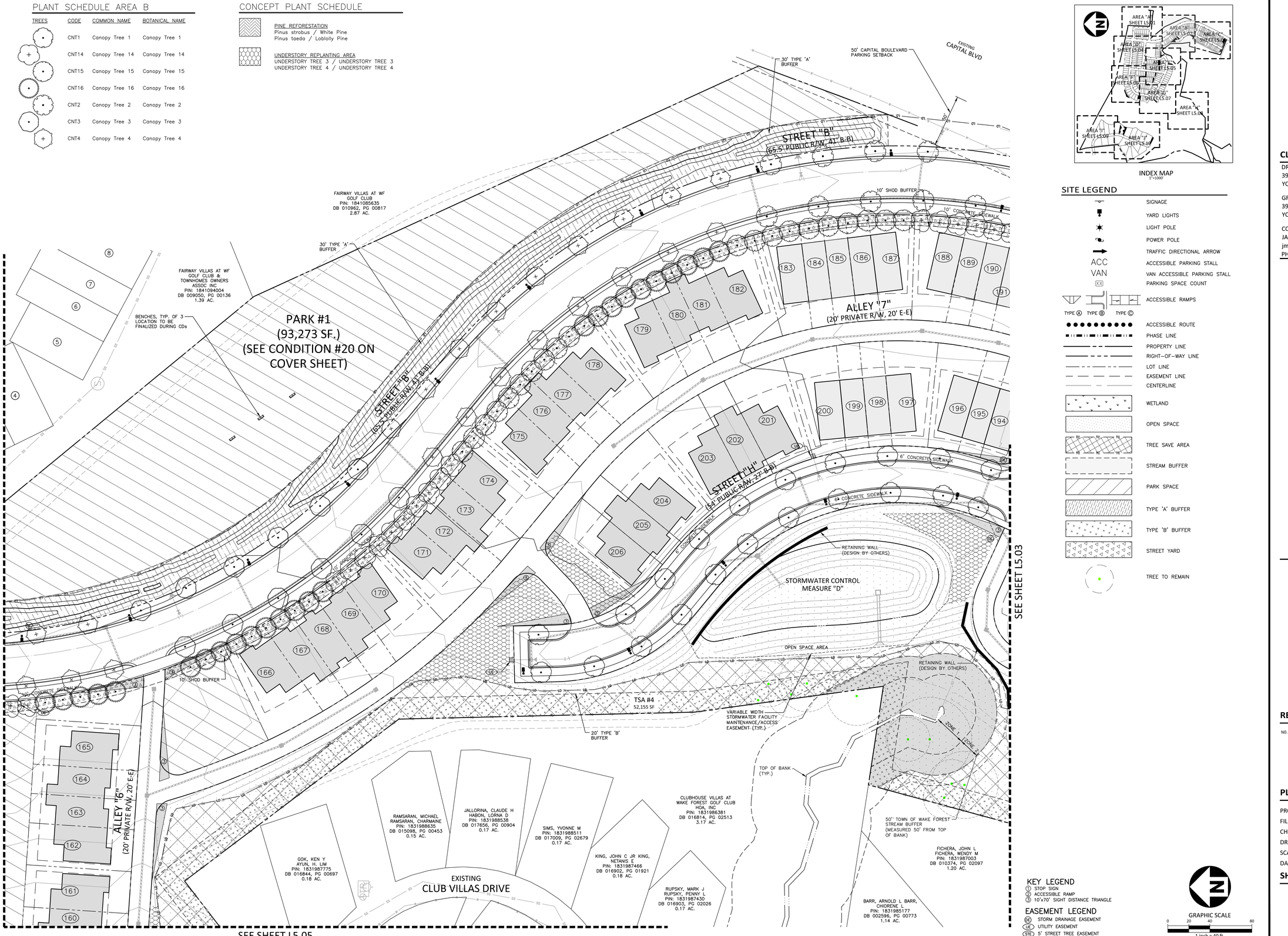
PLANT SCHEDULE AREA B

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT1	Canopy Tree 1	Canopy Tree 1
	CNT14	Canopy Tree 14	Canopy Tree 14
	CNT15	Canopy Tree 15	Canopy Tree 15
	CNT16	Canopy Tree 16	Canopy Tree 16
	CNT2	Canopy Tree 2	Canopy Tree 2
	CNT3	Canopy Tree 3	Canopy Tree 3
	CNT4	Canopy Tree 4	Canopy Tree 4

CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4



INDEX MAP
1"=1000'

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- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- ACCESSIBLE ROUTE
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- WETLAND
- OPEN SPACE
- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND

- SDE — STORM DRAINAGE EASEMENT
- UE — UTILITY EASEMENT
- STEE — 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA LICENSED LANDSCAPE ARCHITECT 1067 MICHAEL P. TARPEY

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
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DRAWN BY	SM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

LANDSCAPE PLAN
AREA "B"
L5.02

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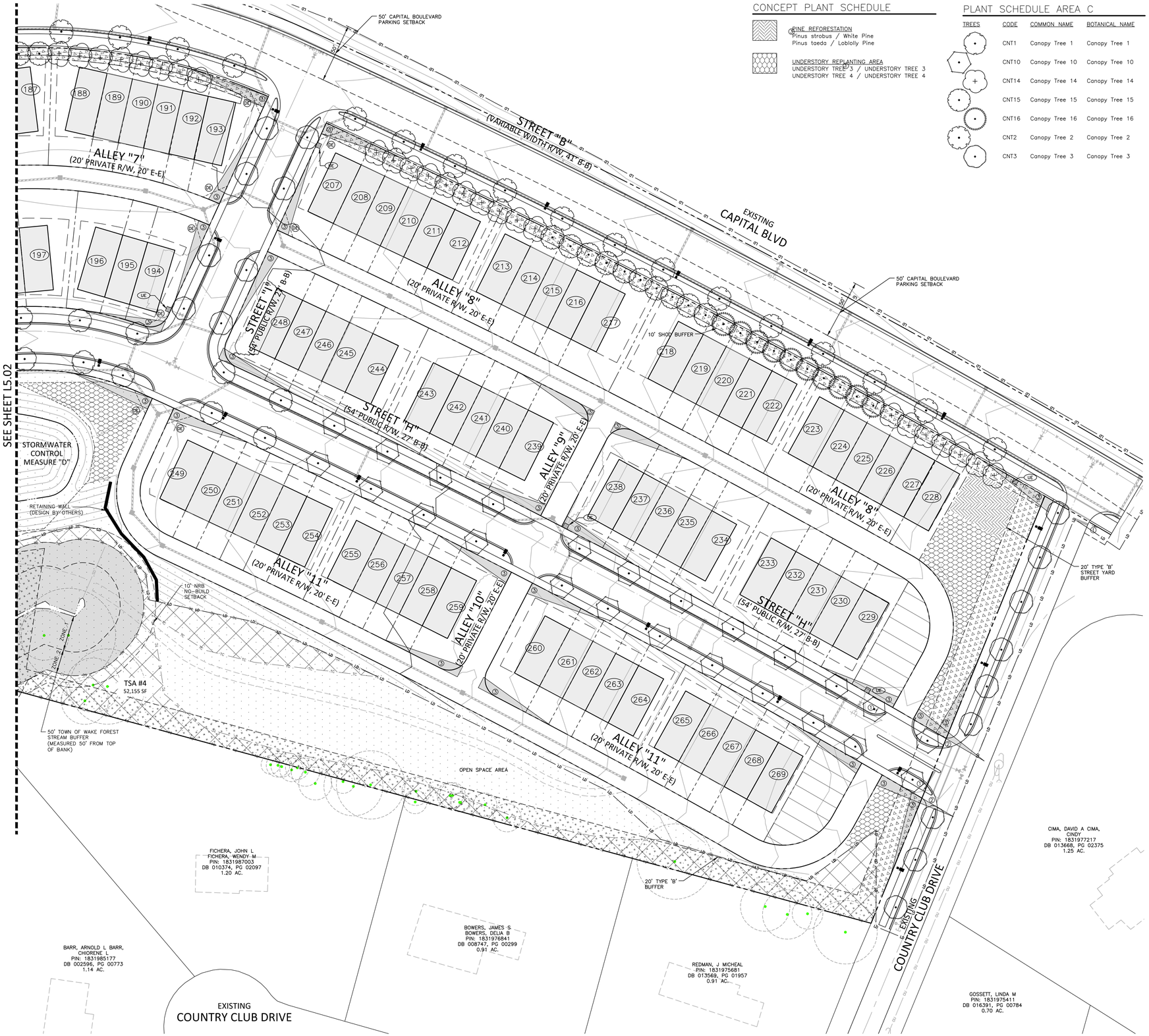


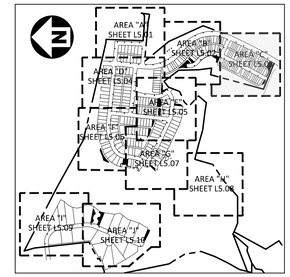
CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4

PLANT SCHEDULE AREA C

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT1	Canopy Tree 1	Canopy Tree 1
	CNT10	Canopy Tree 10	Canopy Tree 10
	CNT14	Canopy Tree 14	Canopy Tree 14
	CNT15	Canopy Tree 15	Canopy Tree 15
	CNT16	Canopy Tree 16	Canopy Tree 16
	CNT2	Canopy Tree 2	Canopy Tree 2
	CNT3	Canopy Tree 3	Canopy Tree 3



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- WETLAND
- OPEN SPACE
- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND

- SDE — STORM DRAINAGE EASEMENT
- UIE — UTILITY EASEMENT
- STE — 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

CAROLINA
MICHAEL P. TARR
044067
ENGINEER
08.01.2023

REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

LANDSCAPE PLAN
AREA "C"
L5.03

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INDEX MAP
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- OPEN SPACE
- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

PLANT SCHEDULE AREA D

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT14	Canopy Tree 14	Canopy Tree 14
	CNT16	Canopy Tree 16	Canopy Tree 16
	CNT2	Canopy Tree 2	Canopy Tree 2
	CNT3	Canopy Tree 3	Canopy Tree 3
	CNT4	Canopy Tree 4	Canopy Tree 4
	CNT5	Canopy Tree 5	Canopy Tree 5
	CNT7	Canopy Tree 7	Canopy Tree 7
	CNT8	Canopy Tree 8	Canopy Tree 8
	CNT9	Canopy Tree 9	Canopy Tree 9
SHRUBS	**CODE**	**COMMON NAME**	**BOTANICAL NAME**
	EVS1	Evergreen Shrub 1	Evergreen Shrub 1

CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4

STREET "A" (54' PUBLIC R/W, 27' B-B)
STREET "B" (65.5' PUBLIC R/W, 41' B-B)
ALLEY "2" (20' PRIVATE R/W, 20' E-E)
ALLEY "3" (20' PRIVATE R/W, 20' E-E)
STREET "F" (54' PUBLIC R/W, 34.5' B-B)
STREET "J" (54' PUBLIC R/W, 27' B-B)
ALLEY "4" (20' PRIVATE R/W, 20' E-E)
ALLEY "5" (20' PRIVATE R/W, 20' E-E)
ALLEY "6" (20' PRIVATE R/W, 20' E-E)
ALLEY "7" (20' PRIVATE R/W, 20' E-E)
ALLEY "12" (20' PRIVATE R/W, 20' E-E)
STREET "D" (54' PUBLIC R/W, 34.5' B-B)
CLUB VILLAS DRIVE (54' PUBLIC R/W, 27' B-B)
AMENITY AREA
10' NRB NO-BUILD SETBACK
25' TYPE 'B' BUFFER
30' TYPE 'A' BUFFER
TSA #2
53665 SF
ACCESSIBLE PARKING SIGN
MAIL KIOSK
SEE SHEET L5.05

KEY LEGEND
1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND
- DE — STORM DRAINAGE EASEMENT
- UE — UTILITY EASEMENT
- STE — 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

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394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

GREEN TIMBER FOUNDATION
394 FLEMING ROAD
YOUNGSVILLE, NC 27596-9698

CONTACT:
JAMES ADAMS
jmas@millridgeco.com
PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

LANDSCAPE PLAN
AREA "D"
L5.04

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SEE SHEET L5.02

SEE SHEET L5.04

SEE SHEET L5.07

AMENITY AREA

CLUB VILLAS DRIVE
(54' PUBLIC R/W, 27' B-B)

EXISTING
CLUB VILLAS DRIVE

ALLEY "6"
(20' PRIVATE R/W, 20' E-E)

ALLEY "4"
(20' PRIVATE R/W, 20' E-E)

ALLEY "5"
(20' PRIVATE R/W, 20' E-E)

ALLEY "13"
(20' PRIVATE R/W, 20' E-E)

ALLEY "14"
(20' PRIVATE R/W, 20' E-E)

STREET "C"
(54' PUBLIC R/W, 34.5' B-B)

STREET "D"
(54' PUBLIC R/W, 34.5' B-B)

STREET "E"
(54' PUBLIC R/W, 34.5' B-B)

MAIL KIOSK

60.0' CANOPY TREE SHADE AREA

20' TYPE 'B' BUFFER

25' TYPE 'B' BUFFER

PARK SPACE AREA

TSA #5
2002.9 SF

30' CITY OF RALEIGH PUBLIC SANITARY SEWER EASEMENT (TYP.)

EXISTING 20' CITY OF RALEIGH SANITARY SEWER EASEMENT (TYP.)

EXISTING 20' CITY OF RALEIGH SANITARY SEWER EASEMENT (TYP.)

EXISTING POND

EXISTING POND

10' NRB
NO-BUILD
SETBACK

100' TOWN OF WAKE FOREST
STREAM BUFFER
(MEASURED 100' FROM EX. POND)

ZONE 3 50'
ZONE 2 20'
ZONE 1 30'

RAMSARAN, MICHAEL
RAMSARAN, CHARMAINE
PIN: 1831988635
DB 015098, PG 00453
0.15 AC.

JALLORINA, CLAUDE H
HABON, LORNA D
PIN: 1831988538
DB 017656, PG 00904
0.17 AC.

SIMS, YVONNE M
PIN: 1831988511
DB 017009, PG 02679
0.17 AC.

KING, JOHN C JR KING,
NETANIS E
PIN: 1831987466
DB 016002, PG 01921
0.18 AC.

GOK, KEN Y
AYUN, H. LIM
PIN: 1831987775
DB 016844, PG 00697
0.18 AC.

REITMANN, ROBERT
PIN: 1831986696
DB 017165, PG 00638
0.16 AC.

HIGGINS, JOHN W III
PIN: 1831986589
DB 017055, PG 00072
0.19 AC.

ZHAO, BAIRU
PIN: 1831986524
DB 017010, PG 01441
0.18 AC.

BIELIK, EDWARD A PACE,
KAYLA N
PIN: 1831985552
DB 017423, PG 02305
0.19 AC.

CLUBHOUSE VILLAS AT
WAKE FOREST GOLF CLUB
HOA, INC.
PIN: 1831986381
DB 016814, PG 02513
3.17 AC.

PLANT SCHEDULE AREA E

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT11	Canopy Tree 11	Canopy Tree 11
	CNT6	Canopy Tree 6	Canopy Tree 6
	CNT7	Canopy Tree 7	Canopy Tree 7
	CNT9	Canopy Tree 9	Canopy Tree 9
SHRUBS	CODE	COMMON NAME	BOTANICAL NAME
	EVS1	Evergreen Shrub 1	Evergreen Shrub 1

CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4



INDEX MAP
1"=1000'

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC — ACCESSIBLE PARKING STALL
- VAN — VAN ACCESSIBLE PARKING STALL
- (XX) — PARKING SPACE COUNT
- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- ACCESSIBLE ROUTE
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- WETLAND
- OPEN SPACE
- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND

- (SDE) STORM DRAINAGE EASEMENT
- (UE) UTILITY EASEMENT
- (STE) 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

CAROLINA
10061
PROFESSIONAL ENGINEER
MICHAEL P. TARVER
08.01.2023

REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

LANDSCAPE PLAN
AREA "E"

L5.05

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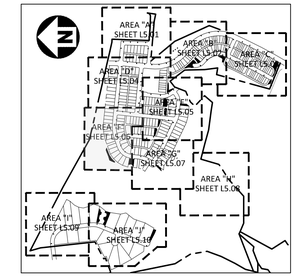
CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4

PLANT SCHEDULE AREA F

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT11	Canopy Tree 11	Canopy Tree 11
	CNT13	Canopy Tree 13	Canopy Tree 13
	CNT5	Canopy Tree 5	Canopy Tree 5
	CNT7	Canopy Tree 7	Canopy Tree 7
	CNT8	Canopy Tree 8	Canopy Tree 8
	CNT9	Canopy Tree 9	Canopy Tree 9



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- WETLAND
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- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

KEY LEGEND

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3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND

- SDE — STORM DRAINAGE EASEMENT
- UE — UTILITY EASEMENT
- STE — 5' STREET TREE EASEMENT

GRAPHIC SCALE
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1 inch = 40 ft.

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CONTACT:
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jmas@millridgeco.com
PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

REVISIONS

NO. DATE

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LANDSCAPE PLAN
AREA "F"
L5.06

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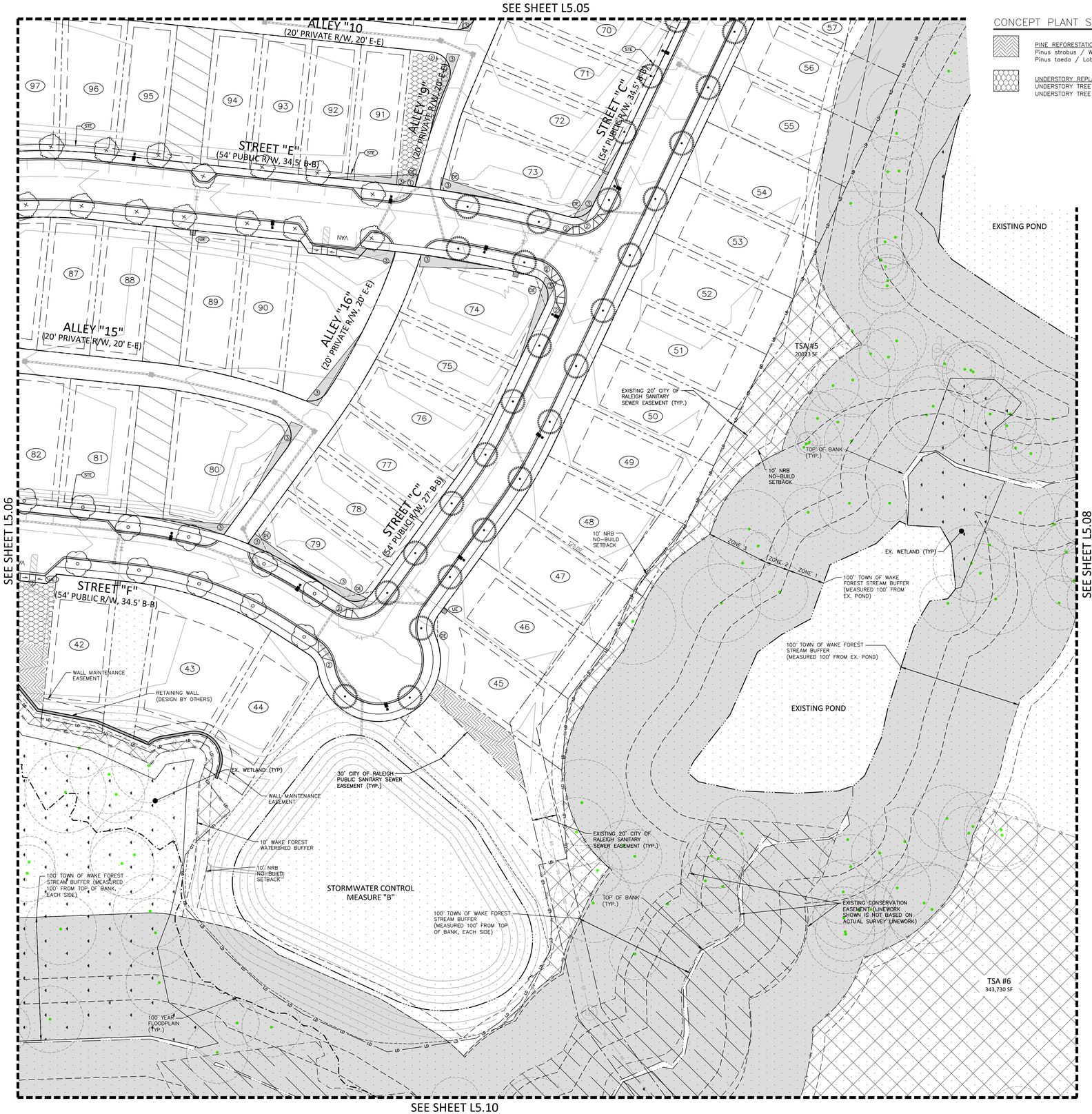
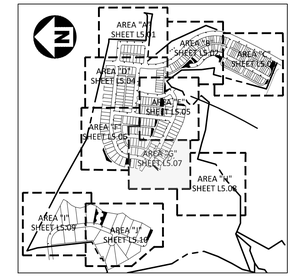


CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4



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- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

PLANT SCHEDULE AREA G

TREES	CODE	COMMON NAME	BOTANICAL NAME
+	CNT11	Canopy Tree 11	Canopy Tree 11
o	CNT13	Canopy Tree 13	Canopy Tree 13
•	CNT6	Canopy Tree 6	Canopy Tree 6

KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND

- (DE) STORM DRAINAGE EASEMENT
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GRAPHIC SCALE
0 20 40 80
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jmas@millridgeco.com
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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

CAROLINA
042201
MARCEL P. TAYLOR
08.25.23

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
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SHEET

LANDSCAPE PLAN
AREA "G"

L5.07

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SEE SHEET L5.05

SEE SHEET L5.07

EXISTING POND

TOP OF BANK (TYP.)

10' NRB NO-BUILD SETBACK

100' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 100' FROM EX. POND)

30' ZONE 1 | 20' ZONE 2 | 50' ZONE 3

100' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 100' FROM EX. POND)

10' NRB NO-BUILD SETBACK

OPEN SPACE AREA

TSA #6
343,730 SF

EXISTING 20' CITY OF RALEIGH SANITARY SEWER EASEMENT (TYP.)

FLOODWAY (TYP.)

EX. WETLAND (TYP)

10' WAKE FOREST WATERSHED BUFFER

10' NRB NO-BUILD SETBACK

100 YEAR FLOODPLAIN (TYP.)

10' WAKE FOREST WATERSHED BUFFER

25' TYPE 'B' BUFFER

UPTON, KEVIN C UPTON, MITZI M
PIN: 1831887351
DB 007686, PG 00928
1.13 AC.

WILLIAMS, PATRICK EUGENE WILLIAMS, CHELSEA FAIRCLOTH
PIN: 1831886151
DB 018244, PG 00964
0.92 AC.

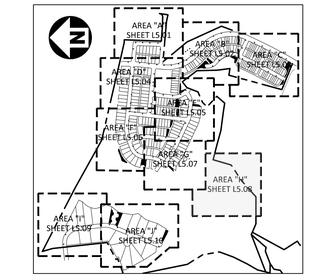
JOYNER, SAMUEL H JOYNER, PATRICIA S
PIN: 1831884051
DB 016867, PG 02193
0.93 AC.

FISHER, C P JR
PIN: 1831873802
DB 002417, PG 00449
1.30 AC.

PERRY, MICHAEL K PERRY, LEE B
PIN: 1831870765
DB 008212, PG 02270
1.10 AC.

MICCHIA, JOSEPH M JR TRUSTEE MICCHIA, GINA L TRUSTEE
PIN: 1831778748
DB 016880, PG 02215
0.95 AC.

EXISTING COUNTRY CLUB DRIVE



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- STREET YARD
- TREE TO REMAIN

KEY LEGEND

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2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

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- UE — UTILITY EASEMENT
- STE — 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

CAROLINA
MATTHEW P. TAYLOR
SEAL 049741
ENGINEER

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

LANDSCAPE PLAN
AREA "H"

L5.08

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SEE SHEET L5.06

PLANT SCHEDULE AREA I

TREES	CODE	COMMON NAME	BOTANICAL NAME
+	CNT11	Canopy Tree 11	Canopy Tree 11
+	CNT12	Canopy Tree 12	Canopy Tree 12

MOSELEY, THEDRIC
JACKSON MOSELEY,
KAREN HARRIS
PIN: 1832800697
DB 017863, PG 02357
2.06 AC.

KUMAR, DHRUVA KUMAR,
USHA
PIN: 1832709714
DB 007590, PG 00661
1.23 AC.

VAN, ORDEN JOHN E
VAN, ORDEN AMARILIS
PIN: 1832707851
DB 015984, PG 02301
1.15 AC.

OSTERGARD, RICHARD A
OSTERGARD, YONG S
PIN: 1832706809
DB 016272, PG 01652
1.30 AC.

HARKLEY, JOSEPH LEE
HARKLEY, MARIA J
PIN: 1832702850
DB 014916, PG 01240
0.73 AC.

WALLACE, MARK FRANKLIN
WALLACE, NICOLE J
PIN: 1832703700
DB 018282, PG 02793
0.69 AC.

LERNER, MICHELLE
GOLDBERG
PIN: 1832703518
DB 00644, PG 00644
0.69 AC.

CARLETON, BETH A
CARLETON, JOHN M
PIN: 1832703441
DB 017957, PG 00350
0.69 AC.

WU, THUAN WU, MINH
LUU
PIN: 1832703268
DB 006648, PG 00731
0.69 AC.

JOHNSON, RAYMOND JR
PIN: 1832703175
DB 016464, PG 00905
0.69 AC.

MAYO, RICHARD E MAYO,
DEIDRE LYNN
PIN: 1832703074
DB 005850, PG 00855
0.69 AC.

100' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 100' FROM TOP OF BANK, EACH SIDE)

120' HAWKSHEAD BUFFER

160' HAWKSHEAD BUFFER

OPEN SPACE AREA

FLOODWAY (TYP.)

ZONE A

ZONE X

TOP OF BANK (TYP.)

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

10' NRB NO-BUILD SETBACK

OPEN SPACE AREA

100 YEAR FLOODPLAIN (TYP.)

EXISTING CONSERVATION EASEMENT (LINEWORK SHOWN IS NOT BASED ON ACTUAL SURVEY LINEWORK)

SIMPSON COURT
(54' PUBLIC R/W, 27' B-B)

EXISTING SIMPSON COURT

20' TYPE 'B' BUFFER

20' TYPE 'B' BUFFER

TSA #11
94,673 SF

285 286 287 288 289 270 271 272 273

UE

SEE SHEET L5.10



INDEX MAP
1" = 1,000'

SITE LEGEND

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- POWER POLE
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- XX — PARKING SPACE COUNT
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- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

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- STE — 5' STREET TREE EASEMENT

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jmas@millridgeco.com
PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

CARL E. ANDERSON
10671
REGISTERED
PROFESSIONAL
LANDSCAPE ARCHITECT
Oct. 31, 2023

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
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SHEET

LANDSCAPE PLAN AREA "I"

L5.09

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SEE SHEET L5.07

SEE SHEET L5.09

SEE SHEET C2.11 FOR GREENWAY CONNECTION

100' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 100' FROM TOP OF BANK, EACH SIDE)

EX. WETLAND (TYP.)

100 YEAR FLOODPLAIN (TYP.)

10' NRB NO-BUILD SETBACK

10' WAKE FOREST WATERSHED BUFFER

10' PEDESTRIAN TRAIL/CART PATH TYING TO ORIGINAL PATH

OPEN SPACE AREA

TOP OF BANK (TYP.)

ZONE 1

ZONE 2

50' TOWN OF WAKE FOREST STREAM BUFFER (MEASURED 50' FROM TOP OF BANK)

TSA #8
186,464 SF

SIMPSON COURT
(54' PUBLIC R/W, 27' B-B)

STREET "L"
(54' PUBLIC R/W, 27' B-B)

STORMWATER CONTROL MEASURE "C"

20' TYPE 'B' BUFFER

MAYO, RICHARD E MAYO, DEIDRE LYNN
PIN: 1832703074
DB 005850, PG 00855
0.69 AC.

LEAVENGOOD, EUGENE L
LEAVENGOOD, TERI L
PIN: 1831793941
DB 008598, PG 00333
0.69 AC.

EXISTING
HOGAN DRIVE

PALMERTON, JEFFREY DALE PALMERTON, ELIZABETH
PIN: 1831791891
DB 007468, PG 00414
0.75 AC.

TSA #9
27,480 SF

30' CITY OF RALEIGH PUBLIC SANITARY SEWER EASEMENT (TYP.)

MAIL KIOSK

VAN

EXISTING 30' CITY OF RALEIGH PUBLIC SANITARY SEWER EASEMENT (TYP.)

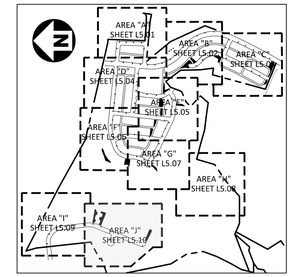
CONCEPT PLANT SCHEDULE

PINE REFORESTATION
Pinus strobus / White Pine
Pinus taeda / Loblolly Pine

UNDERSTORY REPLANTING AREA
UNDERSTORY TREE 3 / UNDERSTORY TREE 3
UNDERSTORY TREE 4 / UNDERSTORY TREE 4

PLANT SCHEDULE AREA J

TREES	CODE	COMMON NAME	BOTANICAL NAME
	CNT11	Canopy Tree 11	Canopy Tree 11
	CNT12	Canopy Tree 12	Canopy Tree 12
	CNT13	Canopy Tree 13	Canopy Tree 13
	CNT8	Canopy Tree 8	Canopy Tree 8
SHRUBS	CODE	COMMON NAME	BOTANICAL NAME
	EVS1	Evergreen Shrub 1	Evergreen Shrub 1



INDEX MAP
1"=1000'

SITE LEGEND

- SIGNAGE
- YARD LIGHTS
- LIGHT POLE
- POWER POLE
- TRAFFIC DIRECTIONAL ARROW
- ACC / VAN — ACCESSIBLE PARKING STALL
- VAN ACCESSIBLE PARKING STALL
- (XX) — PARKING SPACE COUNT
- ACCESSIBLE RAMPS (TYPE A, TYPE B, TYPE C)
- ACCESSIBLE ROUTE
- PHASE LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- WETLAND
- OPEN SPACE
- TREE SAVE AREA
- STREAM BUFFER
- PARK SPACE
- TYPE 'A' BUFFER
- TYPE 'B' BUFFER
- STREET YARD
- TREE TO REMAIN

KEY LEGEND

1. STOP SIGN
2. ACCESSIBLE RAMP
3. 10'x70' SIGHT DISTANCE TRIANGLE

EASEMENT LEGEND

- (SDE) STORM DRAINAGE EASEMENT
- (UE) UTILITY EASEMENT
- (STE) 5' STREET TREE EASEMENT

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McADAMS
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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	1"=40'
DATE	08. 25. 2023

SHEET

LANDSCAPE PLAN AREA "J"

L5.10

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LANDSCAPE CALCULATIONS

STREET YARD

COUNTRY CLUB DRIVE - 20' TYPE B STREET YARD — 285 LF*

EVERGREEN TREES:
REQUIRED: 6 (2/100 LF)
PROVIDED: 6*

CANOPY TREES
REQUIRED: 6 (2/100 LF)
PROVIDED: 6*

UNDERSTORY TREES
REQUIRED: 6 (2/100 LF)
PROVIDED: 6*

SHRUBS
REQUIRED: 69 (24/100 LF)
PROVIDED: 69*

SERVICE ROAD - 10' TYPE B STREET YARD — 1866 LF*

EVERGREEN TREES:
REQUIRED: 38 (2/100 LF)
PROVIDED: 38*

CANOPY TREES
REQUIRED: 19 (1/100 LF)
PROVIDED: 19*

UNDERSTORY TREES
REQUIRED: 38 (2/100 LF)
PROVIDED: 38*

SHRUBS
REQUIRED: 224 (12/100 LF)
PROVIDED: 224*

PERIMETER BUFFERS

SOUTHERN PROPERTY — 5121 LF**
20' & 25' TYPE B BUFFER

EVERGREEN TREES:
REQUIRED: 103 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

CANOPY TREES
REQUIRED: 103 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

UNDERSTORY TREES
REQUIRED: 103 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

SHRUBS
REQUIRED: 1229 (24/100 LF)
PROVIDED: EXISTING SHRUBS TO FULFILL REQUIREMENT**

EASTERN PROPERTY — 496 LF*
20' & 25' TYPE B BUFFER

EVERGREEN TREES:
REQUIRED: 10 (2/100 LF)
PROVIDED: 10*

CANOPY TREES
REQUIRED: 10 (2/100 LF)
PROVIDED: 10*

UNDERSTORY TREES
REQUIRED: 10 (2/100 LF)
PROVIDED: 10*

SHRUBS
REQUIRED: 120 (24/100 LF)
PROVIDED: 120*

EASTERN PROPERTY — 1,093 LF*
30' TYPE A BUFFER

EVERGREEN TREES:
REQUIRED: 44 (4/100 LF)
PROVIDED: 44*

CANOPY TREES
REQUIRED: 22 (2/100 LF)
PROVIDED: 22*

UNDERSTORY TREES
REQUIRED: 44 (4/100 LF)
PROVIDED: 44*

SHRUBS
REQUIRED: 394 (36/100 LF)
PROVIDED: 394*

WESTERN PROPERTY — 3626 LF**
20' & 25' TYPE B BUFFER

EVERGREEN TREES:
REQUIRED: 73 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

CANOPY TREES
REQUIRED: 73 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

UNDERSTORY TREES
REQUIRED: 73 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

SHRUBS
REQUIRED: 870 (24/100 LF)
PROVIDED: EXISTING SHRUBS TO FULFILL REQUIREMENT**

NORTHERN PROPERTY — 3100 LF**
20' & 25' TYPE B BUFFER

EVERGREEN TREES:
REQUIRED: 62 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

CANOPY TREES
REQUIRED: 62 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

UNDERSTORY TREES
REQUIRED: 62 (2/100 LF)
PROVIDED: EXISTING TREES TO FULFILL REQUIREMENT**

SHRUBS
REQUIRED: 744 (24/100 LF)
PROVIDED: EXISTING SHRUBS TO FULFILL REQUIREMENT**

*BUFFER PLANTS TO BE INSTALLED PER STANDARD BUFFER DETAILS THIS SHEET. FINAL LOCATIONS OF PLANTINGS TO BE COORDINATED WHEN ENHANCED LANDSCAPE PLANS ARE DEVELOPED
**PRESERVED VEGETATION SHALL BE UTILIZED TO MEET BUFFER STANDARDS. SUPPLEMENTAL PLANTING MAY BE REQUIRED UPON FIELD INSPECTION.

LANDSCAPE CALCULATIONS

STREET TREES

CLUB VILLAS DRIVE — 1002 LF

TREES
REQUIRED: 20 (1/50 LF)
PROVIDED: 20

STREET "A" — 1086 LF

TREES
REQUIRED: 22 (1/50 LF)
PROVIDED: 25

STREET "B" — 3410 LF

TREES
REQUIRED: 69 (1/50 LF)
PROVIDED: 69

STREET "C" — 1746 LF

TREES
REQUIRED: 36 (1/50 LF)
PROVIDED: 42

STREET "D" — 1400 LF

TREES
REQUIRED: 28 (1/50 LF)
PROVIDED: 31

STREET "E" — 1218 LF

TREES
REQUIRED: 25 (1/50 LF)
PROVIDED: 25

STREET "F" — 3200 LF

TREES
REQUIRED: 64 (1/50 LF)
PROVIDED: 65

STREET 'G' — 1400 LF

TREES
REQUIRED: 28 (1/50 LF)
PROVIDED: 30

STREET "H" — 2256 LF

TREES
REQUIRED: 46 (1/50 LF)
PROVIDED: 51

STREET "I" — 350 LF

TREES
REQUIRED: 7 (1/50 LF)
PROVIDED: 8

STREET "J" — 1086 LF

TREES
REQUIRED: 22 (1/50 LF)
PROVIDED: 24

SIMPSON COURT — 2952 LF

TREES
REQUIRED: 60 (1/50 LF)
PROVIDED: 62

STREET "L" — 194 LF

TREES
REQUIRED: 4 (1/50 LF)
PROVIDED: 7

COUNTRY CLUB DRIVE — 340 LF

TREES
REQUIRED: 9 (1/50 LF)
PROVIDED: 9

LANDSCAPE CALCULATIONS

BASELINE CANOPY COVERAGE

BASELINE CANOPY COVERAGE — 3,348,625 SF

PER UDO - A MINIMUM CANOPY COVERAGE OF 1 CANOPY TREE PER 10,000 SF OF PARCEL AREA.

NET PARCEL AREA: 5,361,965 SF
RIPARIAN AREAS: - 2,013,340 SF
3,348,625 SF

CANOPY TREES
REQUIRED: 335 (1/ 10,000 SF PARCEL AREA)

PROVIDED: 448 CANOPY TREES IN STREET TREE PLANTING
25 CANOPY TREES IN STREET YARD PLANTING
270 CANOPY TREES IN BUFFER
1435 CANOPY TREES IN TREE SAVE AREA (1 TREE PER 700 SF OF TREE SAVE AREA - 1,004,444 SF)
3,063 SPECIMEN TREE PRESERVATION CREDIT

SPECIMEN TREE REPLACEMENT
REQUIRED: 1236 CANOPY + 492 UNDERSTORY = **1728** TOTAL
PROVIDED: 1274 CANOPY + 498 UNDERSTORY = **1772**TOTAL
1274 PINE REFORESTATION
498 UNDERSTORY REPLANTING

TREE COVERAGE — 1,004,444 SF

TSA #1	151,539 SF
TSA #2	53,665 SF
TSA #3	12,589 SF
TSA #4	52,155 SF
TSA #5	20,013 SF
TSA #6	343,730 SF
TSA #7	39,652 SF
TSA #8	186,464 SF
TSA #9	27,480 SF
TSA #10	22,484 SF
TSA #11	94,673 SF
TOTAL:	1,004,444 SF

NEIGHBORHOOD PARK

MIN. 1 TREE (2 INCH CALIPER MIN MEASURED 6" ABOVE THE GROUND AT INSTALLATION) TO BE PLANTED IN AT LEAST 350 SQUARE FEET OF SOIL OR 1 PRESERVED EXISTING CANOPY TREE A MIN. OF 12 INCH CALIPER FOR EVERY 2,500 SQUARE FEET OF REQUIRED PARK SPACE. (UDO 7.5.5.A.2)
REQUIRED: 55 (135,772 / 2500)
PROVIDED: 55*

*AMENITY CANOPY TREES SHALL BE PLANTED IF PRESERVED EXISTING CANOPY TREES DO NOT MEET THE REQUIREMENT. REPLANTING TO BE FINALIZED DURING CDs.

SPECIAL HIGHWAY OVERLAY DISTRICT

ALONG STREET "B" — 1866 LF

TREES
REQUIRED: 112 (3/50 LF)
PROVIDED: 112*

*TREES SHALL INCLUDE CANOPY, UNDERSTORY AND EVERGREEN

VEHICLE USE AREA

MAIL KIOSK #1 — 3 SPACES

CANOPY TREES
REQUIRED: ALL SPACES WITHIN 60' FROM PLANTED TREE
PROVIDED: 1

SHRUBS
REQUIRED: EVERGREEN SHRUBS PLACED MAXIMUM OF 5' ON CENTER (150 LF)
30 SHRUBS
PROVIDED: 30 SHRUBS

MAIL KIOSK #2 — 3 SPACES

CANOPY TREES
REQUIRED: ALL SPACES WITHIN 60' FROM PLANTED TREE
PROVIDED: 1

SHRUBS
REQUIRED: EVERGREEN SHRUBS PLACED MAXIMUM OF 5' ON CENTER (143 LF)
29 SHRUBS
PROVIDED: 29 SHRUBS

PLANT SCHEDULE

TREES	CODE	QTY	COMMON NAME	BOTANICAL NAME	CAL	HEIGHT
	CNT1	37	Canopy Tree 1	Canopy Tree 1	1.5" min	8' min
	CNT10	24	Canopy Tree 10	Canopy Tree 10	1.5" min	8' min
	CNT11	33	Canopy Tree 11	Canopy Tree 11	1.5" min	8' min
	CNT12	34	Canopy Tree 12	Canopy Tree 12	1.5" min	8' min
	CNT13	25	Canopy Tree 13	Canopy Tree 13	1.5" min	8' min
	CNT14	47	Canopy Tree 14	Canopy Tree 14	1.5" min	8' min
	CNT15	30	Canopy Tree 15	Canopy Tree 15	1.5" min	8' min
	CNT16	35	Canopy Tree 16	Canopy Tree 16	1.5" min	8' min
	CNT2	58	Canopy Tree 2	Canopy Tree 2	1.5" min	8' min
	CNT3	38	Canopy Tree 3	Canopy Tree 3	1.5" min	8' min
	CNT4	49	Canopy Tree 4	Canopy Tree 4	1.5" min	8' min
	CNT5	36	Canopy Tree 5	Canopy Tree 5	1.5" min	8' min
	CNT6	52	Canopy Tree 6	Canopy Tree 6	1.5" min	8' min
	CNT7	46	Canopy Tree 7	Canopy Tree 7	1.5" min	8' min
	CNT8	29	Canopy Tree 8	Canopy Tree 8	1.5" min	8' min
	CNT9	18	Canopy Tree 9	Canopy Tree 9	1.5" min	8' min
SHRUBS	CODE	QTY	COMMON NAME	BOTANICAL NAME	CONT	HEIGHT
	EVS1	59	Evergreen Shrub 1	Evergreen Shrub 1	36" min	

CONCEPT PLANT SCHEDULE

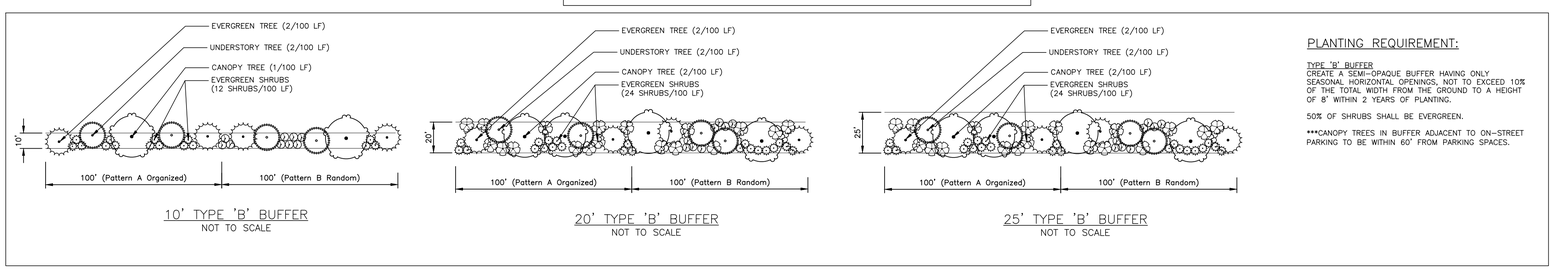
	PINE REFORESTATION	30,634 sf
	Pinus strobus / White Pine	637
	Pinus taeda / Loblolly Pine	637
	UNDERSTORY REPLANTING AREA	33,267 sf
	UNDERSTORY TREE 3 / UNDERSTORY TREE 3	249
	UNDERSTORY TREE 4 / UNDERSTORY TREE 4	249

SPACING "D" ROW "A"
10' o.c. 5' o.c.

TRIANGULAR SPACING FOR PINE SAPLING REFORESTATION

LOBLOLLY PINE SAPLING SPACING CHART

NOTE: UPON ESTABLISHMENT, TREE REFORESTATION AREAS SHALL FOLLOW THE SAME UDO REQUIREMENTS AS TREE SAVE AREAS. DECIDUOUS HARDWOOD MAY BE USED TO SUBSTITUTE PINES. EXACT SPECIES TO BE FINALIZED DURING CDs.



10' TYPE 'B' BUFFER
NOT TO SCALE

20' TYPE 'B' BUFFER
NOT TO SCALE

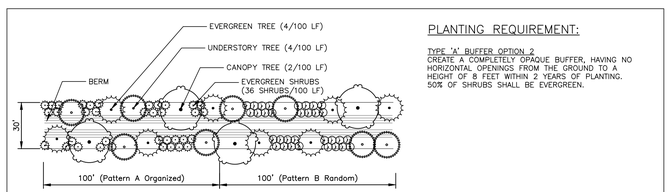
25' TYPE 'B' BUFFER
NOT TO SCALE

PLANTING REQUIREMENT:

TYPE 'B' BUFFER
CREATE A SEMI-OPAQUE BUFFER HAVING ONLY SEASONAL HORIZONTAL OPENINGS, NOT TO EXCEED 10% OF THE TOTAL WIDTH FROM THE GROUND TO A HEIGHT OF 8' WITHIN 2 YEARS OF PLANTING.

50% OF SHRUBS SHALL BE EVERGREEN.

***CANOPY TREES IN BUFFER ADJACENT TO ON-STREET PARKING TO BE WITHIN 60' FROM PARKING SPACES.



TYPE 'A' BUFFER
NOT TO SCALE

PLANTING REQUIREMENT:

TYPE 'A' BUFFER OPTION 2
CREATE A COMPLETELY OPAQUE BUFFER, HAVING NO HORIZONTAL OPENINGS FROM THE GROUND TO A HEIGHT OF 8 FEET WITHIN 2 YEARS OF PLANTING. 50% OF SHRUBS SHALL BE EVERGREEN.

STREET YARD AND PERIMETER BUFFER PLANT SPECIES

CANOPY TREE SPECIES
(INSTALLED AT 1.5" CAL., 8' HT. MIN.)
LIRIODENDRON TULIPIFERA
LIQUIDAMBAR STYRACIFLUA 'ROTUNDILOBA'
NYSSA SYLVATICA
QUERCUS NUTTALLII
QUERCUS PHELLOS
QUERCUS RUBRA
PLATANUS OCCIDENTALIS
ULMUS AMERICANA 'PRINCETON'

EVERGREEN TREE SPECIES
(INSTALLED AT 1" CAL., 8' HT. MIN.)
CEDRUS DEODORA
MAGNOLIA GRANDIFLORA
PINUS TAEDA
THUJA OCCIDENTALIS 'GREEN GIANT'

UNDERSTORY TREE SPECIES
(INSTALLED AT 1" CAL, 6' HT. MIN.)
CARPINUS CAROLINIANA
CERCIS CANADENSIS
CHIONANTHUS RETUSUS
CORNUS 'SPP'
ILEX OPACA 'CAROLINA #2'
ILEX X EMILY BRUNER'
ILEX VOMITORIA
JUNIPERUS VIRGINIANA
PISTACHIA CHINENSIS
VIBURNUM AWABUKI
VIBURNUM DENTATUM

EVERGREEN SHRUB SPECIES
(INSTALLED AT 36" HT. MIN.)
CALLICARPA AMERICANA
ILEX CORNUTA 'NEEDLEPOINT'
ILEX GLABRA 'NIGRA'
ILEX CRENATA 'COMPACTA'
AZALEA HYBRIDS
ILLICIUM PARVIFOLIUM
MYRICA SP.
ILEX VOMITORIA 'NANA'
CAMELLIA SASANQUA
OSMANTHUS X FORTUNEI
PRUNUS CAROLINIANA
HYDRANGEA MACROPHYLLA

GENERAL LANDSCAPE NOTES:

1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE TOWN OF WAKE FOREST AND THE STATE OF NORTH CAROLINA STANDARDS AND SPECIFICATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR THE SITE INSPECTION BEFORE LANDSCAPE CONSTRUCTION AND INSTALLATION IN ORDER TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS.
3. LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES BEFORE BEGINNING DEMOLITION OR INSTALLATION.
4. CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCIES BETWEEN THE NOTES, SPECIFICATIONS, DRAWINGS OR SITE CONDITIONS FOR RESOLUTION PRIOR TO INSTALLATION.
5. ANY DAMAGE TO UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
6. VERIFICATION OF TOTAL PLANT QUANTITIES AS SHOWN IN THE PLANT SCHEDULE SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR. ANY DISCRPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT.
13. SUBSTITUTIONS OF SPECIFIC PLANTS CAN ONLY OCCUR WITH PRIOR WRITTEN PERMISSION OF BOTH OWNER AND LANDSCAPE ARCHITECT.
14. CONTRACTOR TO ENSURE PROPER STABILIZATION AND SEEDING OF THE SITE IN ACCORDANCE WITH APPLICABLE REGULATIONS.
15. LANDSCAPE MATERIAL SHALL BE WELL FORMED, VIGOROUS, GROWING SPECIMENS WITH GROWTH TYPICAL OF VARIETIES SPECIFIED AND SHALL BE FREE FROM DAMAGE, INSECTS AND DISEASES. MATERIAL SHALL EQUAL OR SURPASS #1 QUALITY AS DEFINED IN THE CURRENT ISSUE OF "AMERICAN STANDARD FOR NURSERY STOCK" AS PUBLISHED BY AMERICAN HORT - AMERICANHORT.ORG.
16. ALL PLANT MATERIAL IS TO BE CAREFULLY HANDLED BY THE ROOT BALL, NOT THE TRUNK, BRANCHES AND/OR FOLIAGE OF THE PLANT. MISHANDLED PLANT MATERIAL MAY BE REJECTED BY THE LANDSCAPE ARCHITECT.
17. ALL PLANT MATERIAL IS TO BE WELL ROOTED, NOT ROOT BOUND, SUCH THAT THE ROOT BALL REMAINS INTACT THROUGHOUT THE PLANTING PROCESS. DEFICIENT PLANT MATERIAL MAY BE REJECTED BY THE LANDSCAPE ARCHITECT OR OWNER.
18. ALL PLANTS TO BE A MINIMUM OF WHAT IS SPECIFIED IN THE PLANT SCHEDULE. ANY CHANGES OR SUBSTITUTIONS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT AND GOVERNING JURISDICTION PRIOR TO ANY HOLE BEING DUG.
19. ALL TREES MUST BE PLANTED AFTER OCTOBER 1 AND BEFORE MARCH 31.
20. CONTRACTOR TO COORDINATE WITH OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT TO ESTABLISH THE EXTENTS OF MULCH/SEED/SOD IF NOT SPECIFICALLY SHOWN ON PLANS.
21. CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE IN ALL PLANTING AREAS.
22. PROPOSED TREES TO BE PLANTED A MINIMUM 15 FEET FROM ANY LIGHT POLE AS MEASURED FROM TRUNK OF THE TREE TO THE POLE.
23. PROPOSED TREES TO BE PLANTED A MINIMUM 5 FEET FROM ANY FIRE HYDRANT AS MEASURED FROM TRUNK OF THE TREE TO THE HYDRANT.
24. ALL TREE PLANTINGS SHALL BE MULCHED WITH 3 INCHES OF SHREDDED BARK OR 4 INCHES OF PINE STRAW IN A 3 FOOT RADIUS AROUND THE TREE, OR TO THE DRIPLINE, WHICHEVER IS GREATER. THE MULCH SHALL BE FREE OF TRASH AND MAINTAINED WEED FREE THEREAFTER. MULCH SHALL NOT COVER THE ROOT COLLAR.

MAINTENANCE NOTES:

1. WARRANTY: INSTALLER SHALL REPAIR OR REPLACE ANY PLANTINGS THAT FAIL IN MATERIALS, WORKMANSHIP, OR GROWTH WITHIN ONE YEAR AFTER THE DATE OF SUBSTANTIAL COMPLETION. FAILURES INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   - DEATH AND UNSATISFACTORY GROWTH, EXCEPT FOR DEFECTS RESULTING FROM LACK OF ADEQUATE MAINTENANCE, NEGLECT, ABUSE BY OWNER, OR INCIDENTS THAT ARE BEYOND CONTRACTOR'S CONTROL.
   - STRUCTURAL FAILURES INCLUDING PLANTINGS FALLING OR BLOWING OVER.
2. THE OWNER OF THE PROPERTY AND THEIR AGENTS, HEIRS OR ASSIGNS SHALL BE RESPONSIBLE FOR THE INSTALLATION, PRESERVATION AND MAINTENANCE OF ALL PLANTINGS AND PHYSICAL FEATURES ON THIS PLAN. FAILURE TO MAINTAIN ALL PLANTINGS IN ACCORDANCE WITH THIS PLAN MAY CONSTITUTE A VIOLATION OF THIS ORDINANCE AND MAY RESULT IN FINES. THE OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE VEGETATION, INCLUDING BUT NOT LIMITED TO:
   - FERTILIZATION
   - PRUNING WITHIN LIMITS
   - PEST CONTROL
   - MULCHING
   - MOWING
   - PROTECTION OF THE ROOT ZONES FROM EQUIPMENT, CONSTRUCTION AND RELATED MATERIALS, ETC.
   - METHOD OF IRRIGATION
   - OTHER CONTINUING MAINTENANCE OPERATIONS

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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CLIENT

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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA



REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	N/A
DATE	08. 25. 2023

SHEET

LANDSCAPE NOTES AND DETAILS

L5.11

M:\Projects\TOL\2021110197\04-Production\Engineering\Master Plan - Pricing Set\Current Drawings\2021110197-LS1.dwg, 9/1/2023 9:10:32 AM, Sicong Ma

DECIDUOUS CANOPY						
PRESERVED				REMOVED		
SIZE:	SPECIES	QTY:	CREDIT:	SIZE:	SPECIES	QTY:
20	ash	3	3	30	ash	1
21	ash	4	3	26	ash	1
22	ash	3	3	24	ash	1
23	ash	1	3	22	ash	1
24	ash	1	3	25	beech	1
25	ash	1	3	37	beech	1
26	ash	1	3	30	beech	1
27	ash	1	3	32	beech	1
28	ash	1	3	23	beech	2
29	ash	1	3	28	beech	2
35	ash	1	4	30	chestnut oak	1
20	beech	3	3	23	elm	1
21	beech	3	3	47	gum	1
24	beech	1	3	31	gum	1
25	beech	1	3	32	gum	1
26	beech	1	3	29	gum	2
28	beech	1	3	30	gum	3
34	beech	1	4	24	gum	3
36	beech	1	4	22	gum	3
40	beech	1	4	21	gum	3
26	chestnut oak	1	3	27	gum	4
23	elm	1	3	26	gum	4
26	elm	1	3	25	gum	7
27	elm	1	3	20	gum	9
28	elm	1	3	28	gum	9
29	elm	1	3	23	gum	12
20	gum	43	3	36	hackberry	1
21	gum	1	3	31	hickory	1
21	gum	34	3	28	hickory	1
22	gum	35	3	20	hickory	2
23	gum	25	3	21	hickory	3
24	gum	29	3	23	hickory	3
25	gum	22	3	27	maple	1
26	gum	22	3	20	maple	1
27	gum	20	3	23	maple	1
28	gum	13	3	21	maple	1
29	gum	9	3	29	maple	3
30	gum	10	3	26	pecan	1
31	gum	6	4	31	poplar	1
32	gum	9	4	44	poplar	1
33	gum	1	4	36	poplar	1
34	gum	1	4	28	poplar	1
35	gum	1	4	59	poplar	1
36	gum	1	4	41	poplar	1
37	gum	1	4	33	poplar	2
24	gum double s	1	3	29	poplar	2
27	gumsw	1	3	27	poplar	2
26	hackberry	1	3	32	poplar	2
20	hickory	2	3	40	poplar	2
21	hickory	1	3	22	poplar	3
22	hickory	1	3	38	poplar	3
24	hickory	1	3	25	poplar	3
25	hickory	1	3	23	poplar	3
27	hickory	1	3	21	poplar	4
28	hickory	1	3	26	poplar	4
20	maple	5	3	24	poplar	5
21	maple	5	3	31	red oak	1
22	maple	7	3	25	red oak	1
23	maple	4	3	43	red oak	1
24	maple	2	3	48	red oak	1
25	maple	2	3	23	red oak	1
26	maple	5	3	26	red oak	1
27	maple	4	3	52	red oak	1
28	maple	6	3	21	red oak	1
29	maple	2	3	27	red oak	1
30	maple	3	3	41	red oak	1
31	maple	1	4	20	red oak	2
32	maple	2	4	36	red oak	2
33	maple	1	4	33	red oak	2
34	maple	1	4	42	red oak	2
36	maple	2	4	30	red oak	3
39	maple	1	4	35	red oak	3
40	maple	1	4	34	swamp white o	1
47	maple	1	5	21	walnut	1
20	poplar	11	3	21	white oak	1
21	poplar	7	3	37	white oak	1
22	poplar	11	3	25	white oak	2
23	poplar	8	3	24	white oak	2
24	poplar	6	3	30	white oak	2
25	poplar	8	3	40	white oak	2
26	poplar	7	3	32	white oak	3
27	poplar	1	3	26	white oak	4
28	poplar	6	3	40	willow oak	1
29	poplar	5	3	33	willow oak	1
30	poplar	7	3	20	willow oak	1
31	poplar	5	4	50	willow oak	1
32	poplar	2	4	38	willow oak	1
33	poplar	7	4	34	willow oak	2
34	poplar	1	4			
35	poplar	2	4			
36	poplar	1	4			
37	poplar	2	4			
38	poplar	1	4			
43	poplar	1	5			
45	poplar	1	5			
20	red oak	1	3			
22	red oak	2	3			
24	red oak	1	3			
25	red oak	1	3			
27	red oak	1	3			
28	red oak	1	3			
31	red oak	1	4			
32	red oak	1	4			
33	red oak	1	4			
35	red oak	1	4			
36	red oak	1	4			
37	red oak	1	4			
38	red oak	2	4			
44	red oak	1	5			
20	river birch	2	3			
21	river birch	2	3			
22	river birch	1	3			

DECIDUOUS CANOPY			
PRESERVED			
SIZE:	SPECIES	QTY:	CREDIT:
26	river birch	2	3
33	river birch	1	4
34	river birch	1	4
40	river birch	1	4
27	swamp oak	1	3
25	swamp white	1	3
32	swamp white	1	4
20	sycamore	1	3
21	sycamore	2	3
22	sycamore	1	3
23	sycamore	1	3
26	sycamore	1	3
28	sycamore	1	3
29	sycamore	1	3
30	sycamore	1	3
32	sycamore	1	4
33	sycamore	1	4
34	sycamore	1	4
20	walnut	1	3
20	white oak	1	3
21	white oak	1	3
22	white oak	2	3
24	white oak	2	3
27	white oak	1	3
28	white oak	2	3
32	white oak	1	4
24	willow oak	3	3
30	willow oak	1	3
31	willow oak	1	4
33	willow oak	1	4
35	willow oak	1	4
42	willow oak	1	5
52	willow oak	1	5
21	wilow oak	1	3
23	wilow oak	1	3
25	wilow oak	1	3
26	wilow oak	1	3

UNDERSTORY						
PRESERVED				REMOVED		
SIZE:	SPECIES	QTY:	CREDIT	SIZE:	SPECIES	QTY:
16	cedar	1	2	9	cedar	1
30	cedar	1	2	25	cedar	1
27	cedar	1	2	12	cedar	1
29	cedar	1	2	30	cedar	1
26	cedar	1	2	8	cedar	2
21	cedar	1	2	17	cedar	2
22	cedar	2	2	21	cedar	3
23	cedar	2	2	24	cedar	3
13	cedar	2	2	28	cedar	3
20	cedar	3	2	23	cedar	3
15	cedar	4	2	20	cedar	4
14	cedar	4	2	11	cedar	4
17	cedar	4	2	18	cedar	4
18	cedar	6	2	13	cedar	5
8	cedar	6	2	14	cedar	5
9	cedar	6	2	19	cedar	5
12	cedar	7	2	22	cedar	6
10	cedar	8	2	16	cedar	6
11	cedar	8	2	10	cedar	6
13	cherry	1	2	15	cedar	7
8	cherry	2	2	8	cherry	1
10	cypress	1	2	27	cherry	1
9	cypress	1	2	26	cherry	2
10	dogwood	1	2	19	cypress	1
8	dogwood	3	2	12	dogwood	1
10	holly	1	2	9	dogwood	1
12	holly	1	2	11	dogwood	1
21	leyland cyp	1	2	10	dogwood	1
12	redbud	1	2	14	holly	1
8	black willov	4	2	13	leyland cypress	1
9	black willov	1	2	38	leyland cypress	1
11	black willov	1	2	16	leyland cypress	1
13	black willov	2	2	21	leyland cypress	1
				24	leyland cypress	2
				19	leyland cypress	2
				17	leyland cypress	2
				12	leyland cypress	3
				15	leyland cypress	3
				8	leyland cypress	4
				10	leyland cypress	4
				11	leyland cypress	4
				18	leyland cypress	5
				14	leyland cypress	5
				20	magnolia	1
				24	magnolia	1
				26	magnolia	1

EVERGREEN CANOPY						
PRESERVED				REMOVED		
SIZE:	SPECIES	QTY:	CREDIT:	SIZE:	SPECIES	QTY:
10	pine	1	3	40	pine	1
20	pine	33	3	38	pine	1
21	pine	30	3	34	pine	1
22	pine	40	3	35	pine	2
23	pine	35	3	31	pine	2
24	pine	36	3	36	pine	2
25	pine	31	3	33	pine	3
26	pine	32	3	32	pine	3
27	pine	35	3	29	pine	5
28	pine	24	3	26	pine	6
29	pine	24	3	30	pine	7
30	pine	25	3	27	pine	9
31	pine	1	4	28	pine	10
32	pine	9	4	22	pine	11
33	pine	5	4	23	pine	11
34	pine	3	4	20	pine	15
35	pine	4	4	21	pine	16
36	pine	1	4	25	pine	16
37	pine	1	4	24	pine	17
38	pine	1	4			
39	pine	1	4			
42	pine	1	5			

TREE PRESERVATION AND REPLACEMENT SUMMARY

SEE TABLE AT LEFT FOR INDIVIDUAL TREES AND SPECIES INFORMATION

CANOPY TREES

DECIDUOUS TREES

186 DECIDUOUS TREES REMOVED = 744 REPLACEMENT TREES
551 DECIDUOUS TREES PRESERVED = 1738 CREDITS

EVERGREEN TREES

123 EVERGREEN TREES REMOVED = 492 REPLACEMENT TREES
373 EVERGREEN TREES PRESERVED = 1147 CREDITS

CANOPY TREE TOTAL:

REPLACEMENT TREES REQUIRED: 1236
CANOPY TREES PRESERVED = 2885 CREDITS
REPLACEMENT TREES REQUIRED: 1236**

** REFORESTATION AREAS TO COUNT TOWARD REPLACEMENT TREES. SEE SHEET L5.11 FOR DETAILS.

UNDERSTORY TREES

123 UNDERSTORY TREES REMOVED = 492 REPLACEMENT TREES
89 UNDERSTORY TREE PRESERVED = 178 CREDITS
REPLACEMENT TREES REQUIRED: 492***

*** UNDERSTORY REPLANTING AREAS TO COUNT TOWARD REPLACEMENT TREES. SEE SHEET L5.11 FOR DETAIL.

NOTES:
1) PER CODE SECTION 8.4.3.D WHEN A SPECIMEN TREE IS REMOVED IT SHALL BE REPLACED WITH AN AMOUNT OF TREES AND/OR LANDSCAPING OF EQUAL VALUE. PROPOSED REPLACEMENT AT A RATE OF 4 TREES PER SPECIMEN TREE.

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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	N/A
DATE	08. 25. 2023

SHEET

LANDSCAPE NOTES

L5.12

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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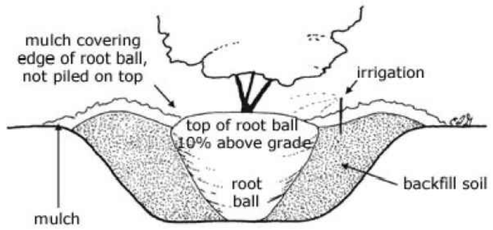
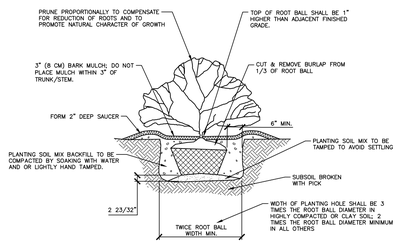
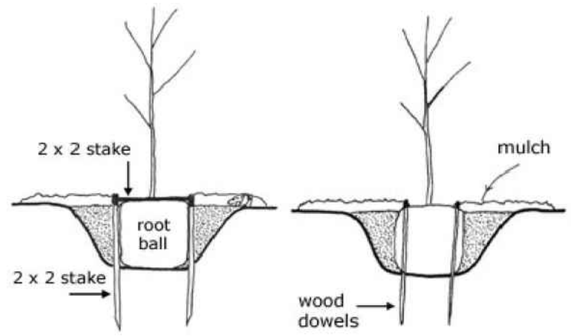


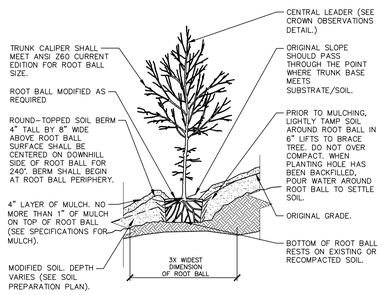
01 TREE INSTALLATION (TOWN OF WAKE FOREST TYP. DETAIL)
SCALE: NTS



02 SHRUB INSTALLATION
SCALE: 3/8"=1'-0"

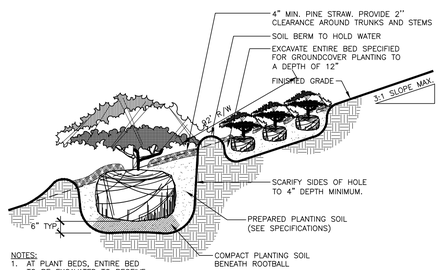


03 PREFERRED TREE STAKING METHODS (TOWN OF WAKE FOREST TYP. DETAIL)
SCALE: NTS



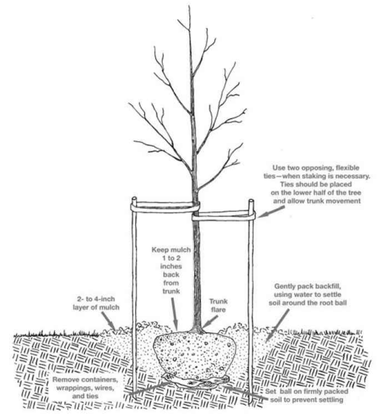
NOTES:
1. TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.
2. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

04 TREE ON SLOPE 5% (20:1) TO 50% (2:1) - MODIFIED SOIL
SCALE: N.T.S.



NOTES:
1. AT PLANT BEDS, ENTIRE BED TO BE EXCAVATED TO RECEIVE PLANTING SOIL AND PLANT MATERIAL.

05 SHRUB PLANTING ON SLOPE
SCALE: 3/4"=1'-0"



06 ALTERNATE TREE STAKING METHOD (TOWN OF WAKE FOREST TYP. DETAIL)
SCALE: NTS

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JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA



REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
CHECKED BY	MPT
DRAWN BY	SM
SCALE	N/A
DATE	08. 25. 2023

SHEET

LANDSCAPE DETAILS

L5.13

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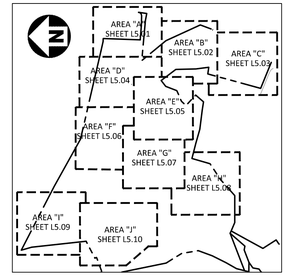

INDEX MAP
1"=1000'

LEGEND

- LD —— LD —— LIMITS OF DISTURBANCE
- 250 PROPOSED CONTOUR
- WETLAND
- TREE SAVE
- TREE TO BE REMOVED
- TREE TO REMAIN

NOTES:

1. REFER TO SHEET C2.00 FOR ADJACENT PROPERTY LEGEND AND OWNER INFORMATION.

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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CAROLINA
ENGINEERING
036781
08.31.2023
MICHAEL P. TARR

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LS1
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SCALE	1"=200'
DATE	08. 25. 2023

SHEET

SPECIMEN TREE MAP

L5.14

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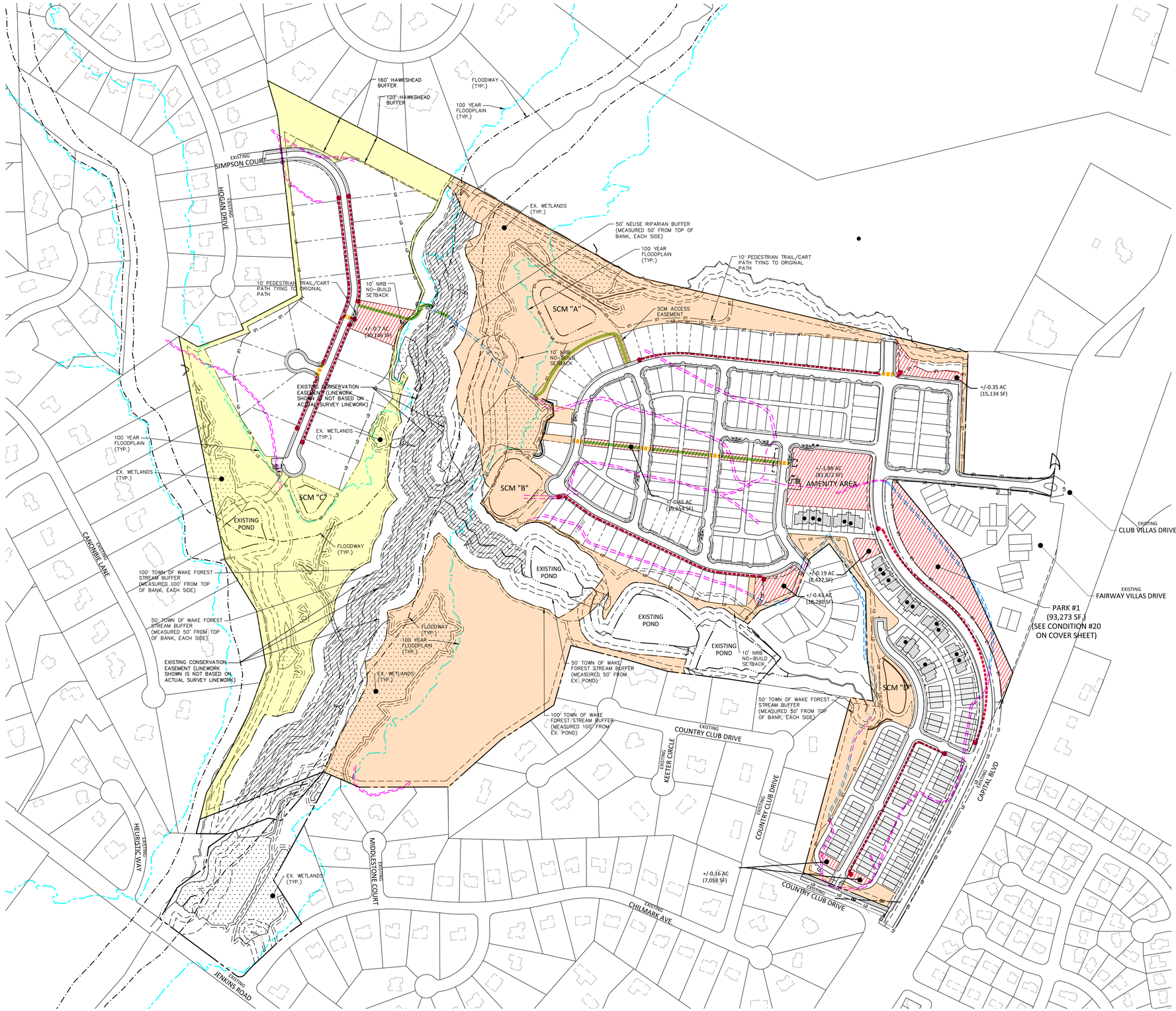

LEGEND

SYMBOL	DESCRIPTION	APPROXIMATE LAND AREA
	OPEN SPACE AREA WEST OF STREAM BUFFER USED TOWARD TOWN OPEN SPACE REQUIREMENT	+/-17.38 AC (756,992 SF)
	OPEN SPACE AREA EAST OF STREAM BUFFER USED TOWARD TOWN OPEN SPACE REQUIREMENT	+/-37.13 AC (1,617,223 SF)
	NEIGHBORHOOD PARK SPACE WEST OF CREEK EAST OF CREEK	+/-5.85 AC (275,886 SF) +/-0.70 AC (30,146 SF) +/-5.15 AC (245,740 SF)
	EXISTING CART PATH TO BE REMOVED	+/-6,563 LF
	TO REMAIN	+/-3,262 LF
	EXISTING CONSERVATION EASEMENT (FOR REFERENCE ONLY; CONSERVATION EASEMENT AREA INCLUDED AS PART OF THE OPEN SPACE CALCULATIONS OF SUP UNDER SEPARATE COVER)	+/-10.35 AC (450,842 SF)

SITE LEGEND

- SIGNAGE
- TRAFFIC DIRECTIONAL ARROW
- VAN — VAN ACCESSIBLE PARKING STALL
- ACCESSIBLE RAMPS
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- LOT LINE
- EASEMENT LINE
- CENTERLINE
- 100 YEAR FLOOD PLAIN
- PEDESTRIAN TRAIL/SIDEWALK (DEMONSTRATING FURTHEST DISTANCES FROM RECREATION SPACE)
- CROSSWALK
- PEDESTRIAN ASPHALT TRAILS

OPEN SPACE CALCULATIONS

OPEN SPACE (UNIMPROVED)	REQUIRED	5,430,882 SF x 10% = 543,088 SF	
	PROPOSED	2,188,322 SF (40.29%)	
OPEN SPACE W/IN:	TREE SAVE		1,004,444 SF (45.9%)
	REFORESTATION		63,901 SF (2.92%)
	CONSERVATION ESMTS		0 SF (EXCLUDED)
OPEN SPACE OUTSIDE OF FLOOD HAZARD, WATERCOURSES, AND WATERSHED BUFFERS	REQUIRED	2,188,322 SF x 25% = 54,708 SF	
	PROPOSED	1,119,977 SF (51.18%)	
PARK SPACE	REQUIRED	5,430,882 SF x 2.5% = 135,772 SF	
	PROPOSED	275,886 SF (5.0%)	
	ACTIVE REQUIRED	68,971 SF (25% PARK SPACE)	
	ACTIVE PROPOSED	82,881 SF (30.04%)	
PARK SPACE OUTSIDE OF PONDS, LAKES, WETLANDS, AND POWER EASEMENTS	REQUIRED	275,886 SF x 50% = 91,306 SF	
	PROPOSED	275,886 SF (100%)	

GRAPHIC SCALE
0 100 200 400
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CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049101 RACHEL P. TARR

REVISIONS

NO. DATE

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-OS1
CHECKED BY	SRD
DRAWN BY	CTM
SCALE	1"=200'
DATE	08. 25. 2023

SHEET

OVERALL OPEN SPACE PLAN

L6.00

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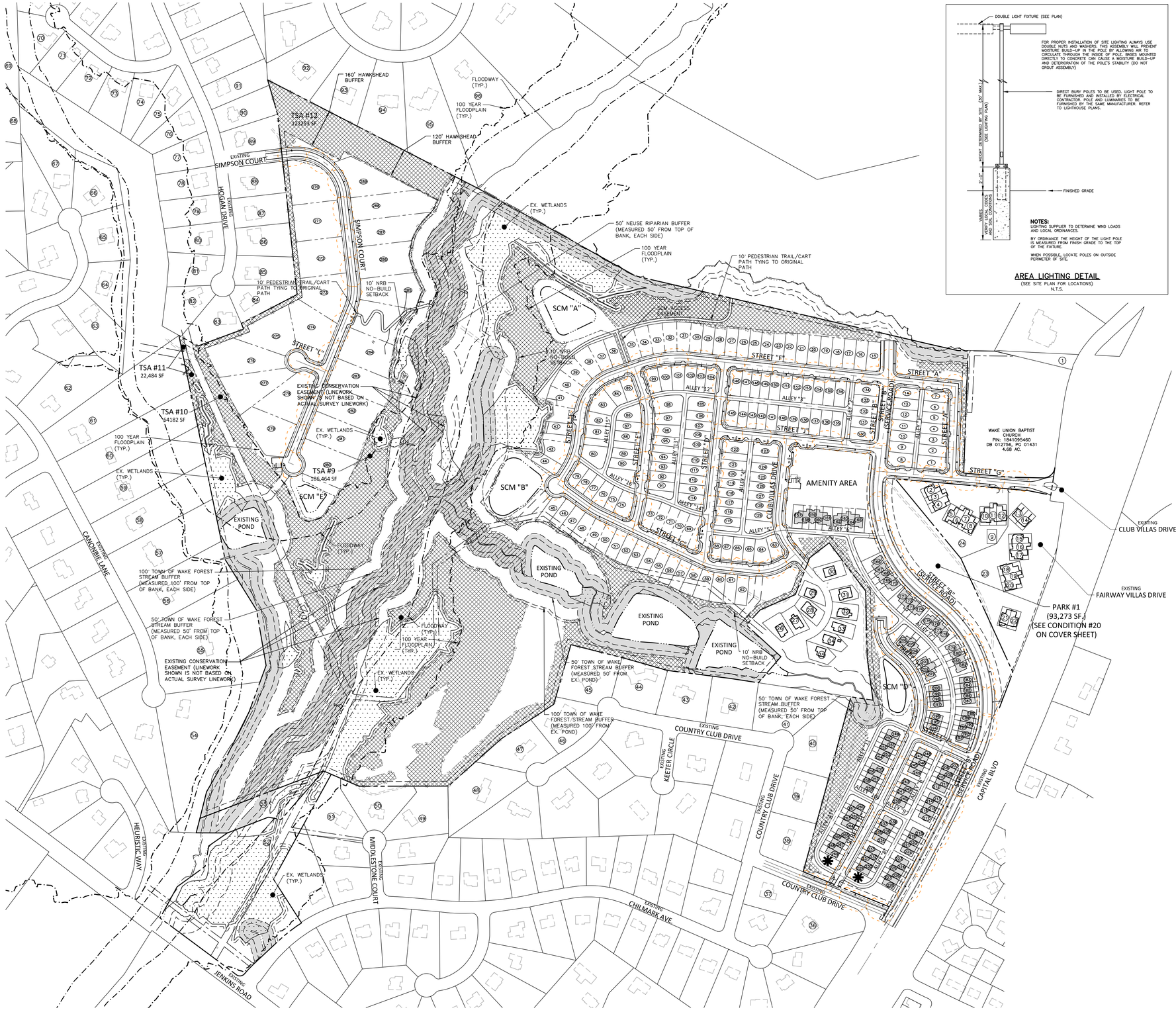

AREA LIGHTING DETAIL
(SEE SITE PLAN FOR LOCATIONS)
N.T.S.

THIS PROJECT WILL MEET THE FOLLOWING LIGHTING STANDARDS AT THE TIME OF CONSTRUCTION PLANS. IN ADDITION, LIGHT POLES WILL BE LOCATED SO AS TO AVOID ANY CONFLICTS WITH EASEMENTS, RETAINING WALLS OR TREES.

OUTDOOR LIGHTING

THE LIGHTING STANDARDS FOR THIS SITE PLAN WILL MEET ALL THE REQUIREMENTS AS LISTED BELOW.

PURPOSE

THE PURPOSE OF THESE STANDARDS IS TO ASSURE THAT ADEQUATE EXTERIOR LIGHTING IS PROVIDED FOR NONRESIDENTIAL AND MULTI-FAMILY DEVELOPMENTS TO FACILITATE CRIME PREVENTION, SECURITY, AND SAFE PASSAGE, AND THAT EXTERIOR LIGHTS BE SHIELDED SO THAT THE LIGHT CAST BEYOND THE PROPERTY LINE DOES NOT EXCEED THE LIMITS IN ACCORDANCE WITH THESE STANDARDS.

APPLICABILITY

A. ADEQUATE LIGHTING SHALL BE PROVIDED IN NONRESIDENTIAL AND MULTIFAMILY DEVELOPMENTS CONFORMING TO PROFESSIONAL ENGINEERING STANDARDS.

B. THE FOLLOWING SHALL BE EXEMPT FROM THESE PROVISIONS:

1. OUTDOOR LIGHTS USED FOR A TEMPORARY EVENT; PERMITTED THROUGH A TEMPORARY USE PERMIT.

2. OUTDOOR LIGHTS USED EXCLUSIVELY FOR RECREATIONAL ACTIVITIES, CONCERTS, PLAYS OR OTHER OUTDOOR EVENTS THAT ARE OPEN TO THE PUBLIC, PROVIDED THAT THE LIGHT FIXTURES ARE LOCATED AT LEAST 100 FEET FROM ANY ADJACENT RESIDENTIAL USE AND THE EVENT OR FUNCTION MEETS ALL OTHER APPLICABLE ZONING REQUIREMENTS. SUCH LIGHTING SHALL NOT BE ILLUMINATED BETWEEN THE HOURS OF 12:00AM AND 8 A.M. AND BETWEEN 1:00 A.M. AND 8 A.M. FRIDAY AND SATURDAY EXCEPT IN THE UC DISTRICT AND THE DOWNTOWN TIER.

3. OUTDOOR LIGHTING EXEMPTED PURSUANT TO 1 AND 2 ABOVE SHALL ONLY BE ILLUMINATED WHILE THE ACTIVITY TAKES PLACE AND DURING HIGH TRAFFIC PERIODS IMMEDIATELY BEFORE AND AFTER THE EVENT.

STANDARDS

A. ALL SITE LIGHTING SHALL BE DESIGNED SO THAT THE LEVEL OF ILLUMINATION AS MEASURED IN FOOT-CANDLES (FC) AT ANY ONE POINT MEETS THE STANDARDS IN THE TABLE BELOW WITH MINIMUM AND MAXIMUM LEVELS MEASURED ON THE PAVEMENT WITHIN THE LIGHTED AREA.

TYPE OF LIGHTING	LIGHT LEVEL (FOOT-CANDLES) MIN.	MAX
ARCHITECTURAL LIGHTING, LANDSCAPE OR DECORATIVE LIGHTING, WALKWAYS EXCEPT FOR THOSE LISTED BELOW	0.0	5.0
CANOPY AREA LIGHTING	2.0	24.0
PEDESTRIAN PASSAGES AND MALLS (ARTICLE 16)	1.0	15.0
MULTIFAMILY PARKING LOT	0.5	8.0
NONRESIDENTIAL AND MULTIFAMILY ENTRANCES	1.0	15.0
NONRESIDENTIAL PARKING LOT	0.5	10.0
ON-SITE WALKWAYS BETWEEN BUILDING ENTRANCES, BETWEEN PARKING & A BUILDING ENTRANCE, OR SERVING TO MEET SIDEWALK REQUIREMENTS PER SEC. 12.4, PEDESTRIAN AND BICYCLE MOBILITY	0.2	5.0
STORAGE AREA (SECURITY LIGHTING)	0.5	10.0
VEHICLE SALES AND DISPLAY	0.5	24.0

B. THE MAXIMUM ILLUMINATION PERMITTED AT THE EDGE OF A PROPERTY LINE SHALL BE AS SET FORTH BELOW. WHERE A DEVELOPMENT IS UNIFIED WITH SHARED PARKING OR OTHER MEASURES SHOWN ON A SITE PLAN, THE MAXIMUM ILLUMINATION LEVELS SHALL APPLY ONLY TO THE EXTERIOR LOT LINES OF THE PROJECT (ANY INTERIOR LOT LINES SHALL BE EXEMPT FROM THIS PARAGRAPH).

1. THE MAXIMUM ILLUMINATION AT THE EDGE OF THE PROPERTY LINE ADJACENT TO A RESIDENTIAL ZONING DISTRICT SHALL BE 0.5 FOOT-CANDLES.

2. THE MAXIMUM ILLUMINATION AT THE EDGE OF THE PROPERTY LINE ADJACENT TO NONRESIDENTIAL ZONING DISTRICT SHALL BE 5.0 FOOT-CANDLES.

3. THE MAXIMUM ILLUMINATION AT THE EDGE OF THE PROPERTY LINE ADJACENT TO A STREET SHALL BE 5.0 FOOT-CANDLES.

C. FULL-CUTOFF LIGHTING
THE MAXIMUM HEIGHT FOR DIRECTIONAL OR FULL CUT-OFF LIGHTING FIXTURES (FIXTURES DESIGNED TO ENSURE THAT NO LIGHT IS EMITTED ABOVE A HORIZONTAL LINE PARALLEL TO THE GROUND) SHALL BE 30 FEET ABOVE GRADE.

D. NON-DIRECTIONAL LIGHTING
THE MAXIMUM HEIGHT FOR NON-DIRECTIONAL LIGHTING FIXTURES (FIXTURES DESIGNED TO ALLOW LIGHT TO BE EMITTED ABOVE A HORIZONTAL LINE PARALLEL TO THE GROUND) SHALL BE 15 FEET ABOVE GRADE. NON-DIRECTIONAL LIGHTING FIXTURES SHALL BE TRANSLUCENT OR HAVE BAFFLES TO PREVENT VIEWS OF THE LIGHT SOURCE.

E. CANOPY LIGHTING
UNDER CANOPY LIGHTING SHALL BE RESTRICTED TO LIGHTING FIXTURES (INCLUDING LENSES) THAT DO NOT PROJECT BELOW THE BOTTOM OF THE CANOPY.

F. GLARE
LIGHTING SHALL BE ORIENTED NOT TO DIRECT GLARE OR EXCESSIVE ILLUMINATION ONTO STREETS IN A MANNER THAT MAY DISTRACT OR INTERFERE WITH THE VISION OF DRIVERS ON SUCH STREETS.

G. ACCENT LIGHTING
LIGHTING FIXTURES USED TO ACCENT ARCHITECTURAL FEATURES, LANDSCAPING OR ART SHALL BE LOCATED, AIMED OR SHIELDED TO MINIMIZE LIGHT SPILL INTO THE NIGHT SKY.

H. BLINKING OR FLASHING LIGHTS
BLINKING OR FLASHING LIGHTS SHALL BE PROHIBITED UNLESS THE LIGHTS ARE REQUIRED AS A SAFETY FEATURE (E.G. BEACONS ON TOWERS) OR PERMITTED AS PART OF A SIGN IN ACCORDANCE WITH ARTICLE 11, SIGN STANDARDS.

I. NON-CONFORMITIES
LIGHTING FIXTURES EXISTING AS OF JUNE 12, 2000 MAY REMAIN, AND SHALL BE CONSIDERED NONCONFORMING STRUCTURES. MODIFICATIONS, REPLACEMENT OR EXPANSIONS, SHALL CONFORM WITH THE STANDARDS OF THIS ORDINANCE.

STREET LIGHT

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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PHONE: 919. 556. 5418

JOYNER PROPERTY
MASTER SITE PLAN
CLUB VILLAS DRIVE
WAKE FOREST, NORTH CAROLINA

REVISIONS

NO.	DATE	
1	04. 06. 2022	RESPONSE TO TOWN COMMENTS
2	07. 07. 2022	RESPONSE TO TOWN COMMENTS
3	09. 29. 2022	RESPONSE TO TOWN COMMENTS
4	06. 27. 2023	RESPONSE TO TOWN COMMENTS

PLAN INFORMATION

PROJECT NO.	2021110197
FILENAME	2021110197-LI1
CHECKED BY	.
DRAWN BY	.
SCALE	1"=200'
DATE	08. 19. 2021

SHEET

LIGHTING PERFORMANCE PLAN
L7.00

M:\Projects\TOB\2021110197\04-Production\Engineering\Master Plan - Pricing Set\Current Drawings\2021110197-LI1.dwg, 6/27/2023 5:09:45 PM, Sciong Ma

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-234-
Submitted by: Monica Sarna
Submitting Department: Engineering
Meeting Date: October 3, 2023

SUBJECT
Presentation of the UNRBA Consensus Principles

Recommendation:
Board approval to support the final draft of the UNRBA's Concepts and Principles Document (C&P Doc) and the draft Consensus Principles II (CPII)

Item Summary:

ATTACHMENTS

- Summary.docx
- AttachmentA-CPIIResolution.docx
- Attachment B_ConsensusPrinciples II_20230920_Board approved.pdf
- Attachment C_2023_09_20 Final UNRBA Concepts and Principles for Reexamination.pdf

ITEM TITLE: Town Approval of the UNRBA Consensus Principles

ITEM SUMMARY: Forest Westall, the Executive Director of the Upper Neuse River Basin Association (UNRBA) will present to the board the final draft of the UNRBA's Concepts and Principles Document (C&P Doc) and the draft Consensus Principles II (CPII) for Town approval. Since the Town is a member of the UNRBA, our approval is an important part of the UNRBA's submittal to the State.

ATTACHMENTS: Attachment_A_CPII Resolution

Attachment B_ConsensusPrinciples II_20230920_Board approved

Attachment C_2023_09_20 Final UNRBA Concepts and Principles for Reexamination

SPECIFIC ACTION REQUESTED: Recommend approval.

RESOLUTION 2023-XX

WAKE FOREST RESOLUTION ENDORSING THE UPPER NEUSE RIVER BASIN ASSOCIATION ("UNRBA") CONSENSUS PRINCIPLES II FOR REVISED FALLS LAKE RULES

WHEREAS, the North Carolina Environmental Management Commission ("EMC") adopted the Falls Lake Rules ("Rules"), and the N.C. Rules Review Commission approved the Rules at its December 16, 2010, meeting, with an effective date of January 15, 2011;

WHEREAS, the jurisdictions of the Falls Lake watershed developed an original set of consensus principles in February 2010 to guide the development of the current Rules;

WHEREAS, the Rules (15A NCAC 02B .0275 (5)(f)) allow for the reexamination of the existing Rules using a Division of Water Resources ("DWR")-approved evaluation process, and for the results of the reexamination to be presented to DWR and the EMC;

WHEREAS, the UNRBA has followed the Rules' reexamination process, secured required approvals of the process by DWR, and invested in a 10-year, $10 million study of Falls Lake and its watershed, to establish an updated and comprehensive scientific basis for revisions to the Rules;

WHEREAS, on September 20, 2023, the UNRBA Board of Directors approved revised consensus principles ("Consensus Principles II", *see* Attachment B) for the readoption of the Rules;

WHEREAS, the UNRBA member local government jurisdictions desire to endorse the Falls Lake Consensus Principles II for the readoption of the Rules;

NOW, THEREFORE, BE IT RESOLVED, that the Town of Wake Forest endorses Consensus Principles II as adopted by the UNRBA Board of Directors, and recommends that the North Carolina Department of Environmental Quality and the EMC use these consensus principles as guidelines in developing the revised rules for Falls Lake.

Duly adopted this 17th day of October 2023.

_____

Vivian A. Jones
Mayor

(ATTEST)

_____

Theresa Savary
Town Clerk

UPPER NEUSE RIVER BASIN ASSOCIATION (UNRBA) CONSENSUS PRINCIPLES II TO GUIDE REVISIONS TO THE FALLS LAKE RULES
Approval by the UNRBA Board of Directors September 20, 2023

These Consensus Principles are based on scientific conclusions resulting from a 10-year evaluation of Falls Lake and its watershed by the UNRBA, NC Collaboratory, and other organizations. The information now available cannot be fully described in this set of Consensus Principles but is described in more detail in a companion document titled "Concepts and Principles for the UNRBA Recommendations for a Revised Falls Lake Nutrient Management Strategy" available online at https://unrba.org/reexamination.

The UNRBA is committed to a cooperative and collaborative process to reach agreement on revised Falls Lake Rules (also referred to as the revised Falls Lake Nutrient Management Strategy). The Association appreciates our positive relationship with the NC Department of Environmental Quality and its Division of Water Resources (DEQ-DWR). The UNRBA will work diligently to maintain this relationship through the development and the adoption of a revised set of Falls Lake Rules. We have had the opportunity to interact and report to the NC Environmental Management Commission (EMC) on initiatives of the UNRBA. We plan to continue this communication through the readoption and implementation of the Falls Lake Rules. These Consensus Principles, and supporting information, will be provided to DEQ-DWR, the EMC, and the NC General Assembly as required by State law.

1. Revised rules are needed to promote effective action and sustainable investment by local governments, utilities, and other partners to meet the goals of maintaining, protecting, and improving water quality in Falls Lake into the future. The UNRBA recognizes the importance of this lake as a water supply source, an ecological and recreational resource, and a flood control reservoir.
2. NC DEQ-DWR and the EMC should move forward promptly with the revisions to the Falls Lake rules, taking into consideration these Consensus Principles.
3. The revised rules should embrace a systems approach focusing on solutions that consider interactions among surface water, land surfaces, groundwater, soils, and atmospheric and climatological drivers. This watershed-health approach should consider environmental benefits, costs, and impacts to users of the water resource and those asked to pay the costs of the regulations. The revised rules should improve water quality throughout the watershed, and not prioritize activities solely based on the reduction of nutrients to Falls Lake.
4. The revised rules should include adaptive management. Implementation of the rules should be reviewed every 5 years, with a report to address new information, conditions, or concerns that have developed during the previous 5 years. The UNRBA proposes that the adaptive management provision also include a detailed reevaluation of the rules completed 25 years after the date the revised rules are enacted. A detailed reevaluation should incorporate additional monitoring data collected by DWR and other organizations, data analysis, modeling evaluations, and consideration of technological advancements for improving water quality. The 25-year review should include a reexamination of the rules, so that changes may be proposed and put forward for consideration.
5. The revised rules for managed lands should be an investment-based, joint-compliance approach. Managed lands include residential, commercial, institutional (schools, hospitals, other state and federal facilities, etc.), agricultural (cropland and pasture), road rights of way, recreational (parks), etc.
6. The revised rules should not require nutrient load reductions from natural or unmanaged

areas including forests, land in forest succession, scrubland, non-pasture grassland, and isolated or connected wetlands. Nutrient loads from these areas should not be directly or indirectly assigned to other source categories.

7. The revised rules should promote land conservation and preservation of natural or unmanaged areas as an investment credit.
8. The revised rules should include a provision for a watershed organization to promote voluntary coordination of an investment-based, joint-compliance approach.
9. The revised rules should maintain the annual loading limits specified in the current new development rule, provide a more flexible evaluation-of-need for stormwater nutrient control for individual residential lots or for the subdivision of large family parcels for the purposes of passing land to heirs for building their homes, allow local governments to consider more innovative approaches to stormwater management, and include joint consultation among watershed organization members to assess and document consistent application of new development requirements.
10. Major and minor wastewater treatment plant owners should continue to optimize treatment performance using currently installed technologies. Review of plant performance should be included as a provision of the 25-year review. Plant and collection system owners should continue to track emerging technologies that may become technically and financially feasible in the future for further improvements to plant operations and biosolids handling; and identify and eliminate exfiltration from sewer lines and sanitary sewer overflows.
11. The revised rules should incorporate requirements for new wastewater treatment facility requests or expansion requests including provisions for technology upgrades, joint-compliance permits (e.g., the Lower Neuse Compliance Association's permit), nutrient offsets, and/or nutrient credit trading using practices on managed lands.
12. Investment credits should continue to be available for inspecting, identifying, and repairing or replacing malfunctioning onsite wastewater treatment systems and, as appropriate, for connecting onsite systems to sewer systems.
13. Separate, State-required nutrient management requirements should not be applied to managed lands in separate areas of the watershed (draining to an upstream watershed impoundment, arms of Falls Lake, etc.). However, water quality in all areas of the watershed should be tracked, particularly sub-watersheds with water-supply impoundments. The adaptive management provisions of the revised rules should address changing conditions in these waterbodies and allow for revisions to the program to address concerns as they arise.
14. The revised rules should expand the types of projects that qualify for investment credit, include the option of developing new credit types, and provide opportunity for other voluntary partners. The revised rules should promote local government participation in other watershed improvement actions.
15. The revised rules should encourage local governments to base implementation decisions on the principles of the fair and equitable treatment of members, and the residents of the watershed. The revised rules should promote opportunities for equitable stakeholder participation by encouraging input and participation from the public and interest groups.
16. The chlorophyll-a standard and water quality 303(d) assessment methodology for Falls Lake should be adjusted to better represent conditions in Falls Lake. The UNRBA supports an adjusted 303(d) assessment methodology and site-specific chlorophyll-a standard for Falls Lake and will continue to cooperate and collaborate with DEQ-DWR, Environmental Protection Agency (EPA), and other stakeholders on these revisions. The UNRBA does not recommend delaying rule revisions while these objectives continue to be developed and evaluated. Readoption of the Falls Lake Rules remains the priority so ongoing implementation efforts in the watershed can proceed.

Concepts and Principles for the Upper Neuse River Basin Association (UNRBA) Recommendations for a Revised Falls Lake Nutrient Management Strategy

Prepared for
Upper Neuse River Basin Association

Approved by the Board of Directors
September 20, 2023

Project Number: 170061

Brown AND Caldwell

421 N. Harrington Street, Suite 420
Raleigh, North Carolina 27603

Statement of Purpose:

This document frames the concepts and principles that have been identified by the Upper Neuse River Basin Association (UNRBA) members and watershed stakeholders as important in developing a revised Falls Lake Nutrient Management Strategy. This document supports the Consensus Principles II that will be submitted as part of the UNRBA's recommendations for a revised nutrient management strategy. This document includes the core concepts and principles that need to be evaluated during the readoption of the rules and addressed in the final version of the rules. This document was not developed to provide specific regulatory language or regulatory requirements.

Executive Summary

Background and Supporting Information

Falls Lake Reservoir was constructed and filled in the late 1970s/early 1980s. Several pre-impoundment evaluations of the reservoir predicted that it would be eutrophic (overly productive biologically) but still meet its designated uses (DNER 1973, NCDEM 1983, USACE 1974): drinking water supply, recreational use, aquatic life use, and flood control. Based on information provided in the US Army Corps of Engineers (USACE) 2013 Falls Lake Master Plan and the NC Division of Water Resources (DWR) 2021 Falls Lake Status Report, the designated uses of the reservoir are being met, and the reservoir provides:

- Flood control for downstream communities preventing over $600 million in cumulative flood damages from construction through 2012
- Water supply for over a half-million customers treating 41 million gallons per day
- A regional recreation resource including swimming, fishing, and boating
- Habitat to aquatic and terrestrial wildlife (no nutrient-related fish kills have been reported since the 1980s)

Falls Lake was listed on the 303(d) list of impaired waters for exceedances of the North Carolina (NC) chlorophyll-a criterion of 40 micrograms per liter (µg/L). Chlorophyll-a measures the green pigment in a water sample and is used as an indicator for algal growth. Monitoring by the Division of Water Resources (DWR) and other organizations show elevated chlorophyll-a levels at some locations and times of year in the lake, especially in shallow areas. However, these levels are lower than predicted, and they have not resulted in any demonstrated water quality conditions that impair designated uses.

In 2005, the NC General Assembly passed a bill requiring the NC Environmental Management Commission (EMC) to develop a Nutrient Management Strategy for Falls Lake. To support this effort, DWR used predictive modeling of the watershed and the reservoir to develop the Falls Lake Rules which set two stages of nutrient reduction requirements for the lake. The two stages of nutrient reductions are relative to a "baseline" year of 2006. Both the monitoring and modeling were developed on a compressed time schedule with limited data. As a result, there is significant uncertainty in the nutrient load reduction targets and the ability of the lake to meet the chlorophyll-a criterion regardless of the nutrient load reductions achieved.

Based on DWR's 2010 Fiscal Analysis of the Falls Lake Rules, the nutrient load reductions prescribed by the Rules were estimated to cost $604 million for Stage I and $946 million for Stage II. In addition, a review by Cardno ENTRIX (2013) concluded that the required load reductions were not technically, financially, or logistically feasible. For example, each square foot of existing development would have to be treated by at least two stormwater control measures (SCMs) to meet

the Stage II requirements. Retrofitting existing development given site constraints with even one SCM is often not possible.

Recognizing the uncertainty associated with model-based load reduction targets, Section 5(f) of the Falls Lake Rules included an adaptive management provision allowing for a re-examination of the Stage II requirements. The decade-long evaluation process by the UNRBA and the four-year study period funded by the NC Collaboratory have provided exceptional scientific information and knowledge about conditions in the lake and its watershed. Falls Lake is at risk of increasing eutrophication, but data and analyses indicate a relatively stable trophic condition. The lake currently meets its designated uses. Furthermore, nutrient reduction efforts in the watershed and changes in environmental conditions have resulted in significant reductions in nutrient loading to the lake since the baseline year of 2006. These conditions have not yet reflected significant and demonstrative reductions in chlorophyll-a in the lake. Due to the slow response of nutrient cycling in the lake and its sediments, the full implications of reduced loading over the last 17 years have not fully manifested. It is likely that these positive changes in the nutrient balance will be reflected over a much longer time given the large store of nutrients present in the lake sediments and the continued addition of nutrients from the watershed.

Other watersheds in the country face similar challenges. The Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC) released a Comprehensive Evaluation of System Response in May 2023. Similar to the Falls Lake watershed, the report concludes that "current efforts to reduce nutrient loads will not meet the TMDL targets" and that "estuary water quality has been slow to respond to realized nutrient and sediment reductions in many regions of the Bay." This report focuses on an estuary that drains a much larger watershed with more opportunities for implementation given the relative amount of agricultural land and urban land in the watershed. Even with additional opportunities for implementation in the Chesapeake Bay watershed, the report concludes that "additional nutrient reductions will improve water quality, but water quality criteria may be unattainable in some regions of the Bay under existing technologies" and that "the legal requirements of the Clean Water Act (the water quality goal) divert attention away from considering multiple means of improving living resources (support of aquatic life as the designated use)."

As noted above, the current Falls Lake Nutrient Management Strategy is not technically, financially, or logistically feasible due to the unique characteristics of the watershed and the reservoir. A revised Nutrient Management Strategy for Falls Lake based on the science available and sound management principles is needed to protect this resource. While it is impossible to change the fundamental characteristics of this watershed and reservoir that make it eutrophic, a regulatory framework for nutrient management is essential for maintaining designated uses. The critical management objective for Falls Lake must be to mitigate impacts from existing activities in the watershed and to design and manage land use changes while continuing to maintain and improve water quality in Falls Lake. Without reasonable, balanced, and economically supportable actions, the risk of increased eutrophication, degradation of water quality, and adverse impacts to designated uses is a real possibility in the face of changing land use patterns and climatological conditions.

Key Findings from Information Gathering, Monitoring, and Modeling Studies

Before the comprehensive monitoring and modeling effort began, the UNRBA conducted an open and transparent planning process to ensure the requirements for a re-examination specified in the Falls Lake Rules were met. The state-approved monitoring and modeling quality assurance project plans (QAPPs) ensured the work of the UNRBA was conducted in a scientific and quality-assured manner. Since the monitoring effort started in 2014, the UNRBA has made considerable effort and investment to further the scientific understanding of the watershed and the lake. The UNRBA has

worked closely with researchers, third-party model reviewers, and DWR modeling staff to review and vet the watershed and lake models. Key findings from the UNRBA monitoring and modeling efforts are listed here and further described in the sections below as well as the UNRBA modeling reports:

- Efforts to reduce loading from the watershed since the baseline year of the Rules and DWR modeling (2006) have significantly reduced nutrient loading to Falls Lake.
  - Major wastewater treatment plants have reduced total nitrogen loads by 57 percent and total phosphorus loads by 73 percent (based on four-year average of loads discharged from 2015 to 2018).
  - Over 350 stormwater control measures and best management practices have been implemented to mitigate loading from existing development.
  - Requirements to limit nutrient export from development occurring since 2012 (i.e., new development) have been implemented by every local government in the watershed.
  - Atmospheric deposition of total nitrogen has decreased by approximately 20 percent since baseline.
  - Best management practices implemented on agriculture including nutrient management plans, livestock exclusion, and stream buffer restoration have reduced loading from this source. The acreage of agriculture has declined 44 percent since baseline due to economic and other pressures.
- 75 percent of the watershed is unmanaged, and opportunities for further nutrient reductions are limited.
- Precipitation is the key driver of increases in nutrient loading to the lake and an important driver of increase/decrease in lake residence time which is a controlling factor for algal growth.
- The watershed soils and lake sediments adsorb nutrients that can be released slowly over decades, extending the time that changes in the watershed will result in water quality changes in the lake.
- Reductions to the nutrients applied or deposited in the watershed do not have an equivalent reduction in delivered loading to Falls Lake. Only 20 percent of the loads applied to the watershed reach the lake, so reducing a pound applied or released will only result in approximately 0.2 pounds reduction to the lake.
- Levels of algae indicated by chlorophyll-a are not well correlated to nutrient loading. The hydrology, morphology, retention time, depth, and characteristics of the different areas of the lake are just as important as nutrient loading.
- Nutrient concentrations in Falls Lake are relatively low. Chlorophyll-a can reach high concentrations even when nutrient concentrations remain low.
- Falls Lake is meeting its designated uses:
  - Algal toxin levels are below U.S. Environmental Protection Agency (EPA) guidelines for drinking water and recreation (DWR 2021).Nutrient-related fish kills have not occurred in nearly 40 years since the lake was filled (NCDEQ annual fish kill reports).
  - Recreation is not limited by water quality (USACE 2013).
  - The City of Raleigh provides safe drinking water to over 500,000 customers and indicates that Falls Lake is an excellent source of raw water (DWR 2021)
  - In 2023, the American Water Works Association ranked the City of Raleigh 3rd in its international “"Best of the Best" Water Taste Test”

- Forested areas are important to the ecological health of the watershed and should be protected. Natural areas, including forests, cycle nutrients and provide important nutrients to waters that sustain aquatic life.
- North Carolina is the only state that limits chlorophyll-a everywhere in a waterbody using instantaneous measurements. A summary of other state's approaches to chlorophyll-a standards is summarized in the April 7, 2020 PFC meeting presentation (slides 57 to 68)
- Several scenarios were evaluated with the UNRBA watershed and lake models. None of the scenarios were able to achieve delivered nutrient loading to Falls Lake that would meet Stage II of the Falls Lake Nutrient Management Strategy nor were any of the scenarios able to meet the chlorophyll-a standard everywhere in Falls Lake. Even a scenario that converts all land to forest and wetlands and removes all watershed-scale human inputs was not able to achieve these goals and standards (rates of atmospheric deposition were not changed for this scenario).
- Lake modeling indicates that an additional 50 percent reduction in total nitrogen delivered to Falls Lake would be needed to achieve the chlorophyll-a water quality standard 90 percent of the time. Achieving this level of additional reduction would require treating runoff from natural areas like forests. An evaluation of a pump-and-treat approach using an algal harvesting system studied by the City of Durham indicates that at least 138 systems would be needed to meet this level of nitrogen loading. However, there is not sufficient water consistently available in the stream network to run this many systems. While these systems should remain an option to consider as part of the revised nutrient management strategy, constraints like cost and land availability will limit widespread application.
- Achieving measurable load reductions to Falls Lake will require a systems approach directed at realistic and incremental change in the nutrient balance. The Stage I Interim Alternative Implementation Approach (IAIA) approved by the EMC provides a useful framework for the revised nutrient management strategy.
- Stakeholder participation in the process is critical to developing a successful strategy.
- A watershed approach for non-point sources provides nutrient management for all waters draining to Falls Lake, including upstream water supply impoundments.

Recommendations for a Comprehensive Approach to Nutrient Management Proposed by the UNRBA

The UNRBA has been working with other watershed stakeholders to study the Falls Lake watershed since 2011. These collaborative efforts have included discussions with internal and external stakeholders who recommend that the revised nutrient management strategy incorporate the fundamental principles of IAIA including using an investment-based, joint-compliance framework on the implementation of projects and activities beneficial to water quality across the watershed.

Based on the extensive work conducted by the UNRBA, the successes of the IAIA Program, and the feedback from external and internal stakeholders, the UNRBA Path Forward Committee (PFC) developed a list of foundational principles for a revised nutrient management strategy. It is anticipated that the jurisdictional governing boards or commissions of the UNRBA will sign a document stating their commitment to a list of foundational principles submitted as part of the UNRBA's recommendations. Below is a brief description of some of these principles which are further described later in this document:

Embrace a systems approach focusing on right-sized solutions. Progressive management of this watershed will require looking beyond individual pipes and parcels of land. Nutrient load reductions will be incremental as project identification and implementation are very challenging. A more comprehensive approach that considers the atmosphere, soils, surface water, groundwater, and

physical, biological, and chemical processes of the system will expand the opportunities for meaningful change. A triple-bottom line approach that considers environmental benefits, costs, and impacts to citizens must be an integral aspect of developing the revised strategy. The tools and models built by the UNRBA predict how management actions in the watershed affect nutrient loading to, and water quality in, Falls Lake. The UNRBA is also conducting economic analyses that consider capital, maintenance, and operational costs of nutrient management activities. By focusing on the whole watershed and local implementation, the proposed strategy aims to improve water quality across the watershed and not prioritize activities solely based on the reduction of nutrients to Falls Lake. Projects will result in reductions in nutrient loading through incremental and sustained progress across the watershed, but may also address other pollutants, long-term watershed sustainability, etc. This comprehensive approach is needed to provide lasting protection of the lake and its designated uses. Focusing on watershed health also addresses the sub-impoundments (e.g., Lake Michie, Little River Reservoir, Lake Orange, Lake Buter, etc.) used for water supply within the basin. Allowing investments throughout the watershed will positively impact water quality across the basin.

Because of the holistic nature of the recommendations, the UNRBA also recommends that its implementation for non-point sources be considered by the State as addressing all waterbodies in the watershed that are currently listed, or may be in the future, on the State's 303(d) list of waters for pollutants related to nutrients. These other waters may be considered Category 5 waters in future Integrated Reports if additional point source controls are required.

Create an adaptive program with scheduled assessments and reevaluation. The UNRBA recommends that the rules exclude the specifics of the program because it will be extremely difficult to adapt to new information and conditions. Rather, the UNRBA recommends development of an approved program document referenced by the rules with specific assessment, renewal, and reevaluation periods. The UNRBA recommends the revised strategy include a formal review period to evaluate how well the program is working in terms of water quality, necessary changes, and evolving technologies. The UNRBA proposes a full evaluation in 25 years following the date the revised rules are readopted with interim evaluations every five years. Interim evaluations and reporting years can address concerns or changes that occur during the 25-year period and assist with tracking trends and accomplishments over the longer 25-year period. As with the IAIA, annual reports are recommended to track implementation and compliance with annual investment commitments. It is in the interest of the state and the citizens of the watershed that these assessments be done in partnership with DWR.

The UNRBA recommends that the rules exclude the specifics of the program because it will be extremely difficult to use adaptive management provisions. Rather, the UNRBA recommends development of an approved program document referenced by the rules.

Cooperate and collaborate with stakeholders – The UNRBA has worked very closely with its members and external partners since the re-examination process began. Extraordinary access and participation by all stakeholders have been promoted by the UNRBA, and transparency has been an important theme in sharing the work and status of the re-examination effort. Internal and external stakeholders are invited to provide comments during monthly status meetings. The UNRBA has hosted several Technical Stakeholder Workshops, Regulatory Forums, or joint Symposia with the NC Collaboratory to hear and incorporate feedback in the process. The UNRBA has worked closely with researchers, third-party model reviewers, and DWR modeling staff to review and vet the watershed and lake models. The UNRBA also worked with DWR, representatives of agriculture, environmental groups, and land conservation organizations to expand the list of practices with state-approved

nutrient credits. This nutrient credit project led to the addition of three nutrient reduction practices eligible for use on existing development and led to the state allowing for over- and under-sized practices to receive an appropriate amount of credit for existing development retrofits. Nutrient practice development should be an ongoing commitment of an investment-based system. The UNRBA proposed a credit for land conservation and continues to work with DWR on securing a credit for this excellent practice in protecting the watershed and lake. The nutrient credit project formed strong working relationships with the organizations involved and ultimately led to discussions regarding the IAIA. The UNRBA recognizes that without these partners, a revised nutrient management strategy cannot be successful. The UNRBA encourages input during the crafting of the revised strategy from all stakeholders to identify opportunities, constraints, and solutions to achieve a shared vision to maximize the serviceable life of the reservoir and maintain its designated uses.

The UNRBA encourages input during the crafting of the revised strategy from all stakeholders to identify opportunities, constraints, and solutions to achieve a shared vision to maximize the serviceable life of the reservoir and maintain designated uses.

Expand the types of projects and provide opportunity for other voluntary partners – The IAIA includes a broad range of eligible projects and activities approved by DWR for compliance with Stage I Existing Development Rules. The UNRBA members and stakeholders have discussed many types of additional projects and activities related to nutrient reduction opportunities for inclusion in the revised nutrient management strategy that would apply to specific types of land use, discharges, etc. As with the IAIA, the UNRBA recommends a provision for expansion of the list of eligible activities to be include in the revised strategy.

To apply a systems approach, opportunities that intersect with other watershed landowners and partners should be considered (e.g., a stream restoration project funded by a local government on private land under an agreement with the landowner). The UNRBA is not proposing that inclusion of other partners come with investment requirements, but where opportunities exist for improving water quality and quantity, the revised strategy allows and promotes local government participation in other watershed improvement actions.

Establish a Watershed Organization with tiered participation. The UNRBA anticipates investment requirements for its members under the revised nutrient management strategy. The potential partners (e.g., agriculture and institutions) would not have the burden of investment requirements. To foster cooperation and establish a functioning, holistic program, the UNRBA proposes establishment of a "Watershed Organization" with tiered membership. Those local governments, state and federal agencies, and utilities with investment requirements would be in Tier 1 and could support administration and implementation of the program through funding. Those without investment requirements could be in Tier 2. This tier would not be expected to fund the program but could participate on committees to identify opportunities and constraints, participate in decision making, etc. Committees specific to a sector (e.g., agriculture) could be chaired by a representative of that sector (i.e., committees may be chaired by a Tier 2 member). Annual compliance reporting and tracking of investment requirements for the Tier 1 members could be managed by the Watershed Organization, similar to the current IAIA. The initiation date of the Watershed Organization will be determined by the readoption of the Falls Lake Rules, which must be achieved in accordance with Session Law 2018-5 Section 13.8.(a). This session law specifies that the EMC must begin rule re-adoption no later than December 31, 2024. It is anticipated by DWR that readoption of the rules will occur no later than 2027.

Develop a fair and equitable strategy. The UNRBA strives to develop a revised nutrient management strategy that protects the watershed and Falls Lake in a fair and equitable manner. An investment-based, watershed-health approach will continue to be most effective when all parties in the

watershed are fully engaged and committed. This should include those with drainage to the lake and those benefiting from the ongoing management of the watershed and lake for reducing nutrient and other water quality impacts. As with the IAIA, the proposed framework provides equity by including those using Falls Lake and other intake points (e.g., Lake Michie, Lake Butner) as a water supply. Equity is also addressed through tiered membership in the program as some sectors can fund activities through taxes and fees, and others are comprised of local landowners and businesses that do not have this ability. The requirements of the revised strategy will consider these and other equity factors. Stakeholder feedback on this proposal and the UNRBA economic analyses will also be considered as the program is developed.

Consider environmental and social justice issues. The program should consider environmental and social justice issues in implementation of the revised nutrient management strategy (funding, siting, public input, public access, etc.). The revised rules should promote opportunities for equitable stakeholder participation by encouraging input and participation from the public and interest groups. Multiple state and federal databases and tools exist to support this effort. Jurisdictions participating in this program should make efforts to assure that the projects and actions do not create social justice issues.

Measure compliance by investment levels and track nutrient reductions as supplemental information. As with the IAIA, the UNRBA recommends that compliance under the revised strategy be tracked by investment and the amount of nutrient reductions be tracked as supplemental information. One of the fundamental differences of the IAIA compared to conventional regulatory approaches is that compliance is tracked by required investment in eligible activities rather than counting the nutrient pounds reduced. This approach provides three key benefits: 1) local governments can plan for required investment levels as part of their budgeting process, 2) activities that do not have state-approved nutrient credits that are known to be beneficial to water quality and quantity can be incorporated into the program, and 3) projects can occur within jurisdictional boundaries that benefit citizens across the watershed as well as downstream water quality. Representatives of agriculture have indicated that they prefer to maintain ownership of their nutrient loss tracking and reporting. This cooperative approach would allow that to continue while potentially leveraging funding from other sectors. Department of Transportation (DOT) representatives have indicated an interest in participating in this revised program.

Nutrient Reduction Opportunities

Nitrogen and phosphorus are naturally occurring elements that are necessary in appropriate amounts for a healthy ecosystem. These nutrients cycle through the air, soils, groundwater, surface water, plants, algae, and other organisms. The UNRBA recognizes the importance of continuing to address nutrient loading using conventional methods, and significant progress cannot be made in this unique watershed if only conventional methods are used. A watershed-approach is needed to limit inputs to the system and sequester nutrients before they reach Falls Lake.

The UNRBA recommends that all opportunities for nutrient reduction be considered in the revised strategy, not as requirements but rather as potential opportunities for cooperation.

Proposed Legislative Changes

The NC Collaboratory is funding a study to evaluate potential changes to the Falls Lake Rules that would allow for a more collaborative, system-based approach to nutrient management in the watershed. The UNRBA is working with the lead author of this study, Dan McLawhorn, to better understand existing legal constraints on its proposals and where legislative changes may be required. A link to the presentation on this topic at the 2023 Falls Lake Nutrient Management Study Symposium hosted by the NC Collaboratory is available here. The UNRBA will begin developing

recommendations for potential rule changes after its December 2023 submittals and plans to coordinate this effort with DWR. Rules will be amended to be consistent with the General Statutes and Session Laws which apply to the program.

Status of the UNRBA Recommendations

This Concepts and Principles Document was developed based on input from the PFC and the Board of Directors, as well as input from external stakeholders, including staff from DWR and representatives from agriculture, DOT, and Non-Governmental Organizations (NGOs). These discussions identified several program components to guide development of the revised Falls Lake Rules. Many program components are designed to promote flexible implementation of the rules. These concepts and principles have been distilled into an updated set of Consensus Principles (called Consensus Principles II) for consideration by the governing bodies of the UNRBA members (e.g., county commissioners, town councils, city councils, utility boards). Once the individual governing bodies have signed the Consensus Principles II and endorsed the UNRBA recommendations for the revised nutrient management strategy, the UNRBA will submit these documents to the EMC and DWR.

As the rules readoption process unfolds, discussions among UNRBA members and other external stakeholders will continue. Additional recommendations and responses to stakeholder feedback will be considered during this process.

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Background and Supporting Information

History of the Reservoir and Characteristics of Falls Lake and its Watershed

The history of Falls Lake reservoir provides important context for its current water quality. The "lake" is a man-made body that results in an impoundment of the Neuse River at the natural fall line of the river at "the Falls of the Neuse." The placement of the Falls Lake Dam converted a natural, riverine environment to one with hydrologic, habitat, and ecological conditions very different from those that existed previously. This conversion has resulted in factors that affect water quality that were not present before the river was dammed. The reality of this history brings us to the regulatory and water quality policy crossroads of how this management effort should proceed over the coming decades.

The Falls Lake reservoir project was authorized by Congress as part of the Flood Control Act in 1965 and began filling in January 1983. Figure 1 shows an old earthen dam uncovered during the construction of the Falls Lake dam in the late 1970s. The Congressionally authorized uses of Falls Lake include flood control, drinking water supply, recreation, fishing, aquatic life, and wildlife. Design and construction of the impoundment were conducted by the U.S. Army Corps of Engineers (USACE), which continues to manage and operate the reservoir today.



Figure 1. Construction of the Falls Lake Dam, photograph courtesy of the US Army Corps of Engineers as cited by the Wake Forest Historical Museum.

Pre-impoundment studies predicted that Falls Lake would be highly eutrophic (over-enriched with nutrients), especially in the shallow, upper end of the lake (DNER 1973, USACE 1974, NCDEM 1983). These studies also predicted that chlorophyll-a concentrations would be high and that dissolved oxygen would be depleted in deeper portions of the lake during thermally stratified (warm summer) conditions.

Laboratory analysis of chlorophyll-a measures the green pigment in a water sample and is used as an indicator for algal growth. In 1979, the NC EMC established a chlorophyll-a criterion of 40 µg/L. The driving force for this water quality standard was poor water quality conditions on the Chowan River in northeastern NC. The Chowan River is a tributary to Albemarle Sound. Water quality conditions in this estuary in the 1970s resulted in demonstrated impairments to the waterbody that directly impacted the classified, designated uses. In response to these impacts, the Division of Environmental Management (predecessor agency of what is now the Division of Water Resources, DWR) evaluated these conditions and convened a group of established scientists and subject matter experts. This group provided a recommendation for a benchmark level of algal activity, using chlorophyll-a as indicator. This threshold would guide regulatory action to address the problems on the Chowan River. The agency, through the EMC, adopted the benchmark level as a standard and applied this value to all waterbodies in the state. The evaluation that led to this standard was not specifically referenced to use support impacts in reservoirs.

Despite the water quality predictions provided in the pre-impoundment studies, it was concluded that the expected levels of algal activity would not impede the anticipated designated uses of Falls Lake. NC allowed the construction of the dam under Section 401 of the Clean Water Act (the Water

Quality Certification required for permitting of a “fill” under Section 404). Evaluations conducted as part of the reexamination process have demonstrated that the lake is meeting its designated uses. There have not been nutrient-related fish kills since the lake was filled. The City of Raleigh is able to use Falls Lake to provide drinking water to over 500,000 customers and was awarded 3rd place in the 2023 American Water Works Association’s international “"Best of the Best" Water Taste Test.” Dissolved oxygen levels are sufficient to provide aquatic habitat to many species, and the lake supports recreational activities throughout the year.

Monitoring by DWR and other organizations show elevated chlorophyll-a levels at some locations and times of year in the lake. However, these levels are lower than predicted, and they have not resulted in any demonstrated water quality or use-related conditions that impair designated uses. For example, the earlier studies predicted summer average chlorophyll-a concentrations of 110 µg/L in the upper part of the lake while data collected from August 2014 to October 2018 show a summer average concentration of 41 µg/L. These data are summarized in the UNRBA 2019 Monitoring Report.

The decade-long evaluation process by the UNRBA and the 4-year study period funded by the NC Collaboratory have provided exceptional scientific information and knowledge about conditions in the lake and its watershed. Falls Lake is at risk of increasing eutrophication, but data and analyses indicate a relatively stable trophic condition at this time. Falls Lake is eutrophic, but it is not increasing in the level of enrichment. The lake currently meets its intended uses.

Nutrient reduction efforts in the watershed and changes in environmental conditions have resulted in significant reductions in nutrient loading to the lake since the designated “baseline” year of 2006. These conditions have not yet reflected significant and demonstrative reductions in chlorophyll-a in the lake. Due to the slow response of nutrient cycling processes in the lake and its sediments, the full implications of reduced loading over the last 17 years may not have fully manifested. However, lake water quality has stabilized since the Rules were enacted, and the lake is continuing to meet its designated uses. The revised strategy should include a long-term water quality review process to track water quality in Falls Lake and the other water supply impoundments in the basin.

Other watersheds in the country face similar challenges. The Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC) released a Comprehensive Evaluation of System Response in May 2023. Similar to the Falls Lake watershed, the report concludes that “current efforts to reduce nutrient loads will not meet the TMDL targets” and that “estuary water quality has been slow to respond to realized nutrient and sediment reductions in many regions of the Bay” This report focuses on an estuary that drains a much larger watershed with more opportunities for implementation given the relative amount of agricultural land and urban land in the watershed. Even with additional opportunities for implementation in the Chesapeake Bay watershed, the report concludes that “additional nutrient reductions will improve water quality, but water quality criteria may be unattainable in some regions of the Bay under existing technologies.”

Falls Lake was sited and constructed within a hydrologic, geologic, and nutrient balance environment that produced a unique morphological configuration and a reservoir environment that was destined to be eutrophic. All reservoirs in Piedmont NC strongly demonstrate a eutrophic nature, and this condition is unavoidable. Previous monitoring and evaluation as well as study, research, and assessment efforts over the last 11 years document this condition in Falls Lake. While all Piedmont reservoirs have different characteristics, site-specific water quality factors, and management challenges, the level of understanding of these factors and challenges are well understood for Falls Lake and its watershed. A revised Nutrient Management Strategy for Falls Lake needs to be based on the available science and sound management principles. While it is impossible to change the fundamental characteristics of this watershed and reservoir, a regulatory framework for nutrient

management is essential to maintaining designated uses. The critical management objective for Falls Lake must be to mitigate impacts from existing activities in the watershed and to design and manage land use changes while continuing to maintain and improve water quality in Falls Lake. Without reasonable, balanced, and economically supportable actions, the risk of increasing eutrophication, degradation of water quality, and adverse impacts to designated uses is a real possibility.

Regulatory and Statutory Requirements for Falls Lake, the UNRBA Response, and the Limitations of the Current Management Approach

Statutory Requirements and the Rules

In 2005, the NC General Assembly passed Senate Bill 981 requiring the NC EMC to develop a nutrient management strategy for Falls Lake. The bill also directed the Commission to "consider the cost of the proposed measures in relation to the effectiveness of the measures. These measures could include, but are not limited to, buffers, erosion and sedimentation control requirements, post-construction stormwater management, agricultural nutrient reduction measures, the addition of nutrient removal treatment processes to point source permitted wastewater treatment plants, the removal of point source discharging wastewater treatments through regionalization and conversion to non-discharge treatment technologies, and any other measures that the Commission determines to be necessary to meet the nutrient reduction goals."

In 2009, Senate Bill 1020 was passed to provide credit for early implementation of practices installed before the Rules were adopted. This bill also delayed adoption of the Rules from July 1, 2009, to January 15, 2011, and required that "stormwater management programs to reduce nutrient loading from new development be implemented no later than 30 months after the Rules become effective." Additional measures listed for consideration in the nutrient management strategy were included in this bill: "measures to address nutrient inputs from on-site wastewater treatment systems, control of atmospheric deposition, allowing the sale and purchase of nutrient offsets, and allowing trading of nutrient loading allocations and credits for nutrient reductions." The bill also specified design standards for sedimentation and erosion control for land-disturbing activities and stated that this section of the bill would not be delayed and would have a start date of January 1, 2010. These requirements were addressed in the Falls Lake Rules.

To support rules development, DWR used predictive modeling of the watershed and the reservoir to develop the Falls Lake Rules, which set two stages of nutrient reduction requirements for the lake. In January 2011, the Falls Lake Rules were adopted by the EMC. The Rules state:

> *The objective of Stage I is to, at minimum, achieve and maintain nutrient-related water quality standards [chlorophyll-a criterion] in the Lower Falls Reservoir [downstream of Highway 50] as soon as possible but no later than January 15, 2021, and to improve water quality in the Upper Falls Reservoir [upstream of Highway 50]. The objective of Stage II is to achieve and maintain nutrient-related water quality standards throughout Falls Reservoir. This is estimated to require a reduction of 40 and 77 percent in average annual mass loads of nitrogen and phosphorus respectively, delivered from the sources named in Item (6) in the Upper Falls Watershed from a baseline of 2006. The resulting Stage II allowable loads to Falls Reservoir from the watersheds of Ellerbe Creek, Eno River, Little River, Flat River, and Knap of Reeds Creek shall be 658,000 pounds of nitrogen per year and 35,000 pounds of phosphorus per year. (15A NCAC 02B .0275)*

However, both the monitoring and modeling were developed on a compressed time schedule with limited data. As a result, there is significant uncertainty in the nutrient load reduction targets and

the ability of the lake to meet chlorophyll-a water quality criteria regardless of the nutrient load reductions achieved.

In the 2010 Fiscal Analysis for Proposed Nutrient Strategy for Falls of Neuse Reservoir (hereinafter DWR Fiscal Analysis), DWR estimated compliance with Falls Lake Rules to cost $1.54 billion, with $604 million for Stage I requirements and $946 million for Stage II requirements. According to the USEPA Municipal Preliminary Screener, Stage II reductions alone ranked as a "Large Impact" to affected communities with each household contributing approximately $1,400 per year (Cardno ENTRIX 2013).

The DWR Fiscal Analysis described its cost estimates as "conservative high-end" because it assumed that technological advancements would lead to more effective nutrient removal measures and more cost-effective compliance options before the Rules took effect (DWR 2010). However, the analysis also presented evidence that costs could be much higher and nutrient reductions could be impossible to meet. Using a watershed assessment of Ellerbe Creek conducted by the City of Durham, DWR extrapolated data to estimate a total, high-end cost of the Rules. The resulting estimate was $1.5 billion to achieve **one third of nitrogen reductions** and **one half of phosphorus reductions** required by the Rules. DWR addressed this possibility: "This suggests a much greater ultimate cost than we have estimated as high-end, or simply unachievable reductions. We expect, however, that more cost-effective solutions to conventional BMP [best management practices] retrofits will continue to emerge, making costs of this nature unnecessary" (DWR 2010, p.85). The 2011 Rules established two portions of Falls Lake for assessing compliance: upstream and downstream of Highway 50. These portions are called assessment units (AUs) which are used under NC's 303(d) assessment process to determine compliance with water quality standards as required under Section 303(d) of the Federal Clean Water Act. NC has incrementally increased the number of AUs in Falls Lake over the past two decades to 12 AUs. The UNRBA has sought to stabilize the 303(d) process to be consistent with the Rules. The UNRBA offered the following comments to the EMC in a letter dated February 18, 2022: "The current dynamic assessment approach (changing AU's) represents a moving target and results in considerable confusion about attaining and maintaining compliance with the water quality standard. Consistent AUs should be established based on the lakes limnologic and morphologic characteristics consistent with EPA guidance. It is also important that the assessment approach be aligned with the management strategy laid out in the Falls Lake Rules. The Draft IR [now final] now includes 12 assessment units (7 upstream and 5 downstream of Highway 50). Falls Lake has a robust monitoring program performed by both the Division of Water Resources and the Center for Applied Aquatic Ecology. Combined, this effort represents approximately 28 monitoring stations in the lake. Applying the current Assessment Methodology continues to increase the number of Assessment Units and challenges the ability of ever attaining the water quality standard for chlorophyll-a in Falls Lake. This "station-by-station" approach does not reflect the physical morphology of the lake. Since the 2008 water quality assessment the number of AUs for Falls Lake has changed from 2 to 12. The increasing number of units has not been due to changes in standards or classification or even designated uses. Rather, it represents the expansion of data collection and the variability of the monitoring results."

The established path for addressing waters that are not meeting water quality standards is laid out in the Federal Clean Water Act (first adopted in 1972). It is a model that has resulted in dramatic improvement of water quality across the country. Companion legislation in NC has been consistent with this framework. It is a "command and control" framework that is based on clear cause and effect of identified pollutant sources impacting downstream water quality. It has worked extremely well when the need for reduced pollution is primarily due to point sources or specific land use activities.

For more disparate watershed related water quality issues, the conventional framework is mostly ineffective. There are extremely limited situations where such regulatory efforts have been successful in reducing the impacts of non-point sources to the degree necessary. One well-known example of the struggles of managing a watershed-based water quality concern is the Chesapeake Bay program. With the application of tremendous financial and management resources, improvements have been elusive. Progress has been and continues to be made, but it remains a challenge to meet. The Chesapeake Bay Program STAC states in their May 2023 Comprehensive Evaluation of System Response that "the legal requirements of the Clean Water Act [the water quality goals in the Bay] divert attention away from considering multiple means of improving living resources [support of aquatic life as the designated use]." The "dead zone" at the mouth of the Mississippi River in the Gulf of Mexico provides another example of the monumental difficulty of achieving significant mitigation of existing land use within a watershed.

Individual degraded streams throughout the country have similar challenges. The Federal 303(d)-process identifies streams with degraded biological integrity, among other programs, usually resulting from watershed-based impacts. In NC, many of these situations do not lend themselves to establishing a Total Maximum Daily Load (TMDL) or do not have the regulatory authority to establish a Water Quality Management Plan that will effectively address the degraded biological integrity of the stream. Most of these streams stay on the 303(d) list of impaired waters and do not have actions in place to manage the pollutant sources within the watershed.

Nutrient issues are predominantly caused by watershed impacts and non-point sources distributed throughout the watershed feeding the reservoir, estuary, or slow-moving stream or river. The long-established framework of "put limits on the sources and solve the problem" does not work in these situations. This is not a failure of intention but rather a failure to identify the true need for a management framework and to define a feasible management system to address the real problem. Faced with similar challenges, the Chesapeake Bay STAC indicates that "additional funding of existing implementation efforts is unlikely to produce the intended nutrient reduction outcomes" and that "achieving and sustaining substantial nonpoint pollutant reductions will likely require development and adoption of new implementation programs and tools."

In other words, the conventional framework does not work for watershed-based water quality issues. That is certainly true based on the findings of the scientific work on Falls Lake. To move this process forward with broad support and allocation of resources to maintain and improve water quality in Falls Lake, an updated nutrient management strategy for Falls Lake is essential.

The conventional source-control framework does not work for watershed-based water quality issues, particularly for the Falls Lake watershed which is mostly unmanaged lands. An updated approach is required to move this process forward with broad support and allocation of resources to maintain and improve water quality in Falls Lake.

In order to develop a more scientifically valid approach, a comprehensive reexamination effort was undertaken by the UNRBA as allowed by the Falls Lake Rules. The Falls Lake UNRBA reexamination effort and the research funded by the NC Collaboratory provide a unique and deep understanding of this watershed and reservoir. It is now the most monitored and studied reservoir in NC. The careful assessment of the data and information by subject matter expert review, statistical comparisons, and watershed and lake modeling provides clarity on how this watershed and lake behave. This level of information is not available for other NC reservoirs and was not available when the current Falls Lake Rules were developed.

However, scientific knowledge and understanding alone cannot effectively consider the unique characteristics of this watershed and lake in developing an improved management approach. Water quality management policy is an essential component in deciding the most effective way to maintain and improve water quality in Falls Lake, now and in the future. The science provides clear evidence regarding specific management actions that can meet the water quality standard for chlorophyll-a throughout the lake. The cause-and-effect aspects of nutrients in this watershed and lake cannot be dramatically changed. Despite significant reductions in nutrient loading to Falls Lake since the mid-2000s, chlorophyll-a concentrations have remained stable. While the chlorophyll-a concentrations are above the standard of 40 µg/L in some parts of the lake, there are no reports of impacts to water treatability, fish kills, algal scums, or mats. This evaluation indicates that the current water quality standard for chlorophyll-a is not well correlated to uses in this lake and is therefore not applicable to Falls Lake. The standard is incorrect for this system and cannot be achieved. Thoughtful and effective management actions, consistent with the scientific findings and feasible to implement, are needed to protect water quality in Falls Lake. The characteristics of this watershed and lake indicate that dramatic changes are not possible. A eutrophic Falls Lake will always exist.

A reasonable management objective should be to prevent a trophic condition that will impede designated uses. This watershed is becoming more urban and suburban, and that transition will continue. Development in the watershed is an essential economic factor for this region and the jurisdictions within the watershed. Land use is shifting away from its historic composition to more intensely developed areas within the watershed. The New Development Rules currently in place mitigate this shift, but long-term changes in the hydrology and nutrient balance within the watershed are still expected. Controls on runoff from new development manage the first inch of runoff from a developed site. While most rainfall events in our region do not exceed one-inch, higher rainfall storms, sometimes several inches, are becoming more frequent. A portion of storms greater than 1 inch bypasses treatment and delivers untreated flow and nutrients to Falls Lake. Larger storms also saturate pervious areas in the watershed including unmanaged lands. Saturated soils result in surface and subsurface transport of nutrients to streams.

Without other watershed mitigation efforts, nutrient loading to Falls Lake will continue to increase over time. Development increases the amount of impervious surface and results in compacted soils. These changes alter the hydrologic and water quality properties of the development site and downstream waters. Land preservation is a critical safeguard for keeping the watershed as natural as possible, particularly considering a recent decision by the US Supreme Court regarding protection of wetlands that do not have a “continuous surface connection to waters of the US” (Sackett versus EPA, Docket number 21-454). Other waters may also be at risk depending on interpretation of the decision. Land conservation should be a voluntary aspect of the revised management strategy and should be recognized by the State as a critical component of a long-term nutrient management strategy. The Raleigh Watershed Protection Program has a target of preserving 30,000 acres of high priority lands by 2045. Retrofits on existing land use are also useful, but 75 percent of the watershed is currently forested, wetlands, or other unmanaged lands. The Interim Alternative Implementation Approach (IAIA) is a sustainable model for keeping the watershed as stable as possible as it includes land conservation as an eligible practice in addition to more conventional stormwater control measures and best management practices.

Unmanaged land in this watershed is a critical reason that lake water quality continues to support designated uses. The composition of the watershed, implementation of new development rules, and the improvements that have been made since the baseline year of 2006 have resulted in a stable trophic condition. There is a tremendous opportunity to structure a management approach that is broadly supported, economically viable, and aimed at an achievable goal. This document identifies

the concepts and principles that outline a revised strategy based on the latest science, good public policy, and common ground among the many stakeholders.

Reexamination of the Rules Under the Adaptive Management Provision-

While the Rules were being developed, UNRBA member jurisdictions developed the Consensus Principles to address key provisions of the rules and recognize uncertainties about the basis for the requirements. The Consensus Principles are a memorandum of agreement between the jurisdictions in the watershed that called for a two-stage approach to nutrient reductions and the potential for reexamination of Stage II. This adaptive management provision was critical because it put in place a review process ahead of the very restrictive provisions of Stage II. In basic terms, the Falls Lake Rules adopted by the EMC allow for a "reexamination" of the required actions under Stage II. An entity is allowed to initiate and conduct a reexamination using a DWR-approved assessment process as laid out in the rules (15A NCAC 02B .0275 (5)(f)) and to bring findings back to the Division and the EMC.

The UNRBA began planning for the reexamination under the cited provision in 2011. In 2013, a framework for conducting the reexamination was developed and approved by DWR. This framework established the plan to review historic data and models for Falls Lake, develop recommendations for additional monitoring, conduct the monitoring, and develop modeling tools to allow assessment of the lake and evaluate different management approaches. The UNRBA's plan included a watershed model and three lake water quality models.

The primary purpose of the UNRBA monitoring program was to provide the necessary data and information to support development of the models that would be used to evaluate updated management approaches. Prior to collecting data, the UNRBA evaluated all available data that had been collected on Falls Lake and its watershed. The monitoring program and other provisions of the reexamination required approval by DWR. The UNRBA secured necessary approvals from DWR for evaluation of the current Falls Lake Nutrient Management Strategy including the UNRBA Monitoring Plan and UNRBA Monitoring Quality Assurance Project Plan (QAPP). These documents and the publicly accessible database are available on the UNRBA monitoring website.

Also as required by the Rules, the UNRBA submitted and DWR approved the Description of the Modeling Framework and the UNRBA Modeling QAPP that specifies how the models should be developed and assessed for performance. The UNRBA conducted a model selection process and selected the following models: the Watershed Analysis Risk Management Framework (WARMF) to conduct watershed and lake modeling, the Environmental Fluid Dynamics Code (EFDC) as the second lake model, and a statistical/Bayesian model as the third lake model. The purposes and relationships of these models toward developing a revised strategy is described in the Conceptual Modeling Plan (Figure 2). The UNRBA has not only provided DWR with the required documentation for the reexamination but has also provided documentation of all its process and decision-making including model selection and discussions of the contracts and scopes of work for those efforts. DWR representatives regularly attend the meetings of the UNRBA, and many follow-up discussions have occurred with the agency to ensure there is a clear

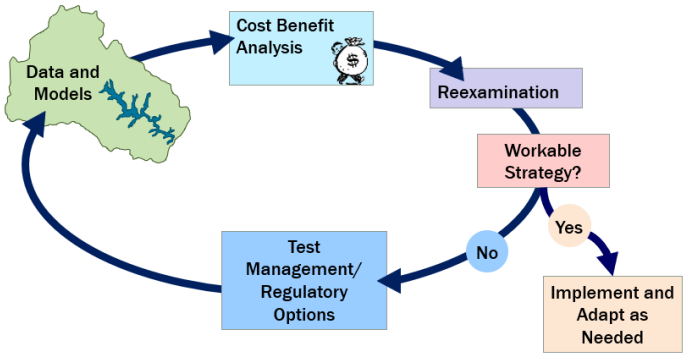

Figure 2. UNRBA Conceptual Modeling Plan for the Reexamination of Stage II

understanding of the work being done to support the UNRBA's recommendations on a revised nutrient management strategy.

In 2016, the NC General Assembly passed legislation (Section 14.13.(a)) that established the NC Collaboratory. One of the initial charges of this organization was to study nutrient management strategies in general and for Jordan and Falls Lakes specifically. This initial legislation required the Falls Lake study to be completed by December 2021. The General Assembly later passed legislation to extend the deadline to December 2023 to allow the UNRBA reexamination process to complete. This legislation also includes a reference to other evaluations of the Falls Lake Nutrient Management Strategy. The bill requires the EMC to consider that information along with the report by the NC Collaboratory.

Following the creation of the Collaboratory, the UNRBA coordinated closely with the organization and its researchers. This allowed the UNRBA to provide input each year on what additional studies would enhance and better inform its work. The UNRBA has shared all its data, work, and preliminary results with the Collaboratory. The Collaboratory also provides subject matter expert and third-party review of the UNRBA modeling efforts. This extremely valuable contribution has been occurring while the models were under development rather than after. This integrated approach allowed the reviewers to provide input and feedback as the models were developed and allowed the modeling team to incorporate adjustments before the models were finalized. Third party reviews increase transparency and provide an extra layer of assurance that the models can be relied upon to support regulatory and policy decisions.

By the end of this reexamination process, the UNRBA membership will have invested approximately $10 million to support this effort. This is an unprecedented effort by a regulated community in NC to provide study and research to DWR, EMC, and the General Assembly to support the development of a management approach on a critically important water body. The purpose of this document is to compile key findings from the available studies and present a document that identifies important concepts and principles that should be included in a revised nutrient management strategy for Falls Lake. This document includes notes derived from discussions or materials generated by the Executive Director, Co-chairs of the Path Forward Committee (PFC), Chair of the Modeling and Regulatory Support Workgroup (MRSW), the Scenario Screening Workgroup and its subgroups, members of the MRSW, PFC, and Board of Directors, workshop/symposium participants, and interested stakeholders who have participated in this process. Most of these discussions are based on presentations that are available on the UNRBA meeting page. Most of this input and discussion has occurred during UNRBA meetings. These meetings are open and all attendees, including stakeholders outside of the UNRBA membership, are invited to attend and provide input.

Key Findings from the Monitoring and Modeling Studies

UNRBA Monitoring Program

Routine water quality monitoring in the watershed began in August 2014 and continued through October 2018. The watershed monitoring program obtained monthly samples on 20 water quality parameters from 38 tributary stations. This effort resulted in more than 38,000 measurements and created a database that covered essentially every sub-watershed to Falls Lake. Targeted special studies were also conducted to provide a detailed understanding of the functions of the watershed and lake. It was essential to the analyses and modeling that this data and information collection effort identified the variation of the input of nutrients and other parameters into the lake. It was also a major objective to carefully document and measure Falls Lake's physical, chemical, biological, and geological characteristics. These special studies included storm event sampling, high-flow event sampling, lake sediment depth and quality, lake sediment nutrient storage and release, lake

bathymetry, constriction point monitoring of water movement and water quality from segment to segment of Falls Lake, and light extinction data. For example, Figure 3 shows the water depth information resulting from the UNRBA bathymetric study. This figure also shows how Interstate 85 and Highway 50 segment the lake into what is referred to below as the upper, middle, and lower lake segments.

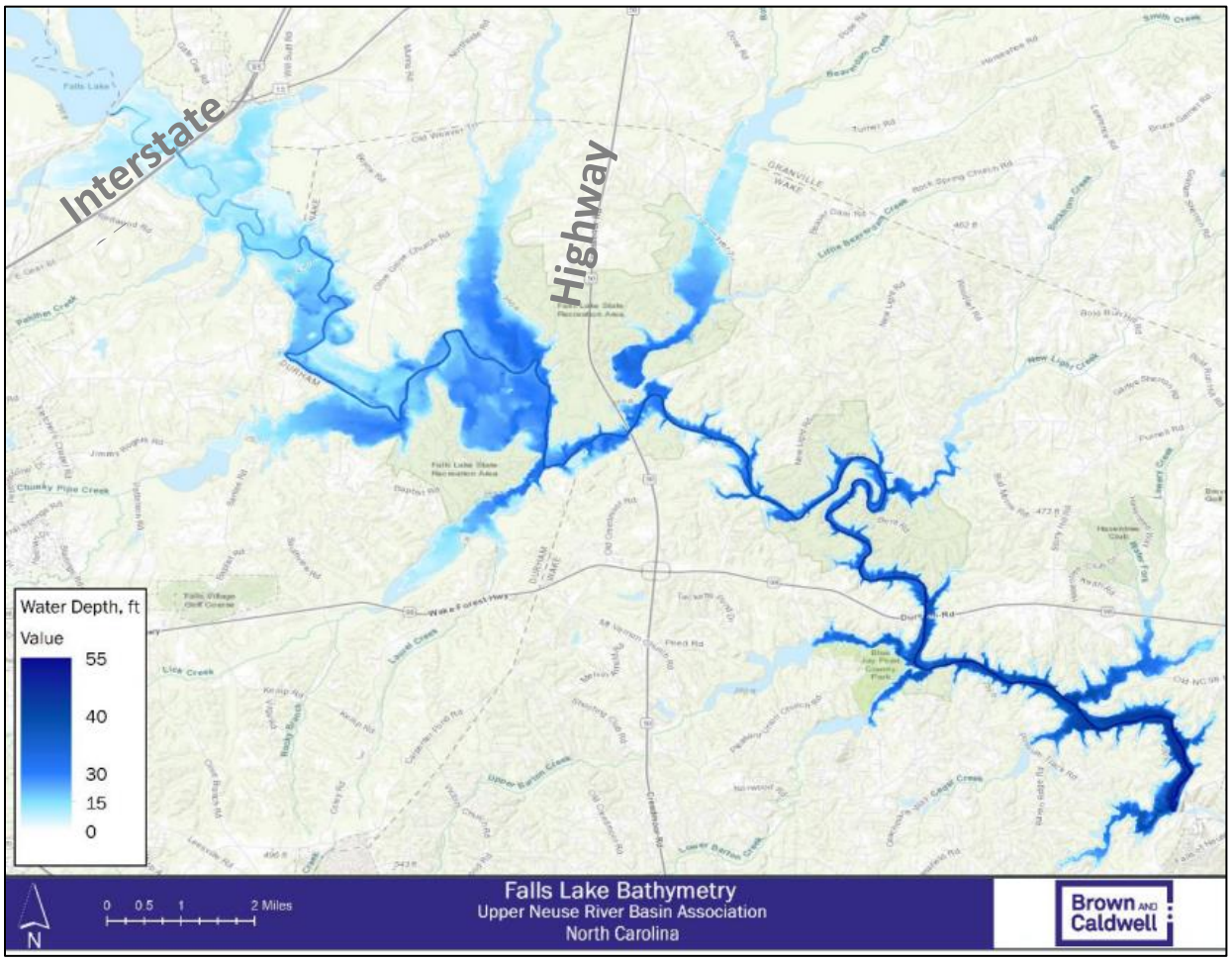

Figure 3. Falls Lake Water Depth

The UNRBA invested approximately $3.5 million in the monitoring effort to fill data gaps in the previous monitoring and modeling effort and provide an improved understanding of the lake and the watershed. In addition to providing an annual report of the monitoring effort as it proceeded, the UNRBA developed a comprehensive monitoring report in 2019 that summarizes the monitoring data and special studies. These efforts provided a comprehensive database that covered the key nutrient-related water quality considerations of the lake, including nutrient loading summaries by source and through time, lake residence time, dissolved oxygen concentrations, and algal toxin data. The UNRBA's monitoring data, DWR data, and data collected by other organizations (NC State University Center for Applied Aquatic Ecology, and the cities of Durham and Raleigh), has been evaluated and included in the data evaluation. This data has been used to develop watershed loading and lake water quality simulation models. The research funded by the Collaboratory has also provided critical insight and understanding of the watershed and lake. Monitoring studies conducted by the US Forest Service in the watershed have provided important information regarding nutrient loading from forested areas. All of this has been incorporated into the UNRBA's evaluation of this

watershed-lake system to inform and support the concepts and principles for the revised nutrient management strategy.

While the UNRBA's complete effort includes comprehensive modeling and the development of tools that can assess the effectiveness of potential management approaches, the data, special studies, and information developed to support the modeling provides an excellent reference and basis for understanding this lake and watershed. The data itself is a "model" by conveying the status of water quality, spatial and temporal variation, and correlations among data sets. A large and extensive database provides important graphical and statistical information that informs further analysis and decision-making. The UNRBA's comprehensive monitoring report, which includes historic data, provides essential insight into the Falls Lake system and documents conditions that must be considered in the regulatory decision-making process.

As a result of the UNRBA's evaluation of the data, one critical finding is that nutrient loading is not the only driver of algal growth in the lake. At times, algal growth and changes in algal activity are independent of short-term changes in nutrient loading and nutrient concentrations in the lake. Other influences such as lake sediment nutrient release, hydrology, and hydraulics in the lake and watershed can be more important in determining the trophic conditions in the lake than nutrient concentrations or loading.

Physical conditions in the lake as well as chemical and biological variation are important drivers of algal growth. The amount of time the water remains in Falls Lake is controlled by the tributary inflows to the lake and releases from the dam which are controlled by the USACE. The release protocol for the dam is directed first at flood control and then, under low-flow situations, water supply and minimum releases to support downstream aquatic life. The longer the water remains in the lake, the more algal activity and growth. Other environmental issues arise during long detention periods including temperature increases and more pronounced fluctuations in dissolved oxygen and pH. This hydrologic condition also impacts lake stratification and the quality of water just above the lake sediment-water interface, impacting the rate of nutrient cycling in bottom sediments. Algal species distribution is impacted as well. Changes in detention time and environmental, chemical, and other physical characteristics impact the function of the arms of the lake including denitrification and settling of suspended materials.

The release protocol for the dam is directed first at flood control and then, under low-flow situations, water supply and minimum releases to support downstream aquatic life. The longer the water remains in the lake, the more algal activity and growth.

High-flow events impact algal conditions in the lake, particularly in the upper portion of the reservoir where the five major tributaries provide more than 60 percent of the flow to Falls Lake. Nutrient inputs in terms of tributary loading are driven by stream flows.

During wetter rainfall periods, high nutrient loading from the watershed associated with high precipitation and stream flows can transport higher sediment and nutrient loads to Falls Lake. These events may increase flushing and reduce residence times. Figure 4 shows the Flat River nearly rising to the bridge deck following a high rainfall event.



Figure 4. Flat River rising near the bridge deck following a UNRBA High Flow Sampling Storm Event

Periods of low loading from the watershed correspond to small inflows and longer residence times when algae are provided longer periods for growth. Sporadic storm events that occur during periods of long detention can provide pulses of nutrients to Falls Lake that may remain stagnant in the lake for an extended time.

The complex relationship between hydrologic condition, nutrient loading, and lake residence time means there is not a predictable cause-and-effect relationship between loading and algal growth. Figure 5 shows that in upper Falls Lake (upstream of Interstate 85), chlorophyll-a concentrations have been declining since the 1980s. This part of the lake historically had more variability in chlorophyll-a concentrations as demonstrated by the longer boxes and whiskers in Figure 5. Chlorophyll-a data were not collected in the upper lake between 2008 and 2012. Since data collection restarted in 2013, chlorophyll-a concentrations have been relatively stable. The middle part of the lake (between Interstate 85 and Highway 50) has lower chlorophyll-a concentrations and less variability than the upper lake. Chlorophyll-a concentrations in this segment have been relatively stable since 2001. In the lower part of the lake (downstream of Highway 50), chlorophyll-a concentrations have been relatively stable over the life of the reservoir, even in the 1980s when concentrations in the upper lake were much higher. During the UNRBA 2014 to 2018 monitoring period, chlorophyll-a concentrations in Falls Lake were highest in 2017 (especially below Highway 50) compared to other UNRBA monitoring years, but nutrient loads that year were approximately half (see the following discussion of UNRBA Watershed Modeling for more information on this characteristic).

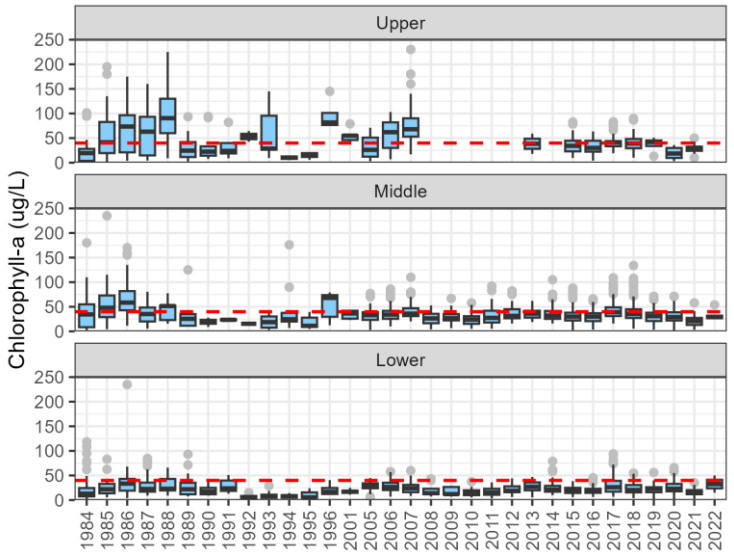

Figure 5. Distribution of Chlorophyll-a Measurements in Upper Falls Lake (upstream of Interstate 85), Middle Falls Lake (between Interstate 85 and Highway 50) and Lower Falls Lake (downstream of Highway 50 to the Dam)

Two additional sources of nutrient loading affect the lake directly. Atmospheric deposition contributes nitrogen, phosphorus, and organic carbon directly to the surface of Falls Lake as well as to the contributing drainage area. Atmospheric deposition data incorporated into the monitoring and modeling shows total nitrogen loads from atmospheric deposition have declined by approximately 20 percent since 2006 (DWR 2021). The bottom sediments within Falls Lake accumulate, release, and cycle nutrients. The UNRBA 2019 monitoring report estimated that lake sediments release approximately 200,000 pounds of total nitrogen each year (10 percent to 25 percent of the watershed load depending on rainfall and the year referenced) and 14,000 pounds of total phosphorus (5 percent to 15 percent of the watershed load depending on rainfall and the year referenced). These preliminary estimates of lake sediment releases have been refined through the UNRBA lake modeling efforts and Collaboratory studies.

The UNRBA 2019 monitoring report estimated that lake sediments release approximately 200,000 pounds of total nitrogen each year (10 percent to 25 percent of the watershed load depending on rainfall and the year referenced) and 14,000 pounds of total phosphorus (5 percent to 15 percent of the watershed load depending on rainfall and the year referenced)

To summarize, the hydrology, morphology, retention time, depth, and characteristics of the different areas of the lake contribute significantly to nutrient loading and chlorophyll-a levels in the lake. These aspects of the lake are beyond the control of the regulated entities in the watershed. While the UNRBA aims to manage nutrient loading in the watershed, it recognizes it is not the only factor to consider in developing a revised nutrient management strategy.

Many important data results and relationships contribute to an updated and improved understanding of this lake and watershed. The best way to examine those in detail is to access the UNRBA 2019 Monitoring Report.

UNRBA Watershed Modeling

The UNRBA has worked extensively with local governments, researchers, state and federal agencies, and utilities to obtain the most comprehensive and complete data available to develop a revised watershed model for Falls Lake. The UNRBA selected the Watershed Analysis Risk Management Framework (WARMF) model partly because it is the same model that DWR used to support development of the Falls Lake Nutrient Management Strategy. Data summaries and discussions related to the Falls Lake and watershed WARMF model development are documented in Modeling and Regulatory Support Workgroup (MRSW) meeting materials and the UNRBA watershed modeling report (BC and Systech Water Resources 2023, available at https://unrba.org/reexamination).

Development of a watershed model is an essential component of a fully informed management approach. The UNRBA has invested significant resources into an effective watershed model development process. The following summary of the watershed modeling effort is provided as context for the UNRBA recommendations for a revised nutrient management strategy. The modeling was reviewed extensively by subject matter experts, third-party model reviewers funded by the NC Collaboratory, and DWR modeling staff. The UNRBA has a high level of confidence in the results of this modeling. A more complete description of the model and the development process is available in the UNRBA Watershed Modeling Report (BC and Systech Water Resources 2023, available at https://unrba.org/reexamination).

Land Use Data and Existing Development Retrofits

A primary input to watershed models is land use data. The Falls Lake watershed is comprised predominately of unmanaged lands (75 percent, Figure 6). Unmanaged lands represent natural areas or areas where former land management activities are no longer occurring (unmanaged grass/shrub areas). Opportunities to reduce nutrient loading from natural areas are very limited.

Opportunities to reduce nutrient loading from natural areas are very limited.

Less than 10 percent of the watershed is used for agriculture, which has declined nearly 45 percent from the baseline year. This decline in production has reduced nutrient loading to the lake. The NC Department of Agriculture and Consumer Services (NCDA&CS) indicates that there are few additional actions that can be taken in the watershed to further reduce nutrient loading from active farmland. Most of the streams in the watershed are buffered, conservation tillage is commonly used, and nutrient management plans and the high cost of fertilizer have lowered the amounts of fertilizer applied. These limited opportunities for additional reductions from agriculture are important to consider in the development of a revised management strategy.

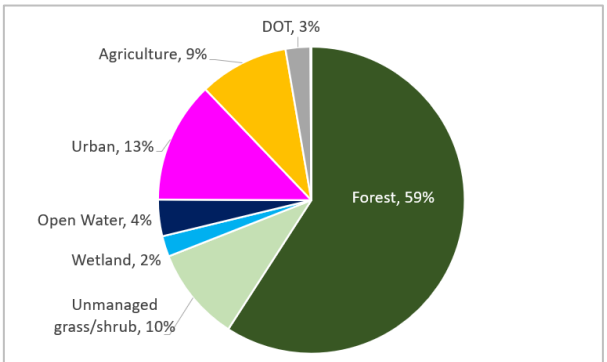

Figure 6. Distribution of Land Uses in the 492 thousand-acre Falls Lake Watershed (2014 to 2018)

Approximately 13 percent of the land is classified as developed, most of which is low intensity and non-DOT road rights of way. There are areas in the watershed like the City of Durham and central municipal areas in the smaller cities and towns where development is represented by more intensive "downtown" impervious land use, but this area is a small subset of the 13 percent classified as urban. In areas that are already densely developed, installation of engineered stormwater control measures (SCMs) is limited due to existing legal, logistical, technological, and economic constraints. Depending on soil conditions and other constraints, the application of some green infrastructure (including rain gardens and similar approaches) is possible with the cooperation of private property owners. The UNRBA's IAIA program encourages these type projects, but nutrient loading reductions are modest. Overall, the opportunity for SCM retrofits on these areas is extremely limited. Even if there were a high level of funding available, private ownership and logistic difficulties may not allow retrofits to occur on most developed sites. The NC General Assembly has prohibited the use of local government eminent domain to condemn property for control of stormwater impacts.

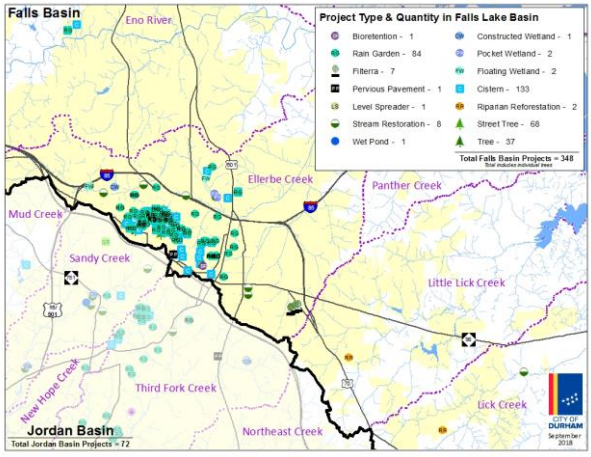

Figure 7. City of Durham Existing Development Retrofits as of December 2015

New development is already managed by every jurisdiction in the watershed under the current Falls Lake New Development Rule.

An example of installation of SCMs in an urban environment is in the City of Durham where the City installed over 350 nutrient and flow reduction measures by the end of 2015 on developed sites to improve water quality (Figure 7). Other local governments in the watershed have also installed retrofits to treat existing development. These projects were accounted for during calibration of the watershed model and were used for support of the IAIA concept. Installation of these projects illustrates the commitment of the jurisdictions in this watershed to mitigate water quality impacts of existing land use in the watershed.

More focused research on the question of applying retrofits was done through NC State University (Hunt et al. (2012), funded by the North Carolina Urban Water Consortium Stormwater Group, through the Water Resources Research Institute of The University of North Carolina). This study assessed opportunities and costs for the installation of SCM retrofits in several developed watersheds including Ellerbe Creek in the City of Durham. The findings indicated that if every potential existing development retrofit identified in the Ellerbe Creek watershed were implemented (at a cost of $16 million capital and $7 million annual maintenance costs), it would only reduce nitrogen loads by approximately 10 percent and total phosphorus loads by 25 percent. These reductions are much lower than the Stage II reduction requirements prescribed in the Falls Lake Rules (40 percent for total nitrogen and 77 percent for total phosphorus).

Development in the watershed occurring after 2011 is subject to the new development rules in the Falls Lake Nutrient Management Strategy. These rules have been implemented by the local governments and require installation of stormwater control measures to limit the amount of nutrients leaving the development to 2.2 pounds per acre of total nitrogen 0.33 pounds per acre of total phosphorus; 50 percent of these reductions must occur on site and 50 percent can be obtained through offsite credits acquired from the State. These amounts were set so that as lands in the watershed were developed, the load delivered to Falls Lake would not increase. The City of Durham began implementing new development requirements before the rules were passed and the loading targets were established. These interim development controls were adopted to reduce the amount of development requiring retrofits once the rules were passed. State law no longer allows for this type of proactive approach.

Soil Properties, Hydrologic, and Nutrient Application Data

Soils data and precipitation data are key drivers of hydrologic response and determine actual loading to streams from nutrients “applied” or deposited in the watershed. These inputs not only determine stream flows and nutrient loads delivered to Falls Lake but also the ability of nutrients to be stored and cycled in the system. Soil hydrologic and chemistry data were obtained from the US Department of Agriculture Natural Resources Conservation Service and the US Geologic Survey. Radar precipitation data for 78 locations in the watershed were provided by the NC State Climate Office (with support from NC Department of Transportation).

Human inputs of nutrients to the land surface are also an important part of the nutrient balance. The model accounts for monthly nutrient application to land surfaces on urban and agricultural lands. Atmospheric deposition of nitrogen and phosphorus is also applied to water surfaces and all land within the watershed, including unmanaged lands.

The passage of the Falls Lake Nutrient Management Strategy resulted in the formation of the Watershed Oversight Committee (WOC) for the Falls Lake Basin. Under the Rules, the WOC is charged with compiling, analyzing, and reporting data related to agricultural production, nutrient reductions, and compliance with the Falls Lake Nutrient Management Strategy. The WOC includes staff from the NCDA&CS Division of Soil and Water Conservation (DSWC), the USDA Natural

Resources Conversation Service, North Carolina Cooperative Extension, and the NC Department of Environmental Quality (DEQ), as well as agricultural and environmental interests from within the watershed. Information on the acreage of crops and pasture in the watershed and the amount and timing of nitrogen application was provided by the WOC for each county for inclusion in the watershed model. Assumptions regarding potassium and phosphorus application rates were obtained from the report "Delineating Agriculture in the Neuse River Basin" (Osmond and Neas 2011).

For developed lands, pervious surfaces such as lawns also receive nutrient application to support plant growth. Less information is available to develop the modeling assumptions for these areas because the owner types and individual preferences and practices vary widely (homeowners, institutions, parks, etc.). Fortunately, two publications that included local homeowner surveys are available to provide reasonable estimates of nutrient application for these types of areas (Fleming 2013 and Osmond and Hardy 2004). These data were used to help build the watershed model and provide a level of accounting for this source in the watershed that is not normally available.

Wastewater Treatment

The model also accounts for the treatment of wastewater as either point source discharges or non-point sources. Point sources are wastewater treatment plants (WWTPs) that can be considered major (discharging more than one million gallons per day) or minor (discharging less). Non-point sources are onsite wastewater treatment systems (e.g., septic systems and discharging sand filter systems).

There are four minor WWTPs (as defined by EPA) in the Falls Lake Basin that treat less than 1 million gallons per day of wastewater. Effluent data for these four facilities was provided by DWR. Two of these facilities are currently in compliance with the Falls Lake Rules, and two are not. While these systems do not contribute significantly to the nutrient load delivered to Falls Lake (one percent or less), they do represent an opportunity for incremental reduction in nutrient loading.

Effluent discharges from the major WWTPs (treating more than 1 million gallons per day of wastewater) were obtained directly from the North Durham Water Reclamation Facility, Town of Hillsborough, and the South Granville Water and Sewer Authority. Over $80 million have been invested to upgrade and optimize these three facilities since 2006. Based on DWR's 2021 Status Report for Falls Lake, these three discharges have reduced their collective total nitrogen and total phosphorus loads by 57 percent and 73 percent, respectively, from the 2006 baseline.

Sources of Nutrient Loading Delivered to Falls Lake

During the UNRBA study period (2014 to 2018), annual rainfall each year was average to high. Under these conditions, WWTPs contributed approximately 6 percent of the total nitrogen load and 3 percent of the total phosphorus load delivered to Falls Lake (Figure 7). These estimates are based on actual discharges, not permit limits.

A lower rainfall condition was also simulated with the model to represent DWR's baseline modeling period more closely (around 20 percent less rainfall than 2014-2018). Under these lower rainfall conditions, the model estimates that WWTPs would contribute approximately 10 percent of the total nitrogen load and 6 percent of the total phosphorus load delivered to Falls Lake. Based on the work of the Scenario Screening Group of the UNRBA and contact with the major system owners, further reducing the nutrient loading from these facilities would be extremely expensive and energy intensive. Additional reductions would also not significantly impact the total loads delivered to Falls Lake. Considering the contributions from watershed sources delivered to the lake, further reductions at WWTPs would have little impact on lake water quality. When looking at the types of actions that

will be most effective in reducing nutrient loading to the lake, it is important to recognize that this watershed is not dominated by point source loading.

One source of nutrients, atmospheric deposition, affects all the land uses and waterbodies in the watershed including the surface of Falls Lake, and not all of this source originates within the watershed. While atmospheric deposition of nitrogen has decreased by approximately 20 percent since the baseline period based on monitoring data from the National Atmospheric Deposition Program, it still contributes more than 40 percent of the total nitrogen that is applied or deposited to the watershed. Note that not all of this load is delivered to the lake. Figure 8 shows the projected amounts of nutrient load delivered from watershed sources to Falls Lake. There is also a component of the load that falls directly onto lake surfaces, and this contributes approximately 6 percent of the total nitrogen load to Falls Lake. As a point of reference, this percentage of loading from the atmosphere directly to the lake surface is the same contribution of total nitrogen load delivered from point sources.

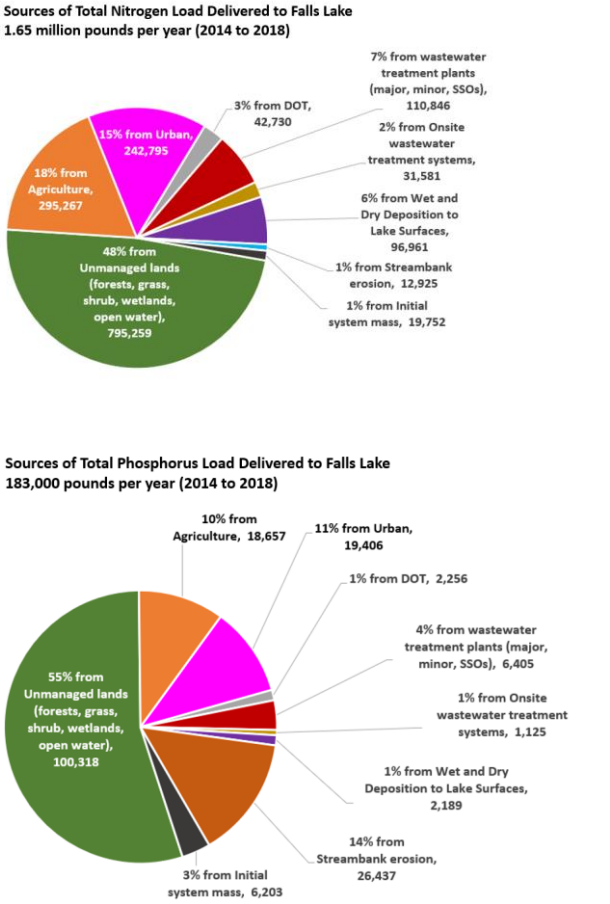

Figure 8. Sources of Delivered Total Nitrogen (top) and Total Phosphorus (bottom) Loads to Falls Lake Based on the Watershed Model

The watershed model simulates stream bank erosion separately from the individual land uses. Loads from stream bank erosion are calculated based on the erosivity of the stream bank soils, the amount of flow in the stream and resulting shear stresses, and stream bank stability metrics due to root systems and other soil characteristics. The model estimates that during 2014 to 2018, stream bank erosion contributed approximately 14 percent of the total phosphorus load delivered to Falls Lake. Because nitrogen content is low in the soil, the amount of nitrogen loading from streambank erosion is not significant. The Collaboratory has recently funded a study to identify the most likely areas of streambank erosion as a result of this modeling and at the request of the UNRBA. This study will be extremely helpful in identifying potential stream restoration sites for future investment projects.

Impacts of Watershed Processes on Delivered Nutrient Loads to Falls Lake

Based on the data compiled for the UNRBA watershed model, an average of 8.6 million pounds of total nitrogen per year were applied or deposited in the watershed in 2014 to 2018. Relative to the baseline period of calendar year 2006, this amount has decreased by approximately 37 percent. Most of the nutrients applied, deposited, or released to the watershed are removed from the system by crop harvesting, denitrification, and other physical, chemical, and biological processes. During the UNRBA study

Reducing one pound of nutrients in the watershed does not translate to reducing one pound delivered to Falls Lake.

period (2014 to 2018), approximately 1.65 million pounds of total nitrogen were delivered to Falls Lake each year. Thus, the watershed processes and crop harvesting reduce the total nitrogen applied to the watershed by approximately 81 percent prior to delivery to Falls Lake. For total phosphorus, the watershed processes reduced the amounts applied, deposited, or released to the watershed by approximately 84 percent. These reductions due to watershed processes and crop harvesting are important considerations for the revised nutrient management strategy. Reducing one pound of nutrients in the watershed does not translate to reducing one pound delivered to Falls Lake. On average, depending on the project location, a one-pound reduction of input may result in 0.2 pounds reduction delivered to Falls Lake. The 770 square-mile watershed is processing a significant amount of nutrients before they reach Falls Lake.

The UNRBA's watershed modeling has also improved understanding of the importance of soil chemistry on the transport, retention, and release of nutrients in the watershed. Soils in the watershed contain iron and aluminum that bind nutrients and release them slowly over time. This understanding must be factored into the revised strategy in terms of compliance dates and to moderate expectations about the length of time it will take for actions that reduce nutrients to impact water quality in the lake. The Chesapeake Bay STAC reported similar findings: realized nutrient load reductions had not translated to expected improvements in water quality.

The modeling also demonstrates that the significant efforts to reduce point and non-point source nutrient loading have had an important impact on delivered loads to Falls Lake. Because most of the land in the watershed is unmanaged (forests, wetlands, etc.) and extensive efforts have already reduced loading from human activities, approximately one-half of the delivered nutrient and carbon load to Falls Lake originates from unmanaged lands (Figure 8). Natural areas, including forests, cycle and provide important nutrients to waters that sustain aquatic life. Land preservation is a critical safeguard for keeping the watershed as natural as possible. These mostly natural areas dominate the drainage area and are important to the health of the watershed and the lake. Even watersheds that are 100 percent forested contribute flow, nutrients, and carbon to downstream waters – healthy ecosystems require nutrients and carbon to support life. Throughout UNRBA meetings, discussions, and document reviews, multiple stakeholders and experts have expressed that conservation must be a component of a revised nutrient management strategy. The scientific work supports this conclusion. The UNRBA's efforts and implementation of the IAIA support this activity as a critical component of future management.

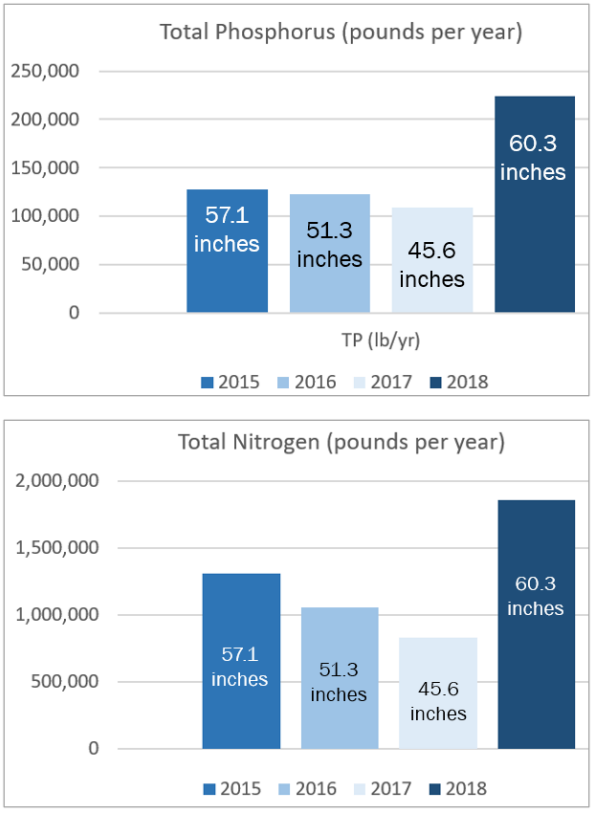

Figure 9. Annual Nutrient Loads Delivered to Falls Lake from the Watershed

As noted above, another important finding is the importance of precipitation and flow on delivered loading to Falls Lake (Figure 9). During an average rainfall year like 2017 (approximately 45 inches of rain at Raleigh Durham International Airport, RDU), delivered total phosphorus and total nitrogen loads were

approximately half of those delivered during a very wet rainfall year like 2018 (approximately 60 inches of rain at RDU).

The predictive models were developed and calibrated to observed water quality data from the monitoring period (2015-2018). The calibrated models were used to evaluate the impacts of different management options and model assumptions on delivered nutrient loading, lake water quality, and designated uses. The UNRBA convened a Scenario Screening Workgroup comprised of UNRBA members and representatives from DWR, agriculture, the US Forest Service, NC DOT, and environmental advocacy groups to prioritize these evaluations. Sensitivity analyses evaluate how much the parameters of concern (like chlorophyll-a) change when a model input or model parameter is changed (e.g., how much do simulated chlorophyll-a concentrations change if the modeled growth rate of algae is increased or decreased by 20 percent?). Scenarios were used to simulate different conditions than the model was originally calibrated for (e.g., how would simulated chlorophyll-a concentrations change if the USACE operated the lake differently?) Several model sensitivity analyses and model scenarios (e.g., 20 percent more or less rainfall) were evaluated using the watershed model to understand the impacts on delivered nutrients. The scenario with the greatest impact to delivered loading was the change in rainfall amount (Appendix H of the UNRBA Watershed Modeling Report). The majority of delivered load comes from non-point sources, and most of these areas are natural, unmanaged lands. This finding further demonstrates the limitations on additional, large-scale nutrient reductions as natural areas like forests are considered a balanced condition of nutrient inputs and outputs.

Implications for a Revised Nutrient Management Strategy

The watershed modeling results support the conclusion that achieving measurable load reductions to Falls Lake will require a systems approach directed at realistic and incremental change. The relatively small amount of managed land, constraints on the ability to install retrofits, relative effectiveness of load reduction projects, and the long response time of the watershed and lake will require a long-term effort to make progress. The revised rules should provide an adaptive management provision to reevaluate conditions in the future and make changes to the approach as needed (discussed later in this document). Any effective management approach must be flexible and include specific provisions for modifying the strategy as projects and improvements are tracked and as understanding about the system is supplemented. These recommendations for adaptive management are similar to the Chesapeake Bay STAC: “refining restoration goals over time should be considered as knowledge evolves about what future conditions are possible, what local communities and the partnership at-large see as priorities, and what is required to attain those possible futures.”

The current Falls Lake Rules require a 40 percent reduction of total nitrogen and a 77 percent reduction of total phosphorus load delivered to Falls Lake relative to the baseline year of 2006. While significant progress has been made, there is no feasible means to achieve these reductions, and as a result, a reexamination of the Rules is needed.

Lake Water Quality Modeling

Three lake water quality models for Falls Lake were developed. Two of these simulate the physical, chemical, and biological processes (e.g., settling of sediment and algae, growth and decay of algae, nutrient uptake rates) in the lake and have been calibrated to match water quality observations collected in Falls Lake.

Researchers funded by the NC Collaboratory have been studying nutrient-related processes in Falls Lake since 2019. Some of these researchers also provided third-party and subject matter expert review of the lake and watershed models. The results of these research studies have been

incorporated into the development of the lake models developed by the UNRBA. For example, researchers found that denitrification in the lake arms reduces nitrogen before reaching the main part of the lake. They also measured rates of nitrogen fixation by blue-green algae where the algae can "import" nitrogen from the atmosphere to support their growth. The researchers found that rates of nitrogen fixation in Falls Lake are currently low. Reports on these and other studies funded by the NC Collaboratory are available online at https://nutrients.web.unc.edu/resources/. The UNRBA models were developed with significant input from the Collaboratory researchers and modeling staff at DWR.

UNRBA Lake Water Quality Models Developed to Support the Reexamination

One of the process-based models is a complex hydrodynamic/water quality/sediment nutrient release model that uses the Environmental Fluid Dynamics Code (EFDC) model framework. One of the reasons EFDC was selected is because it was used by DWR to set the nutrient load reduction requirements specified in the Falls Lake Nutrient Management Strategy. The other UNRBA lake model is a simpler hydrologic/water quality model that uses the Watershed Analysis Risk Management Framework (WARMF). One reason this lake model was selected is because it is directly linked to the WARMF watershed model. This direct linkage generates results for lake water quality when changes in the watershed are simulated. The DWR Falls Lake WARMF model did not include the WARMF Lake model for Falls Lake in the development of the current Falls Lake Nutrient Management Strategy (other impoundments in the watershed were simulated with WARMF Lake).

The UNRBA set up both the EDFC and WARMF Lake models for Falls Lake to use the information from the WARMF watershed model to simulate stream flows and associated sediment, nutrient, total organic carbon, and chlorophyll-a concentrations delivered to Falls Lake. This linked approach is a significant development in the assessment of changes in the watershed and how those are manifested in the lake. Previous modeling did not use a watershed model to provide input files to the lake model. Without this component of the modeling, there is no way to evaluate the feasibility of proposed management activities.

The UNRBA reexamination also includes the development of a third lake model to evaluate how designated uses are affected by lake water quality. This statistical model is primarily data driven and incorporates Bayesian techniques that allow expert opinion to be considered when relationships between parameters and designated uses are difficult to quantify or costly to measure. The UNRBA convened a Technical Advisors Workgroup including users of the lake for feedback on how lake water quality affects their organizations use of Falls Lake for recreation and drinking water supply. This workgroup included representatives from Triangle Fly Fishers, Wake County Parks and Recreation, City of Raleigh Water Treatment Plant, and other local experts in the fields of water chemistry and lake processes.

Comparison of UNRBA Lake Models to Water Quality Data and Algae Data Collected in Falls Lake

The findings of the three lake models for the study period are consistent with the evaluations presented in the UNRBA 2019 comprehensive monitoring report:

- Concentrations of nutrients in Falls Lake are usually relatively low for the study period (2014 to 2018).
- Ammonia releases from lake sediments are higher in the deeper areas of the lake.
- Chlorophyll-a can reach high concentrations even when nutrient concentrations remain low (Figure 10, 1984 to 2020)). Chlorophyll-a is better correlated to total nutrients than inorganic nutrients because algae consume inorganic nutrients and store nutrients as organic material in their cells.

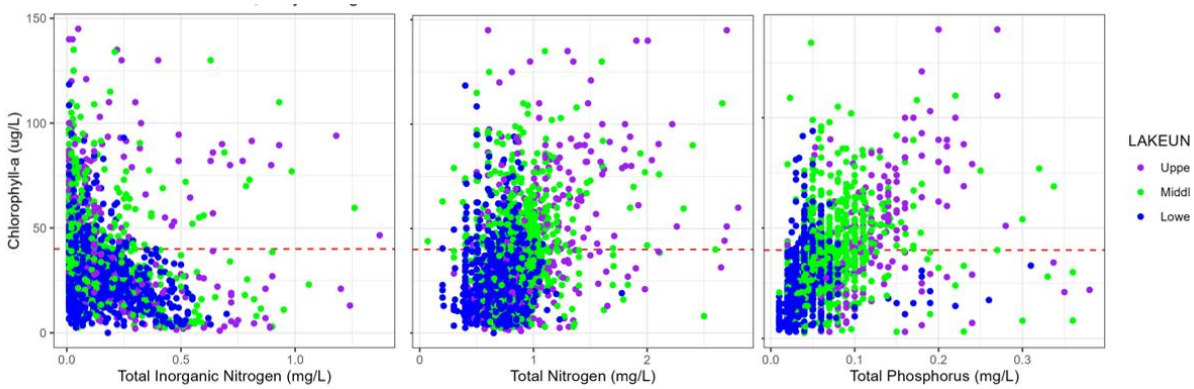

Figure 10. Comparison of Observed Chlorophyll-a Concentrations in Falls Lake to Nutrient Concentrations in Falls Lake (1984 to 2020) Excludes *outliers that are greater than five standard deviations from the mean.*

DWR assesses the presence of different algal species in Falls Lake by counting and identifying algal cells in a water sample. This information is used to estimate the amount of space in the water that algae occupy. This estimate is called biovolume, and DWR provides these estimates monthly at three locations in Falls Lake. As chlorophyll-a is an indicator of algae growth, these two measures are expected to increase and decrease together. However, when the biovolume estimates in Falls Lake are compared to the chlorophyll-a concentrations, they do not always track together. Depending on environmental stressors and dominant algae groups, chlorophyll-a can reach high concentrations even when total biovolume is low (Figure 11). This complicates simulation of chlorophyll-a because the models are designed to predict more chlorophyll-a when more algae are present. Shifts in algal groups and complex algal metabolic and species variation relationships complicate the water quality assessment of Falls Lake.

The lake models can simulate three algal groups, typically modeled as green algae, diatoms, and blue green algae. However, evaluation of DWR algal group data shows that significant concentrations in chlorophyll-a were sometimes caused by species not categorized as one of these three groups. The DWR data also show that green algae are a very small component of the algae in Falls Lake. The alternate species of algae were simulated as a group called "green/other algae."

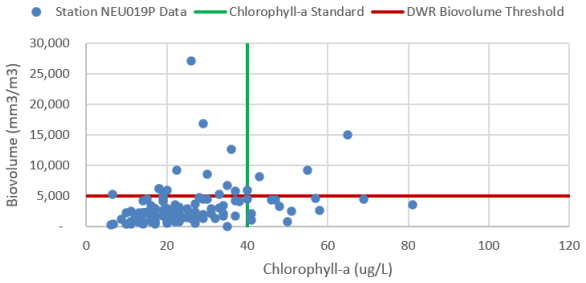

Figure 11. Scatter plot of algal biovolume (the amount of space occupied by algae in a water sample) and chlorophyll-a at a station below Highway 50 *At this station, nearly 80 percent of the exceedances of the chlorophyll-a standard occur when the biovolume is less than the threshold for a bloom.*

Evaluation of Lake Model Scenarios

Following calibration to observed lake water quality data, WARMF Lake and EFDC were used to predict changes in lake water quality resulting from changes in the watershed or lake operations. One of the scenarios evaluated was a land conversion to "all forest" and wetlands with removal of watershed-scale human inputs (rates of atmospheric deposition were not changed for this scenario). This scenario simulates all lands as forests but leaves wetlands in place. It also removes point sources, fertilizer application, and onsite wastewater treatment systems. This scenario establishes the lowest potential loading to Falls Lake and resulting lake water quality. **Even this hypothetical "all**

forest" scenario does not achieve the Stage II nutrient allocations prescribed in the Falls Lake Rules or compliance with the chlorophyll-a criterion at all lake monitoring stations.

Figure 12 shows the simulated and observed chlorophyll-a concentrations using the UNRBA Falls Lake WARMF model developed for 2014 to 2018. The model was developed and calibrated to observations collected from 2015 to 2018 while 2014 was used to initialize the model. The orange line shows the calibrated model, and the dots show the observations. The top half of the figure shows results at Interstate 85 in the upper part of the lake. The bottom half of the figure shows results in the lower part of the lake near the dam. As with the box and whisker plot shown in Figure 5, the upper lake has higher and more variable chlorophyll-a concentrations than the lower lake. While the "all forest" no watershed-scale human inputs scenario (green line) has lower chlorophyll-a concentrations than the calibrated model, it still exceeds the 40 µg/L chlorophyll-a standard (red dashed line) in the upper lake. At Interstate 85, approximately 32 percent of the simulated chlorophyll-a concentrations exceed 40 µg/L under this hypothetical scenario. For the calibrated model (2015 to 2018 conditions), 38 percent of the simulated chlorophyll-a values exceed 40 µg/L at this location. Therefore, while the percent exceedance decreases, not even this hypothetical scenario can meet the chlorophyll-a standard everywhere, all the time in Falls Lake. Therefore, it is not possible to achieve the chlorophyll-a standard in Falls Lake as currently applied.

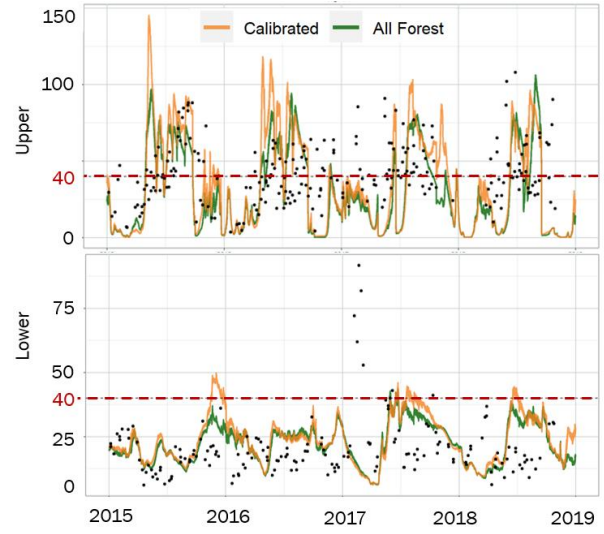

Figure 12. Simulated Chlorophyll-a Concentrations in Upper Falls Lake at Interstate 85 (top) and Lower Falls Lake near the Dam (bottom)

Significant reductions in nutrient loading to Falls Lake have been achieved since the baseline period. Another scenario was evaluated with the EFDC model to determine if these reductions from the watershed would eventually lead to reductions in the amount of nutrients cycled into and out of the Falls Lake sediments and whether this would lower simulated chlorophyll-a concentrations. While changes to the internal nutrient releases were predicted, the simulated chlorophyll-a concentrations did not change significantly. This finding indicates that algae and chlorophyll-a levels will be very resistant to changes in nutrient loading or other conditions of the lake.

A question that was frequently asked by stakeholders is the importance of USACE lake operations on nutrient storage, algal growth, and chlorophyll-a concentrations in Falls Lake. A scenario was evaluated that simulates an outflow structure at normal pool elevation so that water is not retained for flood control purposes. Because the USACE already targets this elevation in their operations, this scenario did not significantly affect simulated water quality in Falls Lake. Maximum values of some parameters either increased or decreased or shifted in time. However, the percent of simulated chlorophyll-a concentrations at I-85 exceeding 40 µg/L (37 percent) was nearly the same as the calibrated model (38 percent). Scenarios were also evaluated to determine the percent reduction in nitrogen and phosphorus loading to Falls Lake that would be required to meet the chlorophyll-a standard at least 90 percent of the time in the upper part of the lake where concentrations are usually highest. This analysis shows that an additional 50 percent reduction in total nitrogen loading beyond what has already been achieved would be required.

Implications for a Revised Nutrient Management Strategy

Given the vast amount of data collected in the watershed and lake, and the unavoidable constraints on further reductions in nutrient loading, a more reasonable implementation program with achievable water quality standards is the most correct path. A long-term, continued program based on investment in water quality management in the watershed and lake is needed. This approach will provide continued progress on protecting and improving water quality. The information developed during this evaluation process shows a reservoir that is eutrophic but meeting its designated uses. It also shows a lake that is subject to elevated algal activity and ongoing development in the watershed. To mitigate the impacts of development, implementation of the New Development Rule is an important management component of the strategy. The full impact of new development includes additional loading to the lake at flows exceeding SCM design standards. Land conservation and promoting the retention and creation of natural areas in the watershed are also essential components of an effective, ongoing strategy. Actions to improve watershed health and address current nutrient loading will provide protection of this important water resource.

Pump-and-Treat Scenario

As discussed in previous sections, one model scenario revealed that removal of all human-generated nutrient inputs and conversion of all land to forests would not meet the chlorophyll-a standard in Falls Lake. This means that all sources in the watershed would have to be treated to levels below that of a wooded watershed to comply with chlorophyll-a standards. This level of treatment would require a pump-and-treat system. To illustrate the cost, tremendous challenges, and economic impact of applying pump-and-treat systems to potentially meet the chlorophyll-a standard, a hypothetical implementation of an algal harvesting system called an algal floway is described below.

System Description

The City of Durham pilot tested a small-scale algal floway nutrient removal system that pumps water out of Falls Lake, releases the water to flow across shallow, open conveyances that grow algae, and then discharges the treated water back into the lake. The cultivated algae consume (remove) nitrogen and phosphorus as the water flows across the conveyance. These algae are periodically harvested along with the nutrients stored in their cells. The harvested material is transported to another location and treated to convert it into a soil amendment or to be disposed of alternatively (landfill, etc.). Reports associated with the pilot test, conceptual design, and 2021 construction cost estimates are available online at https://www.durhamnc.gov/4678/Algal-Floway.

Based on the pilot study results, the City of Durham evaluated the feasibility and operational aspects of a full-scale algal floway which could treat 10 million gallons of water per day. Approximately 2,000 wet tons of cultivated algae would be removed from the floway each year. The amount of nitrogen removed by the algae would range from 3,000 to 6,000 pounds each year. This range assumes the water level at the withdrawal point (either a tributary to Falls Lake or the lake itself) would always be high enough to pump water into the treatment system and that the concentrations of nutrients from the pumped water were like those observed in the pilot study. The cost to construct this facility was estimated at $7.9 million with annual expenses over a 20-yr service life of $170,000 per year. These costs do not include the cost of land or the effort of successfully siting the system.

Reductions Required to Meet the Chlorophyll-a Standard Ninety Percent of the Time

As noted in previous sections, the UNRBA watershed modeling estimates the current delivered total nitrogen load to Falls Lake averages 1.65 million pounds per year. The UNRBA EFDC lake model estimates that a 50 percent reduction in this total nitrogen load would be required to meet the

chlorophyll-a standard 90 percent of the time in the upper part of the lake. A 50 percent reduction in total nitrogen load from 2014 to 2018 levels translates to a reduction of 825,000 pounds per year on average. This is a massive reduction goal on top of the reductions already achieved since 2006. Multiple pump-and-treat type systems would be needed to achieve this level of reduction. Many, if not all of these systems, would be treating nutrients from unmanaged lands including forests and wetlands that do not receive watershed-scale human inputs (however, nutrients are "applied" to these areas from atmospheric deposition).

Implementation

Assuming the highest estimate of nitrogen removal (6,000 pounds per year, which is unlikely), removing 825,000 pounds of nitrogen per year would require 138 full-scale algal floways. These floways would generate an estimated 276,000 wet tons of harvested algae, which would need to be transported to an offsite treatment facility. A rough extrapolation of the pilot study estimates the cost of 138 algal floways at $1.1 billion for construction and $23.4 million per year for operation and maintenance. These facilities have an assumed life span of 20 years, meaning that life-time costs would be approximately $1.6 billion (construction plus 20 years of operational costs). Treatment beyond 20 years would require additional construction or repair costs. This is a conservative cost estimate as site selection, land costs, and legal costs are not included.

These costs assume the maximum amount of treatment based on the pilot study. Assuming the low end of the treatment range (3,000 pounds of nitrogen removed per year per system), construction costs would double to $2.2 billion, and operation and maintenance would double to $46.9 million for a total of $2.7 billion for the 20-year life span of the systems.

Feasibility

While hypothetical costs can be estimated for 138 systems, there are many logistical reasons that warrant this approach infeasible:

- The City of Durham has faced challenges siting even one of these systems, so siting 138 would be unachievable.
- This number of systems would require treatment of 1.38 billion gallons of water per day (10 million gallons per day times 138 systems). This is more water than entered Falls Lake during the average to high precipitation conditions that were evaluated by the UNRBA (only 239 million gallons per day to 476 million gallons per day). If sufficient water is not present in the tributary or lake where pumping occurs, the systems cannot fully operate, and pumps may be stressed.
- More than 276,000 wet tons of algae would have to be harvested, transported, and composted each year. This would likely require construction of a dedicated composting facility.
- The effectiveness of the floways is estimated based on the results of a pilot study. For the sake of illustration, constant removal efficiencies for all 138 systems are assumed. However, cumulative effects for multiple systems are unknown, and removal efficiency for a given floway could decrease significantly if incoming water had already been treated by an upstream floway. Similarly, some of these systems would have to be placed in areas that were predominately forested. Inflow concentrations from these areas would likely be lower than the pilot study, and removal efficiencies would be lower.
- Processing that volume of water and removing that level of nutrients from the system could have unknown environmental and ecological impacts.
- Addition of 138 algal floway footprints and algal harvest transportation could have negative environmental impacts such as increased impervious area and greenhouse gas emissions.

- Community acceptance of widespread installation and maintenance could present an additional hurdle to implementation.
- Local governments cannot condemn land for stormwater treatment, so all systems would require willing landowner participation.

Implications for a Revised Nutrient Management Strategy

Given the cost and constraints listed above, the use of pump-and-treat systems to reduce total nitrogen loads to Falls Lake by 50 percent from recent levels is not feasible. Because of the nutrient reductions that have already been achieved, the mostly natural state of this watershed, and the relative stability of chlorophyll-a concentrations in Falls Lake, nutrient load reductions at the scale necessary to achieve compliance with the chlorophyll-a standard are not reasonable.

This hypothetical pump-and-treat scenario is presented to illustrate the challenges faced by UNRBA members and others in this watershed. The UNRBA is not attempting to avoid costs or responsibility. Rather, this scenario and the modeling discussed previously demonstrates UNRBA's commitment to finding management strategies that will protect water quality instead of applying conventional approaches to try to reach an unrealistic goal.

The data show that achieving the chlorophyll-a standard as currently assessed is not attainable in all areas of Falls Lake. The UNRBA has extensively researched this system and evaluated several scenarios to guide readoption of the Falls Lake Rules. The result of these efforts and discussions with stakeholders indicate that the most effective means to reduce nutrient loading from the watershed and protect water quality in Falls Lake is a measured and incremental investment program that focuses on watershed health. The path forward requires a revised nutrient management strategy that focuses on clear, attainable objectives that continue to maintain the reservoir's designated uses. To move management actions forward with broad support from stakeholders, the revised strategy should not focus on nutrient pounds delivered to Falls Lake with the only goal being attainment of the chlorophyll-a standard. There are finite resources within this watershed, and those allocated to this effort need to be used for enhancing and protecting the entire watershed in sustainable, resilient, and meaningful ways.

Economic Considerations

As recommended in the Framework for a Reexamination Strategy of Stage II of the Falls Nutrient Strategy, the UNRBA planned to supplement monitoring and modeling efforts with a cost-benefit analysis (CBA). The CBA would update the DWR Fiscal Analysis by comparing modeling scenarios that would meet the chlorophyll-a standard in Falls Lake. However, monitoring data and calibrated models revealed that none of the scenarios investigated would comply with the chlorophyll-a standard as currently applied. As no reasonable means of meeting the standard was identified, a formal CBA of nutrient management strategy alternatives could not be conducted during the development of these recommendations. However, the UNRBA will cooperate with DWR to assist in developing a more thorough economic analysis during the rule revision process to evaluate impacts of rule language and alternative strategies as needed. The UNRBA continues to compile information from the local governments to support this effort.

Stakeholder Involvement

Some of the efforts on this vital component of the reexamination have already been briefly noted in this document. Stakeholder engagement for this effort is not limited to specific events but rather is an ongoing commitment to develop the science, support a revised strategy, communicate preliminary findings, and share perspectives on how these findings guide the reexamination.

The UNRBA membership has consistently used consensus to make decisions within the Association's more formal meetings and in conducting its business. The UNRBA is committed to reaching its decisions based on input from its members and representatives as well as other stakeholders. External stakeholders participate through attendance and participation at UNRBA meetings, which are open to the public. External stakeholders also have access to review UNRBA project activities, materials developed to describe and present its work, and documents generated by the UNRBA and its contractors in support of its objectives. As noted, stakeholders are invited to comment on these materials during meetings and in writing to provide input to the work of the UNRBA. Stakeholders have been included as members of workgroups created to support the UNRBA's decisions on many critical topics. Input from the NC DEQ, and its lead agency on the Falls Lake strategy, DWR, has been sought at every step regarding the work of the UNRBA. This agency is the organization that will move the readoption of the Falls Lake Rules forward. The UNRBA has and will continue to provide and enhance input opportunities during stakeholder meetings and workshops. Securing UNRBA input and recommendations to the DWR process is critical to developing a revised strategy and revised rules.

Stakeholder engagement will be expanded as rule revisions are developed. This outreach will include developers and home builders, the USACE, farmers and landowners (outreach to be led by representatives of agriculture), local Soil and Water Conservation Districts, County Health Departments, EPA, and members of the NC General Assembly. This input is critical to the success of implementing a revised nutrient management strategy for Falls Lake.

The Falls Lake Nutrient Management Strategy is an important, ongoing, programmatic commitment for local governments in the watershed. These governments are responsible for implementation of the New Development Rule requirements; identifying, funding, and managing watershed improvement projects; and achieving reductions of nutrient impacts from existing development. It is anticipated that this responsibility will continue, and the revised management strategy will continue to count on these local governments for implementation. The success of water quality management in this watershed requires an effective partnership between regulatory agencies and affected parties. Progress cannot be achieved without trust and collaboration between the state regulatory agencies, citizens, local governments, and landowners in this watershed.

Stage I Existing Development Interim Alternative Implementation Approach

The cooperative and collaborative nature of the UNRBA and its extensive stakeholder engagement process resulted in the development of an innovative and promising approach for ensuring progress for on-the-ground projects and activities that will improve watershed health. This approach addresses the challenges associated with reducing nutrient loading from existing development in the watershed by expanding opportunities for partnerships and the types of projects and activities eligible for compliance.

Beginning in 2018, the UNRBA began exploring an alternative option for achieving compliance with Stage I existing development nutrient load reductions under the Falls Lake Rules. To overcome some of the obstacles present in the current Rules, the UNRBA and its stakeholders developed the IAIA with the goal of protecting and improving water quality in the watershed and lake. The concept was originally suggested by environmental advocacy groups active in the watershed and engaged with the UNRBA and its efforts. The UNRBA worked with its members, representatives from environmental groups, conservation organizations, staff at DWR, other interest groups, and regulated entities to develop an alternative approach for meeting the Stage I Existing Development Rule. This compliance framework uses financial investment in eligible projects and activities that benefit water quality and quantity both for the lake and the watershed. This approach does not rely on the difficult compliance approach of counting pounds of nutrient reductions associated with individual projects,

rather it promotes actions that reduce nutrients, offset impacts, and improve watershed health associated with developed land in the watershed. This approach recognizes long-term benefits and emphasizes protecting lake uses and improving water quality in the watershed and lake. It also engages upstream jurisdictions in the watershed and direct users of the lake in a coordinated and mutual commitment to produce a positive future for water quality in this watershed and lake. The engagement of local governments that represent both lake users and those areas that drain to the lake provides a critical link between upstream actions and downstream benefits. The IAIA Program Document (approved by the EMC in January 2021) and other materials are available here. **The following list identifies the activities and projects currently eligible for use under the IAIA. It is anticipated this list would be expanded in a similar manner allowed under the IAIA.**

- All state-approved practices with established nutrient credits including SCMs and retrofits.
- Green infrastructure and other BMPs that include water quality and quantity improvements.
- Stream and riparian buffer restoration and enhancement.
- Programmatic measures beyond baseline program activities (i.e., levels in 2006) for years after the start of the IAIA program.
  - Fertilizer application education of businesses and homeowners
  - On-site wastewater treatment system inspection programs, maintenance tracking, repair, replacement, and pump-out programs, education of owners regarding proper maintenance, and training of professionals who inspect and repair onsite systems
  - Pet waste pickup education, waste management stations, and enforcement
- Infrastructure improvements including:
  - Repair and replacement of leaky infrastructure
  - Reduction of sanitary sewer overflows
  - Extension of sewer lines to areas using onsite systems (targeting areas with known failure issues) or package plants
- Illicit discharge detection and elimination.
- Land conservation in high priority areas including isolated and connected wetlands, land in forest succession, non-pasture grassland, scrubland, and forests (as determined through an appropriate evaluation resource, i.e., land conservation programs that identify water quality aspects of available preservation sites); the Raleigh Watershed Protection Program has a target of preserving 30,000 acres of high priority lands by 2045.
- Floodplain restoration and reconnection.
- Greenways and parks with water quality and quantity benefits (water quality benefits would be identified as specific project components and documented within the adopted development plans).
- Projects and activities that focus on flooding and have an associated water quality benefit.
- Operation and maintenance costs associated with preserving long-term functionality of practices implemented under the IAIA.
- Hydrilla removal and control

The IAIA is a voluntary program that allows jurisdictions to use a joint compliance approach. The program was designed as a pilot effort to inform the development of the revised nutrient management strategy for Falls Lake. The initial period for undertaking this program was set at five years, but the IAIA is interim because it only applies until the Falls Lake Rules are readopted as required by the NC General Assembly (expected in 2025 or later). The continuation of this approach

to mitigate impacts from existing land use in the watershed is well-suited to the specific challenges of addressing non-point source impacts in the watershed using a long-term management approach.

Year 1 of the IAIA was hugely successful with all participants meeting or exceeding their minimum investment requirements. Participants were required to commit $1.5 million to eligible projects and actions. Annual compliance reporting shows that $5.5 million was committed in the first year. A wide range of projects were implemented including land conservation, green infrastructure, stormwater control measures, illicit discharge detection and elimination, and stream restoration.

Stakeholder feedback received in 2022 and 2023 encouraged the incorporation of this investment-based approach into the revised nutrient management strategy. For example, John Huisman (DWR) said the IAIA demonstrates "positive momentum in the implementation of the Falls Lake Rules and the commitment of the local governments to improve water quality" and that "this is a great success that we can point to as an example for other watersheds." Peter Raabe of American Rivers said, "the adoption of this approach to improving our water supplies for people and nature is a groundbreaking modernization of our clean water regulation. It will deliver benefits that communities will see and appreciate every day and is only possible due to the great work of the UNRBA members and NC DEQ."

Development of the UNRBA Recommendations for a Revised Management Strategy

The efforts of the UNRBA and other organizations including the Collaboratory have greatly improved the scientific understanding of the relationship between nutrients and algae in the lake, nutrient processing, and movement in the watershed, and how those factors should shape a revised strategy for managing water quality in Falls Lake. Revised policies must consider the science and realities of how, and to what extent, actions will impact the entire system. Good policy must be built on good science.

The revised strategy should consider that significant load reductions have occurred since the Rules were passed, and further reductions will be limited by technological, logistical, and economic constraints. The outlook for this watershed and lake is promising because the UNRBA recognizes the importance of protecting Falls Lake, maintaining designated uses, and improving water quality. There is an established and positive relationship between upstream jurisdictions and downstream users of the lake. Jurisdictions in this watershed seek to continue and expand the partnership established between the members of the UNRBA, DEQ/DWR, and the public interest community. A strategy cannot work effectively unless there is mutual agreement on the actions needed and a commitment to manage and oversee those actions for the long-term.

Simply using the models to simulate reduced loading until the standard is met will not work as a regulatory approach. There are significant limitations that existing land use places on the ability to change nutrient input to the lake. It is essential to establish the link between the watershed and the lake and acknowledge the sources and relative amounts of loading.

The concepts and principles aim to establish a revised nutrient management strategy consistent with the long-term realities of how this system responds to changes in the watershed and the length of the time it will take for water quality in the lake to respond. These challenges are best addressed through a flexible, progressive management program. The strategy must also include provisions for ongoing adaptive management plans that continue actions for the long term, assess progress using an appropriate timeline, and adjust the strategy moving forward.

Falls Lake has a specific and complex relationship with its watershed. Efforts on the ground intended to improve water quality in the lake are slow to manifest. Any strategy that expects change to occur quickly is not realistic. Nutrient and water quality management actions and improvements to lake water quality must be assessed over decades.

During 2022, the UNRBA moved into the discussion of concepts and principles for a revised strategy. This critical process began before the modeling was finalized. Discussions of the work completed by the UNRBA and the Collaboratory have occurred over the last several years and inform these recommendations. The lessons learned from the development and implementation of the IAIA have also established some clear guidelines for achieving effective management of the lake and watershed.

Falls Lake is the most thoroughly studied reservoir in NC and among the most studied in the country. As summarized above, the 2014 to 2018 UNRBA monitoring program provided fundamental data and information that was previously not available at this level of detail. The 2019 comprehensive report along with the preliminary results of the Collaboratory research provides an informed picture of the system. The modeling provides further clarification of the system as well as tools to test scenarios and management actions and their impacts on lake water quality.

This document frames the concepts and considerations that have been identified by the UNRBA members and watershed stakeholders as they reference the scientific findings and modeling results. The UNRBA expects to submit these recommendations for the revised strategy to DWR and the EMC by December 2023.

Recommendations for a Comprehensive Approach to Nutrient Management

The UNRBA has been working with other watershed stakeholders to study the Falls Lake watershed since 2011. This work is intended to support the reexamination of Phase II of the Falls Lake Rules. These efforts have led internal and external stakeholders to propose that the revised nutrient management strategy incorporate the fundamental principles of IAIA including using an investment-based, joint-compliance framework on the implementation of projects and activities beneficial to water quality across the watershed.

The IAIA includes a broad range of eligible projects and activities approved by DWR for compliance with Stage I Existing Development Rules. The UNRBA members and stakeholders have discussed many types of additional projects and activities related to nutrient reduction opportunities for inclusion in the revised nutrient management strategy that would apply to specific types of land, discharges, etc. As with the IAIA, the UNRBA recommends including a provision for expanding the list of eligible activities in the revised strategy. Potential expanded activities are organized by topic in this section. However, many of the opportunities and potential partners overlap, and the organization of this document attempted to account for this overlap. Additional projects and activities may be added as the revised nutrient management strategy is implemented.

Because of the holistic nature of the recommendations, the UNRBA also recommends that its implementation for non-point sources be considered by the State as addressing all waterbodies in the watershed that are currently listed, or may be in the future, on the State's 303(d) list of waters for pollutants related to nutrients. These other waters may be considered Category 5 waters in future Integrated Reports if additional point source controls are required. Separate, State-required nutrient management requirements should not be applied to managed lands in separate areas of the watershed (draining to an upstream watershed impoundment, arms of Falls Lake, etc.). However, water quality in all areas of the watershed should be tracked, particularly sub-watersheds with water-supply impoundments. The adaptive management provisions of the revised rules should address changing conditions in these waterbodies and allow for revisions to the program to address concerns as they arise.

The UNRBA anticipates investment requirements for its members under the revised nutrient management strategy. The potential partners (e.g., agriculture and institutions) would not have the burden of investment requirements. To foster cooperation and establish a functioning, holistic program, the UNRBA proposes establishment of a "Watershed Organization" with tiered membership. Those local governments, state and federal agencies, and utilities with investment requirements would be in Tier 1 and could support administration and implementation of the program through funding. Those without investment requirements could be in Tier 2. This tier would not be expected to fund the program but could participate on committees to identify opportunities and constraints, participate in decision making, etc. Committees specific to a sector (e.g., agriculture) could be chaired by a representative of that sector (i.e., committees may be chaired by a Tier 2 member). Annual compliance reporting and tracking of investment requirements for the Tier 1 members could be managed by the Watershed Organization, similar to the current IAIA. The initiation date of the Watershed Organization will be determined by the readoption of the Falls Lake Rules, which must be achieved in accordance with Session Law 2018-5 Section 13.8.(a). This session law specifies that the EMC must begin rule re-adoption no later than December 31, 2024. It is anticipated by DWR that readoption of the rules will occur no later than 2027. Additional details about the Watershed Organization and tiered membership are provided in the section called Program Administration.

Establishment of a Fair and Equitable Program

The UNRBA strives to develop a revised nutrient management strategy that protects the watershed and Falls Lake in a fair and equitable manner. The Falls Lake Rules affect a variety of sectors, some of which can fund compliance through taxes or fees and others that do not have that ability. Beyond financial capabilities, not all communities have the staff resources to fully evaluate potential projects and choose the best options for their citizens. The collaborative nature of a watershed organization will allow regulated parties to share resources and expertise as each member is working towards a common goal. Members will have the option to participate in multi-jurisdictional projects or invest in-kind contributions (i.e., use of equipment, labor and technical service hours, etc.) which allows for significant flexibility in meeting investment requirements.

The watershed organization structure addresses an inherent inequality with conventional water quality regulation: upstream/downstream distribution of costs and benefits. Traditionally, upstream sectors may bear the brunt of expenses for mitigative action without experiencing the corresponding benefits. While downstream sectors may have little influence over incoming water quality and are at the mercy of upstream actions (or inactions). The UNRBA recommendations seek to correct this imbalance by bringing users together to improve and protect valuable water resources regardless of their location within the watershed. The UNRBA recognizes that everyone within the watershed has the potential to be affected by poor water quality, and the recommended investment approach to manage existing development provides a way of fair and equitable means for creating and benefiting from watershed improvements. As with the successful IAIA, the revised strategy should allow projects to be implemented anywhere within the watershed with an expanded suite of compliance activities. Many of the approved activities produce benefits beyond nutrient reduction, such as infrastructure repair, community amenities with a water quality focus (parks, etc.), and high priority land conservation. The result is a fair and equitable strategy where citizens can benefit from projects in their communities and address their unique priorities while protecting water quality in the reservoir.

The UNRBA recommendations for a revised strategy will be most effective when all parties in the watershed are fully engaged and committed to the common goal of watershed protection and improvement. Beyond being a moral obligation to society, a fair and equitable strategy garners

public support and encourages participation, which ultimately results in a more effective nutrient management strategy. Encouraging stakeholder involvement, providing transparent record keeping, facilitating multiple funding vehicles, and offering an expanded suite of compliance activities all contribute to a fair and equitable program. The UNRBA acknowledges that the success of the program depends on participation, and willing participation depends on each member, and each citizen, being treated with respect, equality, and fairness.

Consideration of Environmental and Social/Community Impact Issues

The revised nutrient management strategy should consider environmental and social impact issues in implementation of the program. The revised rules should promote opportunities for equitable stakeholder participation by encouraging input and participation from the public and interest groups. The UNRBA believes that a voluntary and collaborative approach will give more opportunities for communities to be heard and included in the decision-making process. In addition, members are encouraged to employ the multitude of state and federal databases and tools that exist to protect historically underserved communities and individuals. One such tool is the EPAs EJSCREEN tool that can be used to assess whether potential for environmental justice issues may arise within a project's service area. Efforts should be made to ensure that the programs and actions of the regulatory system for nutrient management in Falls Lake and its watershed do not create environmental or social justice issues.

Measuring Compliance Under an Investment-Based, Joint Compliance Approach

As with the IAIA, the UNRBA recommends that compliance under the revised strategy be tracked by investment and the amount of nutrient reductions be tracked as supplemental information. One of the fundamental differences of the IAIA compared to conventional regulatory approaches is that compliance is tracked by required investment in eligible activities rather than counting the nutrient pounds reduced. This approach provides two key benefits: 1) local governments can plan for required investment levels as part of their budgeting process and 2) activities that do not have State-approved nutrient credits that are known to be beneficial to water quality and quantity can be incorporated into the program. Pledged investment levels remove fiscal uncertainty and simplify compliance administration, freeing members to prioritize water quality projects with more comprehensive and sustainable benefits that meet water quality objectives while addressing the unique needs of their communities.

This method of compliance is reminiscent of the EPA's Integrated Planning framework first launched in 2012 and included in the Water Infrastructure and Improvement Act (WIAA) (H.R.7279) of 2019. The integrated planning framework was developed as a means to address the increasingly complex challenges of meeting Clean Water Act (CWA) requirements. "An integrated plan is a process that identifies efficiencies from separate wastewater and stormwater programs to best prioritize capital investments and achieve our human health and water quality objectives. This approach can also lead to more sustainable and comprehensive solutions, such as green infrastructure, which improve water quality and provide multiple benefits that enhance community vitality" (https://www.epa.gov/npdes/integrated-planning-municipal-stormwater-and-wastewater). The success of Integrated Planning shows that moving beyond nutrient tracking into a more comprehensive means of compliance can result in sustainable solutions that reduce pollution sources rather than simply controlling or treating discharges. In fact, many municipalities who have undertaken similar programs have exceeded CWA requirements and saved money by synchronizing water quality goals with capital improvement projects.

Representatives of agriculture have indicated that they prefer to maintain ownership of their nutrient loss tracking and reporting, and this cooperative approach would allow that to continue while

potentially leveraging funding from other sectors. DOT representatives have also indicated an interest in participating in this revised program.

Site-Specific Chlorophyll-a Standard and 303(d) Listing Considerations

The UNRBA is proposing a path forward in our recommendations that sets an ambitious process toward protecting Falls Lake and for continuing those efforts into the future, but the current standard and 303(d) water quality assessment process should be adjusted to better reflect conditions in Falls Lake. The UNRBA could apply much additional financial resources, time, and effort to secure a new standard through administrative, legislative, or legal means. However, the time associated with these efforts would delay watershed improvement actions and put Falls Lake at risk of water quality degradation that could impact uses. Options include a variance, use-attainability analysis, judicial review, legislative action, or other effort to address the compliance issues. UNRBA membership recommends focusing time and financial resources on collaborative projects that address water quality and watershed health. A request for a site-specific standard may still be needed, and the goal would be to promote progress by setting an achievable goal for the watershed and the lake.

The established goal for improving water quality in Falls Lake is the current water quality standard for chlorophyll-a. As part of a comprehensive consideration of an effective nutrient management strategy for Falls Lake, it is appropriate to provide some comments related to this goal.

The UNRBA continues to evaluate and consider a site-specific chlorophyll-a standard for Falls Lake. The current standard was adopted in 1979 to address use support issues on the Chowan River.

The scientific data, research efforts, and an assessment of uses of Falls Lake shows no use impairment. The current standard is not appropriate for the lake because the designated uses are being met despite exceedances of the criterion in some locations. The 303(d)-assessment methodology being applied is not consistent with scientific evaluations of lake quality in NC or any reservoir environment in similar regions of the US.

Even if the UNRBA does not submit a new standard petition as part of this reexamination, the 303(d) assessment methodology should be adjusted for Falls Lake consistent with the science of using chlorophyll-a data to assess overall reservoir quality (how eutrophication is indicated for the reservoir as a whole rather than a station-by-station assessment). The 303(d) assessment methodology for Falls Lake should establish stable and consistent assessment segments based on the physical and limnologic characteristics of the reservoir. On several occasions, the UNRBA has provided comments and requests for an adjusted methodology for Falls Lake.

The data and scientific evaluations provide fundamental information about the reservoir and the watershed. The modeling and scenarios demonstrate the limitations of what can be achieved in terms of additional nutrient load reductions and attainment of the chlorophyll-a standard and the amount of time to realize changes given the soil chemistry in the watershed. Because 75 percent of the watershed is unmanaged and significant reductions in nutrient loading have already occurred since the baseline period of the Rules, additional, large-scale nutrient reductions are not likely to occur. Rather than focus on attainment of the chlorophyll-a standard, the goals of the revised strategy should be incremental improvements and long-term protection of the designated uses of Falls Lake.

The UNRBA supports an adjusted 303(d) assessment methodology and site-specific chlorophyll-a standard for Falls Lake and will continue to cooperate and collaborate with DEQ-DWR, Environmental Protection Agency (EPA), and other stakeholders on these revisions.

Consistent with established legislation, the UNRBA recommends that the NC DEQ-DWR and EMC move forward promptly with the revisions to the Falls Lake Rules taking into consideration these

consensus principles. The UNRBA does not recommend delaying rule revisions while these objectives continue to be developed and evaluated. Readoption of the Falls Lake Rules remains the first priority so ongoing implementation efforts in the watershed can proceed.

Urban Development, State and Federal Lands, and Institutional Lands

The UNRBA recommends an investment-based approach to continue improvements on existing lands. In addition to the eligible activities listed in the IAIA Program Document, stakeholders have identified the following additional activities for inclusion or consideration in the revised nutrient management strategy. **It is noted that the specifics of how to accomplish these actions will need to be considered, evaluated, vetted, and accepted before they are incorporated into the rules or operating procedures. Different communities will have different needs and constraints and may elect to implement the concepts that best support their situation. The opportunities for retrofits will also vary by jurisdiction.** It is anticipated the list of eligible projects and activities would be expanded in a similar manner allowed under the IAIA.

- Expand education activities to address SCM maintenance
  - Focus on Homeowner Association (HOA) Boards and other SCM owners
- Coordinate to fund retrofits for existing and re-development
  - Provide incentives to owners to encourage participation
  - Pay for retrofits and take over inspection and maintenance, but practice ownership would not change (e.g., Hillsborough dry ponds)
  - Evaluate use of development bonds for SCMs as a funding source for maintenance and repairs; local government would not count funds expended from the bond as part of their investment, but staff resources to identify and research bonds and their applicability would count as in-kind investment
- Improve existing stormwater infrastructure on publicly owned lands and privately owned lands under a voluntary agreement
- Improve HOA management and maintenance
  - Inspection and maintenance
  - Outflow management to ensure proper discharge (e.g., cleaning trash debris racks, preventing/repairing erosion downstream of outfalls).

Additional projects and activities will be added to this list as the revised nutrient management strategy is developed.

Opportunities for Partnering on Agricultural Lands

In the Falls Lake watershed, the acreage of land in agricultural production (crops and pasture) has declined by approximately 45 percent since 2006. Most of the operations in the watershed are relatively small and have already implemented best management practices and reduced fertilizer application rates. Many of the streams in the watershed are buffered. The revised strategy should consider the footprint of this land use and its potential for nutrient input to Falls Lake.

In 2006, land identified as agricultural was approximately 89,000 acres. For the study period (2014 to 2018), agricultural land in the watershed was approximately 50,000 acres. The estimated percent contribution of total nitrogen from this land use is 18 percent and total phosphorus is 10 percent. Nonetheless, when incremental improvement is the goal, any reduction of nutrient input is helpful.

The UNRBA recognizes the importance of supporting agriculture in this watershed to maintain its rural nature and support the local food economy. As the revised strategy is being developed, farm-supporting organizations like the NC Farm Bureau and NCDA&CS have helped the UNRBA interface with farmers and make sure we present our common interests in productive ways. The following concerns have been raised during these discussions which should be considered in the transition to rule making to ensure that the interests of all parties are protected and to provide long-term stability for planning and implementation. For some of these concerns, potential solutions were offered (shown in italics). All of these concerns will require additional discussion as rulemaking commences:

- Potential risks to farmers who have received funding from non-agricultural organizations if the structure of the Rules or the accounting methods change in the future; the farmers would have lost reduction credits to other sectors. *Regulatory certainty will need to be addressed with input from DWR; as stated in this document, agriculture would continue to track nutrient loss reductions regardless of the source of funding.*
- Different funding structures or fluctuating levels of funding could affect allocations to the local Soil and Water Conservation Districts. *Funding the Agriculture Cost Share Program with consistent levels of funding is one way to address these allocation issues.*
- Local government funds used for investment credit should be in addition to current levels (2023), so the programs are expanded. *The recommendations in this document have been modified to include a year on which increases will be based.*
- There is a risk that the legislature may reduce funding for the Agriculture Cost Share Program since more funds would be provided by local governments.
- Fluctuating contribution levels from year to year could lead to instabilities in program administration. *Representatives suggest that a recurring minimum contribution level and/or multi-year planning periods with stated commitments (e.g., 5 years like the IAIA) would be helpful for planning and staffing purposes.*
- Farmers want to continue to receive best management practice and technical assistance from existing, trusted organizations like local Soil and Water Conservation Districts. *Funding the Agriculture Cost Share Program with consistent levels of funding would continue existing procedures for funding practices and for technical assistance.*
- Depending on the level of funding increase, additional administrative work may overwhelm staff at NCDA&CS. *Allocating some percent of contributions to support staff would help this issue.*
- Farmers are concerned that their stormwater fees will continue to increase to fund this program. One farmer indicated he pays as much as $1,000 per year in stormwater fees. *By including funding of the Agriculture Cost Share Program as an eligible investment by local governments, farmers are more likely to receive direct benefits under this framework. Alternatively, the fees may increase under the revised nutrient management strategy but would fund projects like stormwater control measures on developed areas, sewer improvement projects, or land conservation.*
- Farmers are used to the existing rule structure that has been in place since 2011 and wary of change that may impact operations and regulatory burdens. Future changes in staff at regulatory agencies or changes in membership of the Watershed Organization could risk stability of the partnership. *Additional outreach is needed to build trust. Formal agreements are needed to protect all stakeholders. Inclusion of representatives of agriculture in the Watershed Organization and its bylaws and committees would solidify partnerships.*

It is always necessary in coordinating with agriculture and in working on all projects to respect the landowner's decision on participation. Since streambank erosion is a significant factor in phosphorus loading and streams normally intersect multiple landowners, farm agencies can help

facilitate coordination with farmers and large landowners on stream projects crossing multiple properties. As the following section of this document deals with forest lands in the watershed, farming-interest representatives pointed out that farmers often own large areas of forest land. Coordination with farmers on potential forest-related projects or initiatives could also be a favorable aspect of agricultural participation in a Watershed Organization.

During the Scenario Screening process, representatives of agriculture met several times with the local agricultural councils to determine if potential additional activities in the watershed could be implemented to further reduce nutrient losses from agriculture. These discussions indicated that in this watershed, additional actions would not significantly decrease nutrient losses.

While large-scale changes may not be feasible, there remain opportunities for local governments and other Tier 1 Watershed Organization members to continue to partner with agriculture. An eligible activity for a local government to meet their investment requirement under the revised nutrient management strategy could include contributing additional funds above and beyond existing investment commitments (for example 2023 levels) to support the following:

- Soil and Water Conservation District activities including soil conservation, water conservation, streambank restoration, and stormwater control measures
- Agricultural best management practices, projects, equipment, and materials
- Local technical assistance, grants, and tracking support
- Voluntary Agricultural Districts (allows for Enhanced Voluntary Agricultural Districts to protect farms from development for 10 years)
- Conservation Reserve Enhancement Program
- Farmland Preservation Program

The most efficient means to provide this funding to agriculture is to utilize existing organizations and programs. For example, the Agriculture Cost Share Program is currently administered by NCDA&CS who coordinates and allocates funding to the local soil and water conservation districts. Utilizing this existing structure minimizes change in current administration of these programs and would rely on their existing decision-making frameworks.

The representatives of agriculture also indicated that they would prefer to maintain their own tracking and reporting systems for production acreages, nutrients applied, cost-share funding, projects implemented, and nutrient loss reductions. The agricultural community has invested a tremendous amount of time and resources into the Nitrogen Loss Estimation Worksheet (NLEW) which was developed by researchers at NC State University Extension. The UNRBA supports the agricultural community conducting its own tracking and reporting, which would be supplemental information to the investment-based compliance metrics under the revised nutrient management strategy. When projects have a method for quantifying nutrient reductions, agriculture would track these projects and reductions in their reporting. Representatives of agriculture indicate they may want to separately track joint projects (with funding support from others) and agriculture-only projects.

The UNRBA is not recommending nutrient reduction or investment regulatory requirements be placed on the agricultural sector, either collectively or individually. The UNRBA proposal is to work cooperatively with agriculture to identify where investment from local governments and other Tier 1 Watershed Organization members could support projects, technical assistance programs, and reporting. This approach would allow the Tier 1 members to work toward their own investment requirements while supporting agriculture in the watershed and allowing agriculture to maintain its autonomy.

The representatives from agriculture that participate in UNRBA meetings and workgroups have noted that an expanded outreach effort is needed as the revised strategy is developed. These representatives (Farm Bureau and NCDA&CS/DSWC) have begun these discussions to gage farmer interest in these concepts and offered to continue these discussions as rule making progresses. The UNRBA would provide support to these discussions as requested and directed by the agricultural representatives.

Forest Lands

Forest lands comprise approximately sixty percent of the Falls Lake watershed. Forests are an important part of a healthy ecosystem as they store, cycle, and release nutrients. Atmospheric deposition in dry and wet forms provides continual inputs of nitrogen, phosphorus, and carbon to all land and water surfaces including forested areas. Natural breakdown of forest debris contributes nutrients to the system. Many stakeholders have expressed the importance of preserving and protecting forested areas in the Falls Lake watershed.

Sediment, nutrient, and carbon loading rates from forests are heavily influenced by hydrologic conditions. Antecedent conditions are important to consider as a dry forest will hold more rainfall than a saturated forest. Destructive storms that disturb the root zone of trees can result in much higher loads of nitrate for an extended period of time (Yeakley et al. 2003, Schaefer et al. 2000, Hogan et al. 2020).

Researchers in Norway are evaluating change to atmospheric deposition of nitrate and sulfate on changes to the biogeochemical processes in forested areas (Deininger et al. 2020). Their findings indicate that "declining sulfur deposition, through reducing the ionic strength in soil water, increases the solubility and mobility of organic soil compounds and may result in increased leaching of organically bound N [nitrogen] to freshwaters." Similar observations of decreased inorganic nitrogen loads coupled with increased organic nitrogen loads were noted in DWR's 20-yr status report for the Neuse and Tar-Pamlico Estuaries (DWR 2023, draft).

Based on the work of the Scenario Screening Group, there are projects and activities that can be implemented to reduce nutrient inputs and exports from forests. The UNRBA recommends that these activities be considered as eligible under the revised nutrient management strategy. Again, the UNRBA does not recommend that these would be regulatory requirements, but rather opportunities for local governments and other Tier 1 Watershed Organization members to invest in activities that would improve water quality and quantity. The first three bullets are currently included in the IAIA Program; the remaining bullets represent an expansion of the Program:

- Forest preservation
- Stream, wetland, and buffer restoration/enhancement
- Floodplain expansion
- Enhancement of Forestry Best Management Practices: stream crossings, haul roads, temporary skid trails, etc.
- Consideration of water usage by tree species in forestry management
- Nitrate capture/denitrification following large, destructive storms through temporary active treatment or passive treatment to enhance denitrification in an improved hyporheic zone
- Controlled burns, harvesting, forest management, vegetation management (native/non-native)
- Phytoremediation (using plants to clean up contaminated environments)

While there are contiguous areas of forests in the watershed, these typically are fractured in terms of ownership. Projects and activities that affect multiple owners will complicate implementation. The Watershed Organization would need to foster relationships with the associations listed and other

groups, including agricultural organizations (since a lot of forest land is on land that includes farming activity.)

As the UNRBA continues to develop the revised nutrient management strategy, stakeholder engagement will be expanded to include the NC Forest Service, NC Forestry Association, and other forest management organizations. Representatives of agriculture have existing working relationships with these associations and have offered to support this outreach. One suggestion has been to fund the NC Forest Service Forest Development Program that provides financial support to replant trees after harvesting or when agricultural production has ceased. As with the Agriculture Cost Share Program, this approach would fund existing organizations who have established administrative procedures, decision-making, and fund-allocation processes.

Streambank Erosion

Stream bank erosion is a significant contributor to the sediment and total phosphorus loads delivered to Falls Lake. Streams may become unstable following channelization, changes to land use, increased impervious surfaces, and changing hydrology. Stream restoration and/or infiltration of stormwater can be implemented to regain stability.

Based on the UNRBA WARMF watershed model, approximately 15 percent of the total phosphorus load to Falls Lake comes from streambank erosion. At the scale of the Falls Lake watershed, the model does not account for previously implemented stream restoration projects or site-scale conditions. While there is uncertainty with the stream bank loading estimates, their relative magnitude compared to other sources indicates opportunities for pollutant reductions (Figure 8).

The UNRBA is not proposing any specific regulatory requirements or projects associated with stream bank erosion, but rather allowing the local governments and other Tier 1 members to fund these projects as an eligible activity. The proposed activities associated with streambank erosion are currently allowed by the IAIA Program:

- Stream, wetland, buffer restoration/enhancement
- Floodplain expansion

Streambank erosion represents a truly “distributed” nutrient source in the watershed. The basin has many miles of streams and rivers. Streams and rivers cross multiple property and jurisdictional boundaries which will complicate implementation of this practice. Many organizations and researchers have studied stream bank erosion in the Falls Lake watershed including City of Durham, USGS, and researchers at NC State University. As a result of the UNRBA modeling study, the NC Collaboratory has recently funded a study to identify hot spots of streambank erosion and potential restoration activities that reduce potential of erosive flows that contribute to streambank erosion. The City of Raleigh is also working with USGS on a streambank erosion study.

Atmospheric Deposition and Climate Resilience

Atmospheric deposition of nitrogen, phosphorus, and carbon affects all land uses and waterbodies, including Falls Lake. While this deposition is a natural process needed to cycle nutrients through the environment, human sources of air emission impact atmospheric concentrations of pollutants, and remote air pollution sources move into the watershed based on weather and prevailing winds. This source may provide an opportunity for reducing the amount of nutrients deposited to the system each year.

According to DWR’s 2021 Status Report for Falls Lake, atmospheric deposition of nitrogen has declined by approximately 20 percent since the baseline period. Improvements to air quality

globally, regionally, and locally have contributed to this reduction. Estimates of reduction since baseline vary annually because the amount of rainfall influences the amount of wet deposition.

Changing weather patterns are important to consider as well. Large storms not only result in greater rates of deposition as direct inputs, but they also erode soil, disturb root systems, and increase runoff volumes and shallow ground water inputs to streams. Drought conditions at critical times can concentrate nutrients near the land surface and when rainfall occurs, wash larger loads of nutrients into waters when algal activity can be stimulated. Warmer temperatures for longer periods can cause biological, chemical, and ecological changes. Together, these factors can result in greater nutrient loading, increased algal growth and species shifts, and impact to downstream waterbodies. Therefore, the revised rules should promote projects and activities that are resilient, effective, and sustainable to provide long-term protection of the lake and the watershed.

The UNRBA recommends that the revised nutrient management strategy employ a systems-based approach that will require looking beyond the actions of individual landowners and facility operators. Tier 1 members could fund the following projects and activities to support this holistic effort. The first three bullets are currently included in the IAIA Program; the remaining bullets represent an expansion of the Program:

- Green infrastructure/infiltration devices
- Floodplain restoration and reconnection
- Projects and activities that focus on flooding that have an associated water quality benefit
- Farmer and forest landowner voluntary conservation work which can significantly contribute to climate solutions and offer many other ancillary benefits including soil health, water quality, and pollinator and wildlife habitat within the watershed.
- Climate sustainability and resiliency projects for water/wastewater/stormwater infrastructure (e.g., elevating key operational equipment like pumps at wastewater treatment plants to mitigate the risk of failure due to flooding)
- Tree planting adjacent to busy streets and highways, e.g., the Center for Watershed Protection Forest- Friendly Codes and Ordinance Worksheet and the Wake County Land Cover Analysis and Tree Canopy Assessment that provides tree-planting priorities by municipality
- Air pollution reduction technologies for point source and vehicle emissions
- Public transportation and green energy sources
- Flood preparedness communications (e.g., operations at watershed impoundments)

Distributed Wastewater Sources

In terms of the total nutrient load delivered to Falls Lake, distributed wastewater sources contribute a minor fraction of the load. Distributed wastewater sources include septic systems, discharging sand filter systems, and sanitary sewage releases. However, the smaller tributaries and headwaters may benefit from projects and activities that reduce nutrient loading. From a public health perspective, these projects and activities can be very beneficial.

The UNRBA does not recommend regulatory requirements in the revised rules for private landowners; however, local Health Departments may require private owner action due to violations of local and state health law and rule. The UNRBA recommends that Tier 1 members work toward their investment requirements by continuing to provide funding and technical assistance to support improvements. The activities listed below are currently included in the IAIA Program and should continue to be eligible under the revised rules:

- Address sanitary sewer overflows (SSO) and sewer exfiltration

- Continue to implement measures that reduce volumes reaching the stream
- Continue to identify and repair potential issues
- Develop grant programs for addressing failing sewer lateral lines

- Address failing on-site wastewater treatment systems (OWWS) and failing discharging sand filters (DSF)
  - Continue to conduct state-mandated operation and maintenance (O&M) inspections to proactively reduce failure rates, investigate and repair malfunctioning systems, prioritize inspections in older neighborhoods, and provide grant programs to subsidize homeowner costs for new systems/repairs
  - Continue to allow credits for connecting onsite systems to sewer systems
  - Consider that expanding sewer may reduce the number of onsite systems but will increase development intensity and impervious surfaces
  - Address regulatory issues with State-issued new permits for DSF
  - Consider financial assistance for system repair or connection to regional wastewater systems to address failing systems.

Point Sources (Major and Minor)

As noted in the "Key Findings from the Monitoring and Modeling Studies," major and minor WWTPs contribute approximately six to ten percent of the total nitrogen load and three to six percent of the total phosphorus load delivered to Falls Lake. One reason these relative contributions are comparatively small is that the three largest dischargers have reduced their collective total nitrogen and total phosphorus loads by 57 percent and 73 percent, respectively, from the 2006 baseline (DWR 2021). Further reductions to nutrients discharged from the major facilities would be extremely expensive and energy intensive. Some of the minor facilities have also achieved significant reductions from the baseline period.

These relative contributions are based on actual discharges from each facility. None of the three major facilities are currently discharging at flows as high as their permit limits. The revised nutrient management strategy will need to address the potential for future facility expansions.

Based on the cost of additional facility upgrades relative to the percent contribution of delivered nutrient loads from WWTPs, the UNRBA is not recommending additional regulatory requirements for the WWTPs in the watershed beyond what has already been achieved. Major and minor wastewater treatment plant owners should continue to optimize treatment performance using currently installed technologies. Review of plant performance should be included as a provision of the 25-year review. Plant and collection system owners should continue to track emerging technologies that may become technically and financially feasible in the future for further improvements to plant operations including biosolids handling. Work should continue to identify and eliminate exfiltration from sewer lines and sanitary sewer overflows.

The revised rules should incorporate requirements for new wastewater treatment facility requests or expansion requests including provisions for technology upgrades, joint-compliance permits (e.g., the Lower Neuse Compliance Association's permit), nutrient offsets, and/or nutrient credit trading using practices on managed lands.

Additionally, the UNRBA recommends that Tier 1 members have the opportunity to fund upgrades and improvements to reduce nutrient discharges from minor WWTPs serving low-income households

in the basin. Technical support to improve operations would also be eligible to meet the investment requirements described by the proposed strategy. The minor facilities are a very small percentage of the load to Falls Lake (one percent or less), but improvements at these facilities would contribute to incremental progress in the watershed.

New Development

The UNRBA proposes that the new development rules would mostly continue as currently prescribed in the Falls Lake Nutrient Management Strategy. Proposals to make slight modifications to these rules have been discussed at UNRBA meetings. One example is possibly waiving the requirement for a stormwater assessment by a professional engineer when family property is parceled and inherited by heirs. Another example is to evaluate the nutrient-related allowances and post-development nitrogen and phosphorus exports that are inherent to the currently-accepted exclusive use of low impact development (LID) criteria, as specified in the 2009 North Carolina Low Impact Development Guidebook to ensure that development meets both the hydrologic goals of LID and the water quality improvement goals for Falls Lake.

Additional activities that would support implementation of the new development rules and address concerns with land disturbance are proposed as eligible activities under the revised nutrient management strategy:

- Include joint consultation among watershed organization members to assess and document consistent application of new development requirements,
- Consider changes to Unified Development Ordinances to allow flexibility in implementing beneficial practices and activities.
- Incentivize green infrastructure, disconnected impervious services, soil improvement, low maintenance lawns, etc.
- Revisit soil improvement practice with NC Division of Energy, Mineral, and Land Resources (DEMLR). This practice is currently creditable only for existing development but is most beneficial for new development.
- Adopt policies allowing stormwater treatment within street rights of way or other easements.
- Encourage, partner, and incentivize larger, regional SCMs that treat upstream existing development and the new development for which new SCMs are being permitted.
- Improve information transfer from developers to HOA Boards.
- Build from current jurisdictional approaches including current inspection programs, enforcement programs, etc.
- Coordinate workshops among members to share information about existing programs and best practices.

Transfer Responsibility of SCMs to Local Governments (Not Recommended)

One suggestion proposed that stormwater systems be transferred into true utilities where existing and new SCMs would be placed under the jurisdiction of the local government. This migration would transfer the systems to the local governments so HOAs and private owners would not be tasked with maintaining them. Several issues were identified as reasons this approach would not be feasible or successful. These notes are included in this document as the UNRBA anticipates this suggestion will be posed again in the future.

- There are thousands of existing SCMs with new ones added regularly.
- Local stormwater programs are already underfunded and understaffed; the workload associated with managing and maintaining thousands of SCMs would be overwhelming.

- Fee increases to provide resources for this action would be large in most jurisdictions and very large in some. Increasing taxes and fees is already challenging, and approved rates are often less than originally proposed. Increased funding through additional taxes and fees could not be expected to provide the staffing levels needed. This approach also transfers the cost of maintenance to all rate payers, including low-income households.

The jurisdictions operating the local government stormwater programs (inspections, education, maintenance, and enforcement), indicate the current approach is the most efficient way to handle SCMs operation and maintenance. For these reasons, the UNRBA does not recommend transferring stormwater systems into utilities operated by the local governments.

Program Administration

Preliminary discussions by the UNRBA members and its advisors are leaning toward establishment of a watershed organization (to be named later). This "Watershed Organization" would include the local governments and utilities that currently comprise the UNRBA as well as other potential partners as described above. Formation of a Watershed Organization would occur as outlined in State law (NCGS 143-214.14). To allow for administration of the Program(s) managed by this organization, it would likely need to register with the State of NC and adopt Bylaws to establish the governance of the Watershed Organization and administer the revised nutrient management strategy. The State of NC would need to delegate authority to the Watershed Organization to implement the revised strategy. Establishing a Watershed Organization to coordinate compliance provides a clear line of communication with the membership and the regulatory agency.

The Collaboratory is funding a study to examine the legislative requirements and operational constraints that may apply to the Watershed Organization. As the rules revision process proceeds, the UNRBA will be working with the Collaboratory, Mr. McLawhorn, the UNRBA legal group, and UNRBA's legal advisor to ensure that State and Federal statutory and regulatory requirements are met.

The Bylaws of the Watershed Organization will need to address the following elements:

- Organizational structure including committees
- Voting and decision making
- Annual administrative dues
- Adding members to the program
- Member resignation and termination - members that resign or are terminated will need to make arrangements with DWR to demonstrate compliance under an alternate framework; it will be the responsibility of the member leaving the program to contact DWR and to determine the actions they need to take to meet these requirements
- Revisions to minimum annual investment amounts
- Joint-funding of special projects)
- Definition of Tier 1 and Tier 2 members; flexibility to add additional member tiers as the program evolves

Participation in the Program will need to be confirmed by the Bylaws of the Watershed Organization, adoption of the program document for the revised strategy, and submission of a resolution of commitment by the members of the Watershed Organization.

Proposed Structure of the Watershed Organization

The preliminary concepts for the new Watershed Organization are to establish two membership tiers. Tier 1 would include local governments, state and federal agencies, and utilities that would have specific requirements under the revised nutrient management strategy. These requirements would likely be investment-based (cash and in-kind) as under the current IAIA Program. Internal and external stakeholders, including staff from DWR and environmental advocacy groups, indicate they would like to see this approach continued under the revised strategy. Tier 1 members would be responsible for funding projects and activities as well as administration of the program. Administrative costs could include meeting coordination and development of meeting materials, compiling annual reports from members, generating a summary report for submittal to DWR, providing technical advisory support, and answering questions about the program from members of the Watershed Organization, regulatory agencies, elected officials, and the public.

Tier 2 members would not have specific requirements under the revised strategy. Their participation would be strictly voluntary. Tier 2 members would be potential partners in the implementation of practices and actions that improve water quality and quantity across the watershed. Tier 1 members would coordinate with and support Tier 2 members to identify and, if appropriate, implement projects across a wide range of land uses and nutrient sources. Funds from Tier 1 members may also be used by Tier 2 members to support reporting and tracking efforts as well as technical assistance programs. Tier 2 members would receive the benefits of investments from Tier 1 members but maintain their own tracking and reporting.

Tier 1 and Tier 2 members would maintain control of actions affecting their lands and interests and provide oversight by leading committees within the Watershed Organization that are focused on their area of responsibility. For example, a committee established to identify opportunities for supporting agriculture in the watershed would be led by representatives from agriculture. The same approach would apply to NC DOT.

As with the IAIA, it is not anticipated that the new Watershed Organization will receive or manage funds from members investing in their own projects, or on projects undertaken by agreement with other participants or other organizations. The current IAIA provides for the funding of "special" projects coordinated through the UNRBA, and the Bylaws for the Watershed Organization should address this potential. As envisioned currently, participating members would develop the necessary agreements and track and report individual and joint contributions. Participants would directly provide the investment funding or support to successfully complete projects and maintain appropriate project files for future reference. Project plans and specific information related to design, installation, operation, and maintenance would not have to be submitted to DEQ but should be kept on file by the participants in accordance with their file retention practices.

Investments

Investments in eligible projects and activities may be "cash" or in-kind (e.g., self-funded projects, donation of technical-service hours, or use of equipment). Individual members will provide annual reports to DEQ that identify each project and the investment amount (for multi-year activities/projects, the participating member will show a total investment and note the projected investment for the coming years). On the basis of these reports, the Watershed Organization will provide a summary report to DWR and to the membership on total participation and total investment.

As envisioned currently, each participant may allocate resources using one or more of four funding options. Participants can use a combination of project funding approaches and can change which funding options they utilize from year to year. Investment credits generated from multi-partner

projects shall be credited to the partners based on individual participant contribution levels including accounting for long-term operation and maintenance costs. The project agreement may provide other allocations for investment credits. The four funding options are listed below:

- Self-funded – An individual participant may use funds for eligible projects and activities within and managed by their own organization.
- Interlocal agreement – Individual participants may enter into interlocal agreements in which eligible projects and activities are jointly funded by two or more jurisdictions.
- Funding existing local organizations - Individual participants may contribute funds towards eligible projects or activities to other local organizations including local Soil and Water Conservation Districts, County Health Departments, School Districts, watershed improvement associations, land conservation groups, and Tier 2 members that do not have investment requirements that may implement projects to improve water quality. The receiving local organization is responsible for prioritizing and selecting from the list of eligible projects and activities under their established procedures for setting priority. Use of funds by other local organizations is limited to projects and activities associated with water quality and watershed improvement benefits. A separate agreement/contract may be required to specify use of funds by other local organizations. Local government funding of agriculture-related projects is discussed in the section called "Opportunities for Partnering on Agricultural Lands."
- Development of a special project– individual participants may contribute to a special project as would be described in the bylaws. These projects would involve the Watershed Organization to manage the project and coordinate the project development steps. Project management subcontractors may be necessary if projects are complex or large. Joint funding would have to cover project management costs, either as managed by the Watershed Organization or by a contractor. The Watershed Organization would likely recommend that the two or more members participating in a proposed special project consider the alternative of a joint project through an interlocal or other type of acceptable agreement. Special projects must fall under the approved list of project types provided in the latest version of the program document.

If a local government receives grant funding for an eligible project, only the investment from the local government(s) used to contribute a match to the project may be counted toward their annual investment commitment under the program (i.e., the grant award may not be counted). It is the responsibility of the participant(s) to ensure that the requirements of the grant are met.

Minimum annual investment commitments for the Tier 1 members will be negotiated during the rules review process and specified in the program document for the revised strategy. Tier 1 members will be responsible for their assigned annual commitment, and if financial resources are made in excess of the annual commitment, the excess may be credited against the member's future years commitment. Each member will have the option to withdraw from the program in accordance with the bylaws of the Watershed Organization as long as an alternate compliance framework is agreed upon by DWR prior to withdrawal. Alternate compliance frameworks may be specified in the revised rules but are not included in this document.

Duration

The revised nutrient management strategy for Falls Lake will be a long-term plan to improve water quality and quantity. Based on stakeholder input, the UNRBA proposes a 25-year program with interim evaluations of success and potential areas of improvement as part of an adaptive management program. The UNRBA recommends that the rules not include the specifics of the program because it will be extremely difficult to use adaptive management provisions. An approved program document referenced by the rules with specific renewal periods (e.g., five years) would be a

more reasonable and adaptative approach. This approach is similar to the IAIA where the Stage I Existing Development Rules reference the IAIA Program Document as the joint-compliance approach.

The initiation date of the revised nutrient management strategy will be determined by the readoption of the Falls Lake Rules which must be achieved in accordance with Session Law 2018-5. This session law specifies that the EMC must begin rule re-adoption no later than December 31, 2024. It is anticipated by DWR that readoption of the rules will occur no later than 2027. The current IAIA program has an initial 5-year investment commitment. The program began on July 1, 2021, and is scheduled to end on June 30, 2026. Depending on the status of rule readoption, the IAIA program may need to be renewed to continue compliance with the Stage I Existing Development Rule. Implementation of the revised strategy will need to take into consideration the status of the IAIA.

Previous and ongoing nutrient reduction activities and projects, including those implemented prior to and under the IAIA will be credited as actions, investments, and/or reductions in the revised strategy. The UNRBA and its members are committed to making sure that projects and activities implemented prior to readoption of the rules are included in the framework for compliance with the readopted Falls Lake Nutrient Management Strategy.

Reporting

Annual reports would be submitted by each Tier 1 member to DWR. These annual reports will list all eligible projects and activities implemented under the program and include an assessment of compliance with respect to minimum investment requirements. Copies of annual reports will be provided to the Watershed Organization for tracking and summary purposes. The Watershed Organization will provide a summary report each year to DWR that summarizes the total investments and commitments for the previous fiscal year. Annual reports from Tier 1 members would be submitted to DWR (with copy to the Watershed Organization) by September 30th following the end of each fiscal year. A summary report based on the individual reports would be generated for consideration by the Watershed Organization at their following meeting in November with submittal to DWR by November 30th.

Regardless of the type of funding arrangement used to demonstrate participation under the revised strategy, each Tier 1 member will need to report, in accordance with the program document, the following types of information depending on the funding option utilized (i.e., as information is available). A template for reporting has been developed to support the IAIA Program and can be modified to support this expanded program:

- Funding option and partners
- Primary organization responsible for management and distribution of funds
- Types and locations of projects and activities planned and linkage to addressing water quality in the watershed and the Lake
- Status of projects and activities (e.g., permitting, construction, completion status)
- Funds allocated (cash and in-kind)
- Estimated nitrogen and phosphorus reductions associated with projects and activities if quantifiable, or other tracking metric, based on the information available for the action/project, for activities without State-approved nutrient credits (e.g., acres conserved, linear feet of pipe repaired). Nutrient credits determined and based on approved crediting methods effective at the time the project is planned, designed, and developed that may be needed for any future credit accounting requirements will not be decreased at a later time based on revisions to credit accounting methods or assumptions. **Note that for projects related to agriculture, Tier 1**

members may include their investments in their tracking reports, but the estimated nutrient reductions associated with the projects will be maintained in the agricultural reporting system.

- Anticipated timeline for completion

As noted previously, the primary reporting and compliance assessment metric will be based on investments. Actions and projects with State-approved nutrient reduction credits would continue to be tracked and reported in annual reports for informational purposes. Representatives of agriculture would continue to maintain their tracking methods and reporting for agricultural production and nutrient losses.

In addition to the annual reports, interim reports (e.g., every five years) will be developed summarizing the previous period of implementation. Interim evaluations and reporting can address concerns and assist with tracking trends and accomplishments during the 25-year assessment period. Challenges that arose during the preceding five years will be noted and revisions to the program suggested as needed. DWR's assessment of water quality and nutrient loading to Falls Lake in their five-year status reports will be summarized as well. Water quality conditions in other impoundments in the watershed will also be summarized. Additionally, these interim reports will be used to identify and track questions and issues that need to be considered in the full reassessment. These interim reports would be submitted by the Watershed Organization based on information and discussions with members and partners including DWR. Interim assessments provide an opportunity to revise the program to address challenges, concerns, and new technologies. Changes and modifications to the program may be considered by the Watershed Organization and DWR. As with the IAIA, the five-year report will also be used to reaffirm commitments of participating jurisdictions and support their capital improvement project planning. Members who choose not to participate in the program for the following years would negotiate a compliance framework with DWR. Alternative compliance frameworks may be developed during the rules review process and included in the revised rules.

The UNRBA recommends the revised strategy include a long-term reassessment of the program (e.g., 25 years) to evaluate performance, identify necessary program changes, and consider evolving technologies and climatological conditions. It is anticipated that the Watershed Organization would coordinate this review process and include a technical assessment of water quality conditions to help guide the readoption of the program with appropriate revisions as part of the reevaluation. The technical assessment would review monitoring data collected by DWR and other organizations and may recommend collection of additional monitoring data. The technical assessment may also require modeling support to assess proposed changes to the program. DWR and the Watershed Organization will work cooperatively to provide the data needed to support the evaluation. To prepare for this assessment, the Watershed Organization could hire a contractor to develop a monitoring plan and other supporting guidelines for the collection and analysis of data, including modeling as needed. DWR would work in conjunction with the Watershed Organization to develop this assessment process and would provide support in the collection of additional data. This adaptive management provision provides a reasonable period of time to assess the program and to determine if changes are needed for the future. Planning for this report and supporting studies should begin no later than 20 years after the start of the program.

Compliance Determination

The revised nutrient management strategy will likely be submitted to the NC EMC as a joint compliance framework for the continued improvement to water quality and quantity in the Falls Lake watershed. Compliance will likely be determined based on the Tier 1 members meeting and reporting on their annual investment levels as specified in an approved program document. This approach is consistent with EPA's Integrated Planning for Municipal Stormwater and Wastewater

which “allows a municipality to balance Clean Water Act requirements in a manner that addresses the most pressing public health and environmental protection issues first.” To better align with the requirements of the Integrated Planning Program, NPDES permit holders may need to reference this approach in their permit.

The revised program will likely be a joint compliance effort, but compliance under this program will be assessed individually for each Tier 1 member. An approved program document will be developed with this understanding and with the following basic provisions for demonstrating compliance:

- Each Tier 1 member must document and track investments and eligibility of funded actions or projects and submit annual reports to DWR (with copies provided to the Watershed Organization).
- A member’s adherence to the provisions of the program represents compliance with the readopted Falls Lake Rules.

If a Tier 1 member resigns or is terminated under the provisions of the Bylaws, the following is a list of guidelines related to the impacts and actions that the departing member must address or that will impact the member in departing:

- Reentry to the program can only be considered under the membership provisions of the Bylaws
- It is the responsibility of the departing member to contact DWR and to determine the actions it must take and the schedule it must follow to comply with the readopted rules
- The member must address specific program commitments made when joining the Watershed Organization as described in the Bylaws including agreements with other members on joint projects

The group as a whole is not out of compliance if a member drops out.

Financial resource commitments of the departing member for any joint projects not yet completed would be controlled by the agreement in place between the joint project members that developed the joint project.

The total investment level will change in the fiscal year following the departure or addition of a member by the amount of the commitment assigned to the member, but the remaining members investment commitments will not be revised.

Projects can be implemented anywhere in the watershed through this program. Additionally, the provisions of 15A NCAC 02B .0703 Nutrient Offset Credit Trading do not apply to existing land uses and therefore do not apply to the revised program.

Demonstration of compliance can be accomplished with a brief description of relevant programs or activities being implemented (e.g., heightened permitting or land use requirements, education programs, recurring program expenditures) by the applicable jurisdictions and are considered eligible practices under the program. This information will be provided by the participant in their individual annual report provided to DWR.

Participants should ensure that all local, state, and federal requirements under their jurisdictional control are met. These include but are not limited to water supply watershed protection, buffer rules, MS4 permits, and sediment and erosion control requirements. In determining whether to be the host jurisdiction (where the project would be located) for an SCM project, the host jurisdiction should be alert to the requirements of other permit programs and determine, in consultation with the Division of Energy, Mineral, and Land Resources, if the SCM will become a part of the MS4 inventory of local government owned facilities.

Proposed Legislative Changes

The NC Collaboratory is funding a study to evaluate potential changes to the Falls Lake Rules that would allow for a more collaborative, system-based approach to nutrient management in the watershed. The UNRBA is working with the lead author of this study, Dan McLawhorn, to better understand existing legal constraints on its proposals and where legislative changes may be required. A link to the presentation on this topic at the 2023 Falls Lake Nutrient Management Study Symposium hosted by the NC Collaboratory is available here. The UNRBA will begin developing recommendations for potential rule changes after its December 2023 submittals and will coordinate this effort with DWR. Rules will be amended to be consistent with the General Statutes and Session Laws which apply to the program.

Status of the UNRBA Recommendations

This Concepts and Principles Document was developed based on input from the PFC and the Board of Directors as well as input from external stakeholders, including staff from DWR and representatives from agriculture, DOT, and NGOs. These discussions identified several program components to guide development of the revised Falls Lake Rules. Many of the program components identified are designed to promote flexible implementation of the rules.

Feedback provided to date supports the inclusion of significant flexibility in the revised strategy. Much of the existing land use or non-point source components of the revised rules need to be built on the submission of joint compliance plans for approval. This flexibility needs to provide for the opportunity to revise programmatic components of the efforts under the existing land use provisions of the strategy. Because the proposal is looking at a 25-year implementation period with planning for data analysis and potential additional data collection and modeling beginning by year 20, it is clear that the rules will not be open for change for a long period of time. Operational activity and the need for adjusting program components will likely arise before the formal assessment of the strategy. If the program is prescribed in the rules, revisions will be extremely difficult to manage. An approved program document referenced by the rules would be much more reasonable and adaptative.

This Concepts and Principles has been distilled into an updated set of Consensus Principles (called Consensus Principles II) for consideration by the governing bodies of the UNRBA members (e.g., county commissioners, town councils, city councils, utility boards). Once the individual governing bodies have signed the Consensus Principles II and endorsed the UNRBA recommendations for the revised nutrient management strategy, the UNRBA will submit these documents to the EMC and DWR by December 2023.

As the rules readoption process unfolds, discussions among UNRBA members and other external stakeholders will continue. Additional recommendations and responses to stakeholder feedback will be considered during this process.

To provide your input on this document, please email
Forrest Westall, UNRBA Executive Director: forrest.westall@unrba.org

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Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-235-
Submitted by: Chris Glass
Submitting Department: Engineering
Meeting Date: October 3, 2023

SUBJECT
Providing update to the US 1 Traffic Study at S Main Street and Burlington Mills Road intersections, executed by Exult Engineering

Recommendation:
Engineering Department will present to the Board the final results of the traffic study performed by Exult Engineering for US 1/South Main Street and Burlington Mills intersections.

Item Summary:

ATTACHMENTS
- Summary_FINAL Draft US 1 Traffic Study.pdf
- FINAL US 1 Traffic Study Appendix.pdf
- FINAL US 1 Traffic Study Report.pdf

Agenda Item: Providing update to the US 1 Traffic Study at S Main Street and Burlington Mills Road intersections, executed by Exult Engineering.

Summary: The Town hired Exult Engineering to perform a study evaluating the intersection operations at South Main Street/Falls of Neuse Road and Burlington Mills Road/ US 1 intersection. The study evaluated the existing and future traffic operations of these two intersections looking at a 3% annual growth rate applied to the existing traffic volumes to determine 2035 traffic conditions, making recommendations for needed roadway, safety, and operational improvements.

Five build Alternatives were developed as an interim solution for the future NCDOT U5307 project, helping address traffic and safety concerns at these two study intersections.

Each of the alternates time reductions to the existing conditions and future build out to 2035 are shown on page 7-10 of the study and future traffic safety predictions are shown on page 18.

Exhibits are shown on page 34,38, 45, and 50-52 of the study. Preliminary cost summaries are as shown below with more detailed cost estimates displayed in the Appendix attachment.

Total Engineer's Option of Probable Construction Cost
Alternative Total Estimated Cost
Alternative 1 $45,036,650.00
Alternative 1a $24,969,090.00
Alternative 2 $40,438,000.00
Alternative 2a $19,347,195.00
Alternative 3 $11,909,750.00

The results presented in the study are as followed, ranking the alternatives from overall lowest delays to highest delays:

1. Alternative 1 – converting both intersections to RRCI's and widening Capital Boulevard
2. Alternative 2 – constructing traditional turn lane improvements at both intersections and widening Capital Boulevard
3. Alternative 1a – converting both intersections to RRCI's without widening Capital Boulevard

4. Alternative 2a – constructing traditional turn lane improvements at both intersections without widening Capital Boulevard
5. Alternative 3 – converting the intersection with Burlington Mills Road to a RRCI without widening Capital Boulevard, and no improvements to the intersection with South Main Street.

Additional synchro models and other data will be provided upon request.

Attachment: Attachment_A_FINAL Draft US 1 Traffic Study Report
Attachment_ B_ FINAL Draft US 1 Traffic Study Appendix

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 1400' South of South Main St to 1000' North of South Main St
Typical Section Existing 4-lane w/ median to 6-lane w/median, with Reverse RCI improvements
Plan Sheet # Figure 9
Prepared By: Exult Engineering Date 6/30/2023
Requested By: Town of Wake Forest Date 6/30/2023

CONSTR. COST
$12,262,000

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 530,000.00	$ 530,000.00
			Construction Survey	1.0	LS	$ 215,000.00	$ 215,000.00
			Clearing and Grubbing	7.5	Acre	$ 40,000.00	$ 300,000.00
			Grading	1	LS	$ 1,000,000.00	$ 1,000,000.00
			Drainage (Existing Location Widening - C&G Section)	0.5	Miles	$ 750,000.00	$ 337,500.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.5	Miles	$ 800,000.00	$ 400,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	14,250	SY	$ 110.00	$ 1,567,500.00
			Pavement Resurfacing	32,500	SY	$ 30.00	$ 975,000.00
			1'-6" Concrete Curb and Gutter	4,300	LF	$ 20.00	$ 86,000.00
			2'-6" Concrete Curb and Gutter	3,900	LF	$ 25.00	$ 97,500.00
			4" Concrete Sidewalk	1,700	SY	$ 40.00	$ 68,000.00
			5" Monolithic Islands	2,200	SY	$ 90.00	$ 198,000.00
			Guardrail	1,100	LF	$ 25.00	$ 27,500.00
			Guardrail Anchors	4	Each	$ 5,000.00	$ 20,000.00
			Erosion Control	6.5	Acres	$ 40,000.00	$ 260,000.00
			Traffic Control (Widening on Existing)	1.3	Miles	$ 300,000.00	$ 390,000.00
			Signage	1.0	LS	$ 85,000.00	$ 85,000.00
			Thermo and Markers (Highway and Urban Area)	1.3	Miles	$ 100,000.00	$ 130,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ South Main Street - Upgrade	1	LS	$ 515,000.00	$ 515,000.00
			2 U-Turn Bulbs	1	LS	$ 360,000.00	$ 360,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 100,000.00	$ 100,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 3,000,000.00	$ 3,000,000.00
			Contract Cost ……..	……..			$ 10,662,000.00
			E. & C. 15% ……..	……..			$ 1,600,000.00
			Construction Cost ……..	……..			**$ 12,262,000.00**

Note: Right-of-Way and private utility costs are not included in the estimate above but are included in overall summary

The Engineer has no control over the cost of labor, materials, or equipment, or over industry Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs, as provided here, are made on the basis of the Engineer's experience and qualifications and represent the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from opinions of probable cost.

Preliminary Estimate

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 1500' South of Burlington Mills Rd to 1500' North of Burlington Mills Rd
Typical Section Existing 4-lane w/ median to 6-lane w/median, with Reverse RCI improvements
Plan Sheet # Figure 11
Prepared By: Exult Engineering Date 9/18/2023
Requested By: Town of Wake Forest Date 9/18/2023

CONSTR. COST
$12,982,650

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 550,000.00	$ 550,000.00
			Construction Survey	1.0	LS	$ 225,000.00	$ 225,000.00
			Clearing and Grubbing	9.5	Acre	$ 40,000.00	$ 380,000.00
			Grading	1	LS	$ 1,100,000.00	$ 1,100,000.00
			Drainage (Existing Location Widening - C&G Section)	0.3	Miles	$ 750,000.00	$ 225,000.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.6	Miles	$ 800,000.00	$ 480,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	13,000	SY	$ 110.00	$ 1,430,000.00
			Pavement Resurfacing	30,500	SY	$ 30.00	$ 915,000.00
			1'-6" Concrete Curb and Gutter	2,820	LF	$ 20.00	$ 56,400.00
			2'-6" Concrete Curb and Gutter	1,770	LF	$ 25.00	$ 44,250.00
			4" Concrete Sidewalk	300	SY	$ 40.00	$ 12,000.00
			5" Monolithic Islands	900	SY	$ 90.00	$ 81,000.00
			Erosion Control	8.0	Acres	$ 40,000.00	$ 320,000.00
			Traffic Control (Widening on Existing)	1.3	Miles	$ 300,000.00	$ 390,000.00
			Signage	1.0	LS	$ 85,000.00	$ 85,000.00
			Thermo and Markers (Highway and Urban Area)	1.3	Miles	$ 100,000.00	$ 130,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ Burlington Mills Rd - Upgrade	1	LS	$ 515,000.00	$ 515,000.00
			2 U-Turn Bulbs	1	LS	$ 360,000.00	$ 360,000.00
			Utility Construction				
			Relocate Existing Water Line	1,100	LF	$ 400.00	$ 440,000.00
			Relocate Existing Sewer Line	750	LF	$ 200.00	$ 150,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 500,000.00	$ 500,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 2,900,000.00	$ 2,900,000.00
			Contract Cost ……..	……..			$ 11,288,650.00
			E. & C. 15% ……..	……..			$ 1,694,000.00
			Construction Cost ……..	……..			**$ 12,982,650.00**

Note: Right-of-Way and private utility costs are not included in the estimate above but are included in overall summary

The Engineer has no control over the cost of labor, materials, or equipment, or over industry Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs, as provided here, are made on the basis of the Engineer's experience and qualifications and represent the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from opinions of probable cost.

Preliminary Estimate

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From Burlington Mills Road to Falls of the Neuse/South Main Street
Typical Section Existing 4-lane w/ median to 6-lane w/median
Plan Sheet # Figure 13 & 14
Prepared By: Exult Engineering Date 6/30/2023
Requested By: Town of Wake Forest Date 6/30/2023

CONSTR. COST
$17,192,000

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 750,000.00	$ 750,000.00
			Construction Survey	1.0	LS	$ 300,000.00	$ 300,000.00
			Clearing and Grubbing	17.0	Acre	$ 40,000.00	$ 680,000.00
			Grading	1	LS	$ 2,400,000.00	$ 2,400,000.00
			Drainage (Existing Location Widening - Ditch Section)	1.4	Miles	$ 350,000.00	$ 490,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	18,000	SY	$ 110.00	$ 1,980,000.00
			Pavement Resurfacing	19,500	SY	$ 30.00	$ 585,000.00
			5" Monolithic Islands	100	SY	$ 90.00	$ 9,000.00
			Guardrail	3,000	LF	$ 25.00	$ 75,000.00
			Guardrail Anchors	8	Each	$ 5,000.00	$ 40,000.00
			Erosion Control	14.0	Acres	$ 40,000.00	$ 560,000.00
			Traffic Control (Widening on Existing)	3.0	Miles	$ 300,000.00	$ 900,000.00
			Signage	1.0	LS	$ 85,000.00	$ 85,000.00
			Thermo and Markers (Highway and Urban Area)	1.5	Miles	$ 100,000.00	$ 150,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ Height/Montys Ln - Upgrade	1	LS	$ 65,000.00	$ 65,000.00
			Structures				
			US-1 Southbound Bridge Widening Over CSXT RR	3,450.00	SF	$ 300.00	$ 1,035,000.00
			US-1 Northbound Bridge Widening Over CSXT RR	3,150.00	SF	$ 300.00	$ 945,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 300,000.00	$ 300,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 3,600,000.00	$ 3,600,000.00
			Contract Cost ……..		……..		$ 14,949,000.00
			E. & C. 15% ……..		……..		$ 2,243,000.00
			Construction Cost ……..		……..		**$ 17,192,000.00**

Note: Right-of-Way and private utility costs are not included in the estimate above but are included in overall summary

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Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 1400' South of South Main St to 1000' North of South Main St
Typical Section Existing 4-lane w/ median, with Reverse RCI improvements (No Widening)
Plan Sheet # Figure 9
Prepared By: Exult Engineering Date 9/18/2023
Requested By: Town of Wake Forest Date 9/18/2023

CONSTR. COST
$11,909,340

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 530,000.00	$ 530,000.00
			Construction Survey	1.0	LS	$ 215,000.00	$ 215,000.00
			Clearing and Grubbing	7.5	Acre	$ 40,000.00	$ 300,000.00
			Grading	1	LS	$ 1,000,000.00	$ 1,000,000.00
			Drainage (Existing Location Widening - C&G Section)	0.5	Miles	$ 750,000.00	$ 337,500.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.5	Miles	$ 800,000.00	$ 400,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	12,528	SY	$ 110.00	$ 1,378,080.00
			Pavement Resurfacing	28,592	SY	$ 30.00	$ 857,760.00
			1'-6" Concrete Curb and Gutter	4,300	LF	$ 20.00	$ 86,000.00
			2'-6" Concrete Curb and Gutter	3,900	LF	$ 25.00	$ 97,500.00
			4" Concrete Sidewalk	1,700	SY	$ 40.00	$ 68,000.00
			5" Monolithic Islands	2,200	SY	$ 90.00	$ 198,000.00
			Guardrail	1,100	LF	$ 25.00	$ 27,500.00
			Guardrail Anchors	4	Each	$ 5,000.00	$ 20,000.00
			Erosion Control	6.5	Acres	$ 40,000.00	$ 260,000.00
			Traffic Control (Widening on Existing)	1.3	Miles	$ 300,000.00	$ 390,000.00
			Signage	1.0	LS	$ 85,000.00	$ 85,000.00
			Thermo and Markers (Highway and Urban Area)	1.3	Miles	$ 100,000.00	$ 130,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ South Main Street - Upgrade	1	LS	$ 515,000.00	$ 515,000.00
			2 U-Turn Bulbs	1	LS	$ 360,000.00	$ 360,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 100,000.00	$ 100,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 3,000,000.00	$ 3,000,000.00
			Contract Cost ……..	……..	……..	……..	$ 10,355,340.00
			E. & C. 15% ……..	……..	……..	……..	$ 1,554,000.00
			Construction Cost ……..	……..	……..	……..	**$ 11,909,340.00**

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Preliminary Estimate

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 900' South of Burlington Mills Rd to 1000' North of Burlington Mills Rd
Typical Section Existing 4-lane w/ median, with Reverse RCI improvements (No Widening)
Plan Sheet # Figure 11
Prepared By: Exult Engineering Date 9/18/2023
Requested By: Town of Wake Forest Date 9/18/2023

CONSTR. COST
$10,759,750

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 475,000.00	$ 475,000.00
			Construction Survey	1.0	LS	$ 190,000.00	$ 190,000.00
			Clearing and Grubbing	4.5	Acre	$ 40,000.00	$ 180,000.00
			Grading	1	LS	$ 850,000.00	$ 850,000.00
			Drainage (Existing Location Widening - C&G Section)	0.3	Miles	$ 750,000.00	$ 225,000.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.4	Miles	$ 800,000.00	$ 320,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	9,000	SY	$ 110.00	$ 990,000.00
			Pavement Resurfacing	12,900	SY	$ 30.00	$ 387,000.00
			1'-6" Concrete Curb and Gutter	2,900	LF	$ 20.00	$ 58,000.00
			2'-6" Concrete Curb and Gutter	2,950	LF	$ 25.00	$ 73,750.00
			4" Concrete Sidewalk	300	SY	$ 40.00	$ 12,000.00
			5" Monolithic Islands	1,000	SY	$ 90.00	$ 90,000.00
			Erosion Control	4.5	Acres	$ 40,000.00	$ 180,000.00
			Traffic Control (Widening on Existing)	1.1	Miles	$ 300,000.00	$ 330,000.00
			Signage	1.0	LS	$ 85,000.00	$ 85,000.00
			Thermo and Markers (Highway and Urban Area)	1.1	Miles	$ 100,000.00	$ 110,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ Burlington Mills Rd - Upgrade	1	LS	$ 450,000.00	$ 450,000.00
			2 U-Turn Bulbs	1	LS	$ 360,000.00	$ 360,000.00
			Utility Construction				
			Relocate Existing Water Line	1,100	LF	$ 400.00	$ 440,000.00
			Relocate Existing Sewer Line	750	LF	$ 200.00	$ 150,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 500,000.00	$ 500,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 2,900,000.00	$ 2,900,000.00
			Contract Cost ……..	……..			$ 9,355,750.00
			E. & C. 15% ……..	……..			$ 1,404,000.00
			Construction Cost ……..	……..			**$ 10,759,750.00**

Note: Right-of-Way and private utility costs are not included in the estimate above but are included in overall summary

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Preliminary Estimate

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 1500' South of Burlington Mills Rd to 1500' North of Burlington Mills Rd
Typical Section Existing 4-lane w/ median to 6-lane w/median, with intersection improvements
Plan Sheet # Figure 12
Prepared By: Exult Engineering Date 6/30/2023
Requested By: Town of Wake Forest Date 6/30/2023

CONSTR. COST
$12,212,000

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 530,000.00	$ 530,000.00
			Construction Survey	1.0	LS	$ 215,000.00	$ 215,000.00
			Clearing and Grubbing	12.0	Acre	$ 40,000.00	$ 480,000.00
			Grading	1	LS	$ 800,000.00	$ 800,000.00
			Drainage (Existing Location Widening - C&G Section)	0.2	Miles	$ 750,000.00	$ 150,000.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.6	Miles	$ 800,000.00	$ 480,000.00
			Drainage (Existing Location Widening - Ditch Section)	0.2	Miles	$ 350,000.00	$ 70,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	15,500	SY	$ 110.00	$ 1,705,000.00
			Pavement Resurfacing	31,000	SY	$ 30.00	$ 930,000.00
			1'-6" Concrete Curb and Gutter	2,050	LF	$ 20.00	$ 41,000.00
			2'-6" Concrete Curb and Gutter	2,400	LF	$ 25.00	$ 60,000.00
			4" Concrete Sidewalk	350	SY	$ 40.00	$ 14,000.00
			5" Monolithic Islands	100	SY	$ 90.00	$ 9,000.00
			Erosion Control	10.0	Acres	$ 40,000.00	$ 400,000.00
			Traffic Control (Widening on Existing)	1.6	Miles	$ 300,000.00	$ 480,000.00
			Signage	1.0	LS	$ 50,000.00	$ 50,000.00
			Thermo and Markers (Highway and Urban Area)	1.6	Miles	$ 100,000.00	$ 160,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ Burlington Mills Rd - Upgrade	1	LS	$ 205,000.00	$ 205,000.00
			Utility Construction				
			Relocate Existing Water Line	1,100	LF	$ 400.00	$ 440,000.00
			Relocate Existing Sewer Line	750	LF	$ 200.00	$ 150,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 500,000.00	$ 500,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 2,750,000.00	$ 2,750,000.00
			Contract Cost ……..	……..			$ 10,619,000.00
			E. & C. 15% ……..	……..			$ 1,593,000.00
			Construction Cost ……..	……..			**$ 12,212,000.00**

Note: Right-of-Way and private utility costs are not included in the estimate above but are included in overall summary

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Preliminary Estimate

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 1400' South of South Main St to 1000' North of South Main St
Typical Section Existing 4-lane w/ median to 6-lane w/median, with turn lane intersection improvements
Plan Sheet # Figure 10
Prepared By: Exult Engineering Date 6/30/2023
Requested By: Town of Wake Forest Date 6/30/2023

CONSTR. COST
$8,469,000

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 380,000.00	$ 380,000.00
			Construction Survey	1.0	LS	$ 150,000.00	$ 150,000.00
			Clearing and Grubbing	6.5	Acre	$ 40,000.00	$ 260,000.00
			Grading	1	LS	$ 750,000.00	$ 750,000.00
			Drainage (Existing Location Widening - C&G Section)	0.3	Miles	$ 750,000.00	$ 225,000.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.5	Miles	$ 800,000.00	$ 400,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	9,200	SY	$ 110.00	$ 1,012,000.00
			Pavement Resurfacing	26,000	SY	$ 30.00	$ 780,000.00
			1'-6" Concrete Curb and Gutter	4,500	LF	$ 20.00	$ 90,000.00
			2'-6" Concrete Curb and Gutter	2,400	LF	$ 25.00	$ 60,000.00
			4" Concrete Sidewalk	300	SY	$ 40.00	$ 12,000.00
			5" Monolithic Islands	500	SY	$ 90.00	$ 45,000.00
			Guardrail	600	LF	$ 25.00	$ 15,000.00
			Erosion Control	5.5	Acres	$ 40,000.00	$ 220,000.00
			Traffic Control (Widening on Existing)	1.3	Miles	$ 300,000.00	$ 390,000.00
			Signage	1.0	LS	$ 50,000.00	$ 50,000.00
			Thermo and Markers (Highway and Urban Area)	1.3	Miles	$ 100,000.00	$ 130,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ South Main Street - Upgrade	1	LS	$ 195,000.00	$ 195,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 100,000.00	$ 100,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 2,100,000.00	$ 2,100,000.00
						Contract Cost …….. ……..	$ 7,364,000.00
						E. & C. 15% …….. ……..	$ 1,105,000.00
						Construction Cost …….. ……..	**$ 8,469,000.00**

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Preliminary Estimate

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 1500' South of Burlington Mills Rd to 1500' North of Burlington Mills Rd
Typical Section Existing 4-lane w/ median, with intersection improvements (No Widening)
Plan Sheet # Figure 12
Prepared By: Exult Engineering Date 9/18/2023
Requested By: Town of Wake Forest Date 9/18/2023

CONSTR. COST
$9,106,475

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1	LS	$ 400,000.00	$ 400,000.00
			Construction Survey	1	LS	$ 160,000.00	$ 160,000.00
			Clearing and Grubbing	4.0	Acre	$ 40,000.00	$ 160,000.00
			Grading	1	LS	$ 800,000.00	$ 800,000.00
			Drainage (Existing Location Widening - C&G Section)	0.2	Miles	$ 750,000.00	$ 150,000.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.2	Miles	$ 800,000.00	$ 160,000.00
			Drainage (Existing Location Widening - Ditch Section)	0.2	Miles	$ 350,000.00	$ 70,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	7,000	SY	$ 110.00	$ 770,000.00
			Pavement Resurfacing	18,000	SY	$ 30.00	$ 540,000.00
			1'-6" Concrete Curb and Gutter	720	LF	$ 20.00	$ 14,400.00
			2'-6" Concrete Curb and Gutter	2,225	LF	$ 25.00	$ 55,625.00
			4" Concrete Sidewalk	350	SY	$ 40.00	$ 14,000.00
			5" Monolithic Islands	105	SY	$ 90.00	$ 9,450.00
			Erosion Control	4.0	Acres	$ 40,000.00	$ 160,000.00
			Traffic Control (Widening on Existing)	0.9	Miles	$ 300,000.00	$ 270,000.00
			Signage	1	LS	$ 50,000.00	$ 50,000.00
			Thermo and Markers (Highway and Urban Area)	0.9	Miles	$ 100,000.00	$ 90,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ Burlington Mills Rd - Upgrade	1	LS	$ 205,000.00	$ 205,000.00
			Utility Construction				
			Relocate Existing Water Line	1,100	LF	$ 400.00	$ 440,000.00
			Relocate Existing Sewer Line	750	LF	$ 200.00	$ 150,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 500,000.00	$ 500,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 2,750,000.00	$ 2,750,000.00
			Contract Cost ……..		……..	……..	$ 7,918,475.00
			E. & C. 15% ……..		……..	……..	$ 1,188,000.00
			Construction Cost ……..		……..	……..	**$ 9,106,475.00**

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Preliminary Estimate

Planning Level County: **WAKE**

Route US-1 Capital Boulevard
From 1400' South of South Main St to 1000' North of South Main St
Typical Section Existing 4-lane w/ median, with turn lane intersection improvements (No Widening)
Plan Sheet # Figure 10
Prepared By: Exult Engineering Date 9/18/2023
Requested By: Town of Wake Forest Date 9/18/2023

CONSTR. COST
$8,025,720

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Mobilization	1.0	LS	$ 380,000.00	$ 380,000.00
			Construction Survey	1.0	LS	$ 150,000.00	$ 150,000.00
			Clearing and Grubbing	6.5	Acre	$ 40,000.00	$ 260,000.00
			Grading	1	LS	$ 750,000.00	$ 750,000.00
			Drainage (Existing Location Widening - C&G Section)	0.3	Miles	$ 750,000.00	$ 225,000.00
			Drainage (US-1 Widening Shld Section, C&G Median)	0.5	Miles	$ 800,000.00	$ 400,000.00
			Asphalt Pavement				
			Pavement Widening - Full Depth	6,547	SY	$ 110.00	$ 720,170.00
			Pavement Resurfacing	22,885	SY	$ 30.00	$ 686,550.00
			1'-6" Concrete Curb and Gutter	4,500	LF	$ 20.00	$ 90,000.00
			2'-6" Concrete Curb and Gutter	2,400	LF	$ 25.00	$ 60,000.00
			4" Concrete Sidewalk	300	SY	$ 40.00	$ 12,000.00
			5" Monolithic Islands	500	SY	$ 90.00	$ 45,000.00
			Guardrail	600	LF	$ 25.00	$ 15,000.00
			Erosion Control	5.5	Acres	$ 40,000.00	$ 220,000.00
			Traffic Control (Widening on Existing)	1.3	Miles	$ 300,000.00	$ 390,000.00
			Signage	1.0	LS	$ 50,000.00	$ 50,000.00
			Thermo and Markers (Highway and Urban Area)	1.3	Miles	$ 100,000.00	$ 130,000.00
			Traffic Signals				
			Capital Blvd (US 1) @ South Main Street - Upgrade	1	LS	$ 195,000.00	$ 195,000.00
			Misc. & Mob (15% Strs&Util)	1	LS	$ 100,000.00	$ 100,000.00
			Misc. & Mob (45% Functional)	1	LS	$ 2,100,000.00	$ 2,100,000.00
			Contract Cost ……..	……..		……..	$ 6,978,720.00
			E. & C. 15% ……..	……..		……..	$ 1,047,000.00
			Construction Cost ……..	……..		……..	**$ 8,025,720.00**

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Cost Estimate Alternative Summary

Route: US-1 Capital Boulevard
Description: US 1 Traffic Study
County / Division: Wake / Division 5

Prepared By: Exult Engineering
Requested By: Town of Wake Forest

Alternative	Description	Construction	Utility Relocation	ROW	Total
???	US 1 at Burlington Mills Rd - Standard RCI Improvements (w/widening)	$ 12,843,000.00	$ 500,000.00	$ 650,000.00	**$ 13,993,000.00**
Alternative 1	US 1 at Burlington Mills Rd - Reverse RCI Improvements (w/widening)	$ 12,982,650.00	$ 500,000.00	$ 650,000.00	**$ 14,132,650.00**
Alternative 1a & 3	US 1 at Burlington Mills Rd - Reverse RCI Improvements (w/o widening)	$ 10,759,750.00	$ 500,000.00	$ 650,000.00	**$ 11,909,750.00**
Alternative 2	US 1 at Burlington Mills Rd - Standard Turn lanes (w/ widening)	$ 12,212,000.00	$ 500,000.00	$ 915,000.00	**$ 13,627,000.00**
Alternative 2a	US 1 at Burlington Mills Rd - Standard Turn lanes (w/o widening)	$ 9,106,475.00	$ 500,000.00	$ 865,000.00	**$ 10,471,475.00**
Alternative 1 & 2	Capital Blvd Widening (3 lane from Burlington Mills Rd to South Main St)	$ 17,192,000.00	$ 100,000.00	$ 200,000.00	**$ 17,492,000.00**
Alternative 1	US 1 at South Main St/Falls of Neuse Rd - Reverse RCI Improvements (w/widening)	$ 12,262,000.00	$ 650,000.00	$ 500,000.00	**$ 13,412,000.00**
Alternative 1a	US 1 at South Main St/Falls of Neuse Rd - Reverse RCI Improvements (w/o widening)	$ 11,909,340.00	$ 650,000.00	$ 500,000.00	**$ 13,059,340.00**
Alternative 2	US 1 at South Main St/Falls of Neuse Rd - Standard Turn lanes (w/ widening)	$ 8,469,000.00	$ 650,000.00	$ 200,000.00	**$ 9,319,000.00**
Alternative 2a	US 1 at South Main St/Falls of Neuse Rd - Standard Turn lanes (w/o widening)	$ 8,025,720.00	$ 650,000.00	$ 200,000.00	**$ 8,875,720.00**
Alternative 3	US 1 at South Main St/Falls of Neuse Rd - No Improvements	$ -	$ -	$ -	**$ -**

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US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT

US–1 AT BURLINGTON MILLS ROAD
ALTERNATE 1

WAKE FOREST, NORTH CAROLINA
SEPTEMBER 15, 2023

US–1
(CAPITAL BOULEVARD)

BURLINGTON MILLS ROAD

CROSSROADS FORD

SOUTHBOUND US–1 (U–TURN)
TWO U–TURN LANES (300′ STORAGE)

EASTBOUND BURLINGTON MILLS ROAD
ONE RIGHT TURN LANES (200′ STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (200′ STORAGE)

SOUTHBOUND US–1
THREE THRU LANES
ONE RIGHT TURN LANE (FREE FLOW)

MATCHLINE US–1 (SEE FIGURE 13)

NORTHBOUND US–1
THREE THRU LANES
ONE RIGHT TURN LANE (FREE FLOW)

NORTHBOUND US–1 (U–TURN)
ONE U–TURN LANE (400′ STORAGE)

US–1
(CAPITAL BOULEVARD)

WESTBOUND BURLINGTON MILLS ROAD
TWO RIGHT TURN LANES (600′ STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
TWO LEFT TURN LANES (400′ STORAGE)

BURLINGTON MILLS RD

LEGEND
- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED PAVEMENT WIDENING
- PROPOSED CONCRETE ISLAND
- PROPOSED RIGHT OF WAY
- PROPOSED CONTROLLED ACCESS
- PROPOSED SIGNALIZED INTERSECTION

100′ 0′ 100′ 200′
50′

FIGURE 15

US–1 TRAFFIC STUDY CONCEPTUAL WIDENING EXHIBIT

US–1 AT SOUTH MAIN STREET/ FALLS OF NEUSE ROAD ALTERNATE 1

WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023

MATCHLINE US-1(SEE FIGURE 14)

US–1 (CAPITAL BOULEVARD)

WAKEFIELD COMMONS

FALLS OF NEUSE ROAD

SOUTHBOUND US–1 (U–TURN)
TWO U–TURN LANES (825′ STORAGE)

EASTBOUND FALLS OF NEUSE ROAD
ONE RIGHT TURN LANE (650′ STORAGE)
ONE RIGHT TURN LANE (920′ STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (700′ STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)

REX HEALTHCARE OF WAKEFIELD

SOUTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (300′ STORAGE)

STAR ROAD (SR 2183)

NORTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (300′ STORAGE)

NORTHBOUND US–1 (U–TURN)
TWO U–TURN LANES (650′ STORAGE)

US–1 (CAPITAL BOULEVARD)

WESTBOUND SOUTH MAIN STREET
ONE RIGHT TURN LANE (450′ STORAGE)
ONE RIGHT TURN LANE (920′ STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (650′ STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)

CROSSROADS NISSAN

WESTGATE DODGE RAM AND KIA

S MAIN STREET (US 1 ALT)

WAKE DRIVE

LEGEND

- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED PAVEMENT WIDENING
- PROPOSED CONCRETE ISLAND
- PROPOSED RIGHT OF WAY
- PROPOSED CONTROLLED ACCESS
- PROPOSED SIGNALIZED INTERSECTION

100′ 0′ 100′ 200′
50′

FIGURE 9

US–1 TRAFFIC STUDY CONCEPTUAL WIDENING EXHIBIT

US–1 AT SOUTH MAIN STREET/ FALLS OF NEUSE ROAD ALTERNATE 2

WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023

MATCHLINE US-1(SEE FIGURE 14)

WAKEFIELD COMMONS

US–1 (CAPITAL BOULEVARD)

FALLS OF NEUSE ROAD

REX HEALTHCARE OF WAKEFIELD

EASTBOUND FALLS OF NEUSE ROAD
TWO THRU LANES
EXISTING RIGHT TURN LANE (275′ STORAGE)
THREE LEFT TURN LANES (500′ STORAGE)

SOUTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (225′ STORAGE)
TWO LEFT TURN LANES (700′ STORAGE)

STAR ROAD (SR 2183)

NORTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (375′ STORAGE)
TWO LEFT TURN LANES (1000′ STORAGE)

WESTBOUND SOUTH MAIN STREET
TWO THRU LANES
ONE RIGHT TURN LANE (200′ STORAGE)
ONE LEFT TURN LANE (500′ STORAGE)
TWO LEFT TURN LANES (650′ STORAGE)

US–1 (CAPITAL BOULEVARD)

CROSSROADS NISSAN

WESTGATE DODGE RAM AND KIA

S MAIN STREET (US 1 ALT)

WAKE DRIVE

LEGEND

- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED PAVEMENT WIDENING
- PROPOSED CONCRETE ISLAND
- PROPOSED RIGHT OF WAY
- PROPOSED CONTROLLED ACCESS
- EXISTING SIGNALIZED INTERSECTION

100′ 0′ 100′ 200′
50′

FIGURE 10

US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT

US–1 AT BURLINGTON MILLS ROAD
ALTERNATE 1

WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023

US–1
(CAPITAL BOULEVARD)

BURLINGTON
MILLS ROAD

CROSSROADS FORD

SOUTHBOUND US–1 (U–TURN)
ONE U–TURN LANE (700′ STORAGE)

EASTBOUND FALLS OF BURLINGTON MILLS ROAD
TWO RIGHT TURN LANES (250′ STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)

SOUTHBOUND US–1
THREE THRU LANES
ONE EXISTING RIGHT TURN LANE (125′ STORAGE)
ONE LEFT TURN LANE (475′ STORAGE)

MATCHLINE US–1 (SEE FIGURE 13)

NORTHBOUND US–1
THREE THRU LANES
ONE EXISTING RIGHT TURN LANE (400′ STORAGE)
ONE LEFT TURN LANE (350′ STORAGE)

NORTHBOUND US–1 (U–TURN)
ONE U–TURN LANE (350′ STORAGE)
ONE U–TURN LANE (900′ STORAGE)

US–1
(CAPITAL BOULEVARD)

WESTBOUND BURLINGTON MILLS ROAD
TWO RIGHT TURN LANES (500′ STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)

BURLINGTON
MILLS RD

LEGEND

- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED PAVEMENT WIDENING
- PROPOSED CONCRETE ISLAND
- PROPOSED RIGHT OF WAY
- PROPOSED CONTROLLED ACCESS
- PROPOSED SIGNALIZED INTERSECTION

100′ 0′ 100′ 200′
50′

FIGURE 11

US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT

US–1 AT BURLINGTON MILLS ROAD
ALTERNATE 2

WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023

BURLINGTON MILLS ROAD

CROSSROADS FORD

US–1
(CAPITAL BOULEVARD)

EASTBOUND FALLS OF BURLINGTON MILLS ROAD
ONE THRU LANE
ONE RIGHT TURN LANE (200′ STORAGE)
ONE LEFT TURN LANE (275′ STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)

SOUTHBOUND US–1
THREE THRU LANES
ONE EXISTING RIGHT TURN LANE (125′ STORAGE)
TWO LEFT TURN LANES (730′ STORAGE)

MATCHLINE US–1 (SEE FIGURE 13)

NORTHBOUND US–1
THREE THRU LANES
ONE RIGHT TURN LANE (400′ STORAGE)
TWO LEFT TURN LANES (335′ STORAGE)

WESTBOUND BURLINGTON MILLS ROAD
ONE THRU/RIGHT LANE (375′ STORAGE)
ONE RIGHT TURN LANE (375′ STORAGE)
TWO LEFT TURN LANES (725′ STORAGE
ONE LEFT TURN LANE (CONTINUOUS STORAGE)

US–1
(CAPITAL BOULEVARD)

BURLINGTON MILLS RD

LEGEND
- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED PAVEMENT WIDENING
- PROPOSED CONCRETE ISLAND
- PROPOSED RIGHT OF WAY
- PROPOSED CONTROLLED ACCESS
- EXISTING SIGNALIZED INTERSECTION

100′ 0′ 100′ 200′
50′

FIGURE 12

400

US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT

US–1
ALTERNATE 1

WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023

THOMAS CONCRETE

MONTY'S LANE

MATCHLINE US–1 (SEE FIGURE 11 & 12)

MATCHLINE US–1 (SEE FIGURE 14)

THE POWELL HOUSE

US–1
(CAPITAL BOULEVARD)

CSX RAILROAD

STAR ROAD
(SR 2183)

HEIGHT LANE

LEGEND

- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED PAVEMENT WIDENING
- PROPOSED CONCRETE ISLAND
- PROPOSED RIGHT OF WAY
- PROPOSED CONTROLLED ACCESS
- EXISTING SIGNALIZED INTERSECTION

100′ 0′ 100′ 200′
50′

FIGURE 13

US–1 TRAFFIC STUDY CONCEPTUAL WIDENING EXHIBIT

US–1
ALTERNATE 1

WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023

MATCHLINE US-1 (SEE FIGURE 13)

HANSON AGGREGATES

PONDEROSA SERVICE ROAD SR (2182)

US–1 (CAPITAL BOULEVARD)

STAR ROAD (SR 2183)

LIVING WORD FAMILY CHURCH

MATCHLINE US-1 (SEE FIGURE 9 & 10)

LEGEND

- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED PAVEMENT WIDENING
- PROPOSED CONCRETE ISLAND
- PROPOSED RIGHT OF WAY
- PROPOSED CONTROLLED ACCESS
- EXISTING SIGNALIZED INTERSECTION

100′ 0′ 100′ 200′
50′

FIGURE 14

September 2023



US 1 TRAFFIC STUDY

WAKE FOREST, NC

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US 1 Traffic Study

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09/25/2023

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EXECUTIVE SUMMARY

The Town of Wake Forest has contracted with Exult Engineering to evaluate the intersection operations of the following intersections in Wake Forest, NC:

- US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road
- US 1 (Capital Boulevard) at Burlington Mills Road

The purpose of this study is to evaluate the existing and future traffic operations of these two intersections and to make recommendations for needed roadway, safety, and operational improvements.

Five build Alternatives were developed to address traffic and safety concerns at these two study intersections as follows:

- Alternative 1 consists of converting the two existing study intersections to reverse reduced conflict intersections (RRCI's) and constructing associated new U-turn locations along with widening Capital Boulevard from just south of Burlington Mills Road to the existing 6-lane section just south of South Main Street.
- Alternative 1a consists of converting the two existing study intersections to reverse reduced conflict intersections (RRCI's) and constructing associated new U-turn locations without widening Capital Boulevard.
- Alternative 2 consists of constructing additional turn lanes at the two existing study intersections along with widening Capital Boulevard from just south of Burlington Mills Road to the existing 6-lane section just south of South Main Street.
- Alternative 2a consists of constructing additional turn lanes at the two existing study intersections without widening Capital Boulevard.
- Alternative 3 consists of converting only the intersection with Burlington Mills Road to a reverse reduced conflict intersection (RRCI) without widening Capital Boulevard, and no improvements to the intersection with South Main Street.

Based on coordination with the Town and NCDOT, Transportation Improvement Program (TIP) project #U-5307 plans to convert Capital Boulevard to a controlled access facility from I-540 in Raleigh to Purnell Road/Harris Road in Wake Forest, with a Diamond or Partial Cloverleaf interchange at Capital Boulevard and Burlington Mills Road, and a Diverging Diamond Interchange (DDI) at Capital Boulevard and South Main Street. However, only TIP project #U-5307A, from I-540 to north of Durant Road, is funded for construction, with a planned construction year of 2026. TIP projects #U-5307B, #U-5307C, and #U-5307D are not yet funded for construction. Therefore, the TIP project was not considered in this analysis.

TIP project #U-5307 is the best permanent solution for the two study intersections, however, funding has been delayed until 2035. The alternatives evaluated in this report are an interim solution and will only help maintain the current poor levels of services, or prevent further delays if nothing else is done. Traffic delays shown in the tables in this report are based on existing and proposed traffic patterns.

Due to the traffic pattern reconfiguration by the recommended RRCI's, it is difficult to directly compare movement delays pre and post proposed improvements. For the purposes of this executive summary, delays in Tables E1-E4 are represented as overall and single direction delays, and north/south delays for the RRCI's. The actual delays per approach can be found in the capacity analysis tables in this report. The

delays shown below are simplified for the purposes of this executive summary. It should be noted that the RRCI "EBT", "WBT", "NBL", and "SBL" movement delays presented below may be overestimated. It should also be noted that the existing and no-build westbound and southbound left turn delays at the intersection with US 1 and South Main Street, and the northbound and southbound lefts at the intersection with US 1 and Burlington Mills Road may be overestimated due to modeling the u-turns with permissive phasing per NCDOT's *Capacity Analysis Guidelines.* If the u-turns were modeled with protected phasing, delays may be reduced by up to 63-78%.

The yellow highlighted rows represent the primary routes during the AM and PM peak hours. The orange highlighted rows represent the secondary routes during the AM and PM peak hours.

Table E-1: US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road AM Peak Hour Results

Approach	Movement	RCI Movement Notes	Existing AM (2023)	No-Build AM (2035)	Alternative 1 AM - Reverse RCI (2035) Widening	Alternative 1a AM - Reverse RCI (2035) No Widening	Alternative 2 AM - Traditional Improvements (2035) Widening	Alternative 2a AM - Traditional Improvements (2035) No Widening	Alternative 3 AM - No Improvements (2035)
Eastbound Approach (Falls of Neuse toward S. Main)	EBL	= EBL Traditional	F (2 min 4 sec)	D (0 min 51 sec)	F (1 min 54 sec)	F (1 min 54 sec)	F (2 min 41 sec)	F (2 min 41 sec)	F (2 min 9 sec)
	EBT	= EBR + South U-turn SBU + NBR	E (1 min 17 sec)	F (7 min 30 sec)	F (2 min 52 sec)	F (5 min 6 sec)	F (2 min 24 sec)	F (2 min 24 sec)	F (2 min 7 sec)
	EBR	= EBR Traditional	D (0 min 48 sec)	D (0 min 53 sec)	F (2 min 12 sec)	F (2 min 12 sec)	D (0 min 41 sec)	D (0 min 41 sec)	D (0 min 48 sec)
Westbound Approach (S. Main toward Falls of Neuse)	WBL	= WBL Traditional	F (20 min 51 sec)	F (23 min 55 sec)	F (2 min 47 sec)	F (2 min 47 sec)	F (2 min 53 sec)	F (2 min 53 sec)	F (2 min 31 sec)
	WBT	= WBR + North U-turn NBU + SBR	E (1 min 6 sec)	D (0 min 52 sec)	F (3 min 56 sec)	F (3 min 57 sec)	F (2 min 17 sec)	F (2 min 17 sec)	F (2 min 55 sec)
	WBR	= WBR Traditional	Shared thru/right	Shared thru/right	F (1 min 42 sec)	F (1 min 42 sec)	A (0 min 3 sec)	A (0 min 3 sec)	Shared thru/right
Northbound Approach (Capital Blvd toward Youngsville)	NBL	= NBT + North U-turn NBU + SBR	F (1 min 40 sec)	F (4 min 55 sec)	F (2 min 34 sec)	F (2 min 36 sec)	F (2 min 36 sec)	F (2 min 34 sec)	F (3 min 55 sec)
	NBT	= NBT Traditional	C (0 min 34 sec)	F (5 min 49 sec)	B (0 min 19 sec)	C (0 min 20 sec)	D (0 min 46 sec)	D (0 min 37 sec)	D (0 min 38 sec)
	NBR	= NBR Traditional	B (0 min 14 sec)	E (1 min 14 sec)	A (0 min 0 sec)	A (0 min 0 sec)	C (0 min 25 sec)	B (0 min 18 sec)	C (0 min 25 sec)
Southbound Approach (Capital Blvd toward Raleigh)	SBL	= SBT + South U-turn SBU + NBR	F (8 min 1 sec)	F (9 min 34 sec)	F (2 min 1 sec)	F (4 min 16 sec)	F (1 min 27 sec)	F (1 min 27 sec)	F (1 min 30 sec)
	SBT	= SBT Traditional	D (0 min 44 sec)	F (8 min 13 sec)	F (1 min 22 sec)	F (1 min 22 sec)	F (1 min 23 sec)	F (1 min 23 sec)	F (2 min 8 sec)
	SBR	= SBR Traditional	C (0 min 29 sec)	E (1 min 11 sec)	A (0 min 0 sec)	A (0 min 0 sec)	B (0 min 17 sec)	B (0 min 17 sec)	C (0 min 34 sec)
		OVERALL LOS for intersection	F (2 min 0 sec)	F (6 min 5 sec)	D (0 min 55 sec)	D (0 min 55 sec)	F (1 min 26 sec)	F (1 min 23 sec)	F (1 min 44 sec)
		ICU LOS	D	H	F	F	G	G	H

Table E-2: US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road PM Peak Hour Results

Approach	Movement	RCI Movement Notes	Existing PM (2023)	No-Build PM (2035)	Alternative 1 PM - Reverse RCI (2035) Widening	Alternative 1a PM - Reverse RCI (2035) No Widening	Alternative 2 PM - Traditional Improvements (2035) Widening	Alternative 2a PM - Traditional Improvements (2035) No Widening	Alternative 3 PM - No Improvements (2035)
Eastbound Approach (Falls of Neuse toward S. Main)	EBL	= EBL Traditional	F (1 min 20 sec)	F (1 min 35 sec)	F (2 min 33 sec)	F (2 min 33 sec)	F (1 min 46 sec)	F (1 min 46 sec)	F (2 min 53 sec)
	EBT	= EBR + South U-turn SBU + NBR	E (1 min 3 sec)	F (11 min 57 sec)	F (4 min 24 sec)	F (6 min 41 sec)	F (2 min 9 sec)	F (2 min 9 sec)	F (2 min 18 sec)
	EBR	= EBR Traditional	D (0 min 37 sec)	D (0 min 49 sec)	F (2 min 33 sec)	F (2 min 33 sec)	C (0 min 31 sec)	C (0 min 31 sec)	D (0 min 46 sec)
Westbound Approach (S. Main toward Falls of Neuse)	WBL	= WBL Traditional	E (1 min 14 sec)	F (31 min 55 sec)	F (2 min 52 sec)	F (2 min 52 sec)	F (2 min 26 sec)	F (2 min 26 sec)	F (2 min 53 sec)
	WBT	= WBR + North U-turn NBU + SBR	D (0 min 52 sec)	D (0 min 54 sec)	F (3 min 55 sec)	F (3 min 55 sec)	F (1 min 23 sec)	F (1 min 23 sec)	F (2 min 32 sec)
	WBR	= WBR Traditional	Shared thru/right	Shared thru/right	F (2 min 48 sec)	F (2 min 48 sec)	C (0 min 26 sec)	C (0 min 26 sec)	Shared thru/right
Northbound Approach (Capital Blvd toward Youngsville)	NBL	= NBT + North U-turn NBU + SBR	E (1 min 16 sec)	F (2 min 17 sec)	F (2 min 0 sec)	F (1 min 58 sec)	F (1 min 30 sec)	F (1 min 25 sec)	F (2 min 27 sec)
	NBT	= NBT Traditional	D (0 min 45 sec)	F (8 min 36 sec)	D (0 min 54 sec)	D (0 min 52 sec)	F (1 min 37 sec)	F (1 min 28 sec)	F (2 min 10 sec)
	NBR	= NBR Traditional	B (0 min 16 sec)	F (1 min 57 sec)	A (0 min 0 sec)	A (0 min 0 sec)	C (0 min 21 sec)	B (0 min 15 sec)	D (0 min 44 sec)
Southbound Approach (Capital Blvd toward Raleigh)	SBL	= SBT + South U-turn SBU + NBR	F (11 min 54 sec)	F (15 min 19 sec)	F (3 min 2 sec)	F (5 min 19 sec)	F (2 min 50 sec)	F (2 min 50 sec)	F (3 min 16 sec)
	SBT	= SBT Traditional	D (0 min 41 sec)	F (2 min 53 sec)	E (1 min 11 sec)	E (1 min 11 sec)	E (1 min 9 sec)	E (1 min 9 sec)	F (1 min 30 sec)
	SBR	= SBR Traditional	C (0 min 27 sec)	D (0 min 37 sec)	A (0 min 0 sec)	A (0 min 0 sec)	B (0 min 14 sec)	B (0 min 14 sec)	C (0 min 30 sec)
		OVERALL LOS for intersection	E (1 min 12 sec)	F (7 min 1 sec)	E (1 min 11 sec)	E (1 min 11 sec)	F (1 min 26 sec)	F (1 min 23 sec)	F (1 min 59 sec)
		ICU LOS	D	G	F	F	G	G	H

Table E-3: US 1 (Capital Boulevard) at Burlington Mills Road AM Peak Hour Results

Approach	Movement	RCI Movement Notes	Existing AM (2023)	No-Build AM (2035)	Alternative 1 AM - Reverse RCI (2035) Widening	Alternative 1a AM - Reverse RCI (2035) No Widening	Alternative 2 AM - Traditional Improvements (2035) Widening	Alternative 2a AM - Traditional Improvements (2035) No Widening	Alternative 3 AM - Reverse RCI (2035) No Widening
Eastbound Approach (Car Dealership to Burlington Mills)	EBL	= EBL Traditional	F (1 min 55 sec)	F (7 min 19 sec)	E (1 min 2 sec)	F (1 min 34 sec)	F (1 min 33 sec)	F (2 min 8 sec)	F (1 min 34 sec)
	EBT	= EBR + South U-turn SBU + NBR	F (1 min 51 sec)	F (1 min 21 sec)	F (3 min 10 sec)	F (6 min 27 sec)	F (2 min 55 sec)	F (2 min 55 sec)	F (6 min 27 sec)
	EBR	= EBR Traditional	Shared thru/right	Shared thru/right	F (2 min 4 sec)	F (4 min 6 sec)	A (0 min 3 sec)	A (0 min 5 sec)	F (4 min 6 sec)
Westbound Approach (Burlington Mills to Car Dealership)	WBL	= WBL Traditional	F (1 min 44 sec)	F (17 min 8 sec)	F (1 min 43 sec)	F (4 min 20 sec)	F (1 min 55 sec)	F (8 min 14 sec)	F (4 min 20 sec)
	WBT	= WBR + North U-turn NBU + SBR	F (1 min 27 sec)	F (7 min 34 sec)	F (3 min 8 sec)	F (7 min 31 sec)	F (1 min 31 sec)	F (2 min 2 sec)	F (7 min 31 sec)
	WBR	= WBR Traditional	Shared thru/right	Shared thru/right	F (1 min 51 sec)	F (4 min 40 sec)	A (0 min 9 sec)	C (0 min 23 sec)	Shared thru/right
Northbound Approach (Capital Blvd toward S. Main and Youngsville)	NBL	= NBT + North U-turn NBU + SBR	F (5 min 55 sec)	F (17 min 39 sec)	F (1 min 56 sec)	F (4 min 54 sec)	F (2 min 14 sec)	F (3 min 10 sec)	F (4 min 54 sec)
	NBT	= NBT Traditional	F (1 min 59 sec)	F (11 min 24 sec)	D (0 min 39 sec)	F (2 min 2 sec)	D (0 min 40 sec)	F (2 min 2 sec)	F (2 min 2 sec)
	NBR	= NBR Traditional	B (0 min 13 sec)	C (0 min 33 sec)	A (0 min 1 sec)	A (0 min 0 sec)	A (0 min 8 sec)	A (0 min 6 sec)	A (0 min 0 sec)
Southbound Approach (Capital Blvd toward Raleigh)	SBL	= SBT + South U-turn SBU + NBR	F (23 min 45 sec)	F (27 min 25 sec)	F (2 min 6 sec)	F (6 min 17 sec)	F (1 min 48 sec)	F (3 min 15 sec)	F (6 min 17 sec)
	SBT	= SBT Traditional	F (1 min 37 sec)	F (11 min 52 sec)	E (1 min 0 sec)	F (3 min 56 sec)	D (0 min 39 sec)	F (3 min 18 sec)	F (3 min 56 sec)
	SBR	= SBR Traditional	C (0 min 21 sec)	C (0 min 29 sec)	A (0 min 0 sec)	A (0 min 0 sec)	A (0 min 2 sec)	A (0 min 2 sec)	A (0 min 0 sec)
		OVERALL LOS for intersection	F (2 min 13 sec)	F (11 min 28 sec)	D (0 min 53 sec)	F (2 min 49 sec)	D (0 min 52 sec)	F (2 min 56 sec)	F (2 min 49 sec)
		ICU LOS	F	H	F	H	F	H	H

Table E-4: US 1 (Capital Boulevard) at Burlington Mills Road PM Peak Hour Results

Approach	Movement	RCI Movement Notes	Existing PM (2023)	No-Build PM (2035)	Alternative 1 PM - Reverse RCI (2035) Widening	Alternative 1a PM - Reverse RCI (2035) No Widening	Alternative 2 PM - Traditional Improvements (2035) Widening	Alternative 2a PM - Traditional Improvements (2035) No Widening	Alternative 3 PM - Reverse RCI (2035) No Widening
Eastbound Approach (Falls of Neuse toward S. Main)	EBL	= EBL Traditional	F (2 min 38 sec)	F (6 min 27 sec)	E (1 min 1 sec)	F (1 min 44 sec)	F (2 min 5 sec)	F (3 min 17 sec)	F (1 min 44 sec)
	EBT	= EBR + South U-turn SBU + NBR	F (2 min 13 sec)	E (1 min 3 sec)	F (2 min 1 sec)	F (7 min 17 sec)	F (1 min 42 sec)	F (1 min 49 sec)	F (7 min 17 sec)
	EBR	= EBR Traditional	Shared thru/right	Shared thru/right	E (1 min 7 sec)	F (4 min 6 sec)	A (0 min 4 sec)	A (0 min 4 sec)	F (4 min 6 sec)
Westbound Approach (S. Main toward Falls of Neuse)	WBL	= WBL Traditional	F (1 min 44 sec)	F (7 min 57 sec)	F (1 min 51 sec)	F (3 min 47 sec)	F (1 min 32 sec)	F (6 min 16 sec)	F (3 min 47 sec)
	WBT	= WBR + North U-turn NBU + SBR	F (2 min 11 sec)	F (12 min 20 sec)	F (2 min 50 sec)	F (5 min 29 sec)	F (1 min 48 sec)	F (2 min 37 sec)	F (5 min 29 sec)
	WBR	= WBR Traditional	Shared thru/right	Shared thru/right	F (1 min 58 sec)	F (3 min 56 sec)	D (0 min 37 sec)	E (1 min 11 sec)	Shared thru/right
Northbound Approach (Capital Blvd toward Youngsville)	NBL	= NBT + North U-turn NBU + SBR	F (8 min 34 sec)	F (30 min 40 sec)	F (1 min 59 sec)	F (4 min 22 sec)	F (1 min 56 sec)	F (3 min 17 sec)	F (4 min 22 sec)
	NBT	= NBT Traditional	D (0 min 48 sec)	F (11 min 34 sec)	E (1 min 7 sec)	F (2 min 49 sec)	D (0 min 48 sec)	F (2 min 15 sec)	F (2 min 49 sec)
	NBR	= NBR Traditional	B (0 min 11 sec)	D (0 min 53 sec)	A (0 min 1 sec)	A (0 min 0 sec)	B (0 min 13 sec)	A (0 min 9 sec)	A (0 min 0 sec)
Southbound Approach (Capital Blvd toward Raleigh)	SBL	= SBT + South U-turn SBU + NBR	F (58 min 6 sec)	F (43 min 15 sec)	E (1 min 4 sec)	F (5 min 24 sec)	F (1 min 50 sec)	F (3 min 22 sec)	F (5 min 24 sec)
	SBT	= SBT Traditional	D (0 min 38 sec)	F (11 min 57 sec)	B (0 min 10 sec)	F (2 min 13 sec)	B (0 min 17 sec)	F (1 min 58 sec)	F (2 min 13 sec)
	SBR	= SBR Traditional	B (0 min 16 sec)	D (0 min 35 sec)	A (0 min 0 sec)	A (0 min 0 sec)	A (0 min 3 sec)	A (0 min 2 sec)	A (0 min 0 sec)
		OVERALL LOS for intersection	F (3 min 27 sec)	F (12 min 21 sec)	D (0 min 41 sec)	F (2 min 15 sec)	D (0 min 46 sec)	F (2 min 18 sec)	F (2 min 15 sec)
		ICU LOS	F	H	E	H	F	H	H

Based on the results presented in Tables E-1 through E-4, the following ranks the alternatives from overall lowest delays to highest delays:

1. Alternative 1 – converting both intersections to RRCI's and widening Capital Boulevard
2. Alternative 2 – constructing traditional turn lane improvements at both intersections and widening Capital Boulevard
3. Alternative 1a – converting both intersections to RRCI's without widening Capital Boulevard
4. Alternative 2a – constructing traditional turn lane improvements at both intersections without widening Capital Boulevard
5. Alternative 3 – converting the intersection with Burlington Mills Road to a RRCI without widening Capital Boulevard, and no improvements to the intersection with South Main Street

Table E-5 provides an overall engineer's opinion of probable construction cost for each alternative. Additional details can be found in Table 16 and in the Appendix, starting on page 67.

Table E-5: Total Engineer's Opion of Probable Construction Cost

Alternative	Total Estimated Cost
Alternative 1	$45,036,650.00
Alternative 1a	$24,969,090.00
Alternative 2	$40,438,000.00
Alternative 2a	$19,347,195.00
Alternative 3	$11,909,750.00

Based on the analysis results, Alternative 1 is the best interim solution for these two intersections. Alternative 1 will improve the intersection delay per vehicle at South Main Street by approximately 11 minutes, and by approximately 22 minutes and 15 seconds at Burlington Mills Road when compared to no-build conditions.

However, considering this is only an interim solution, the high cost associated with these improvements may not be feasible. Therefore, consideration should be given to Alternative 3 as the best, most affordable interim solution. Alternative 3 will improve the average delay per vehicle at Burlington Mills Road by approximately 18 minutes and 45 seconds, with little impact to the intersection of South Main Street.

It should be noted that the existing and no-build delays may be overestimated due to modeling the u-turns with permissive phasing per NCDOT's *Capacity Analysis Guidelines.* If the u-turns were modeled with protected phasing, existing and no-build delays may be reduced by up to 63-78%.

INTRODUCTION

The Town of Wake Forest has contracted with Exult Engineering to evaluate the intersection operations of the following intersections in Wake Forest, NC, as shown in Figure 1:

- US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road
- US 1 (Capital Boulevard) at Burlington Mills Road

The purpose of this study is to evaluate the existing and future traffic operations of these two intersections and to make recommendations for needed roadway, safety, and operational improvements.

Five build Alternatives were developed to address traffic and safety concerns at these two study intersections as follows:

- Alternative 1 consists of converting the two existing study intersections to reverse reduced conflict intersections (RRCI's) and constructing associated new U-turn locations along with widening Capital Boulevard from just south of Burlington Mills Road to the existing 6-lane section just south of South Main Street.
- Alternative 1a consists of converting the two existing study intersections to reverse reduced conflict intersections (RRCI's) and constructing associated new U-turn locations without widening Capital Boulevard.
- Alternative 2 consists of constructing additional turn lanes at the two existing study intersections along with widening Capital Boulevard from just south of Burlington Mills Road to the existing 6-lane section just south of South Main Street.
- Alternative 2a consists of constructing additional turn lanes at the two existing study intersections without widening Capital Boulevard.
- Alternative 3 consists of converting only the intersection with Burlington Mills Road to a reverse reduced conflict intersection (RRCI) without widening Capital Boulevard, and no improvements to the intersection with South Main Street.

This study is the initial step in the planning and design process for this project and is not the product of environmental planning or design investigations.

A Traffic Analysis Scoping MOU was prepared and submitted to the Town of Wake Forest and the North Carolina Department of Transportation (NCDOT). The Scoping MOU and subsequent correspondence regarding the scope of the traffic study is included in the Appendix (starting on page 67) of this report. The *NCDOT Congestion Management Capacity Analysis Guidelines* were referenced to perform this study.

Capacity analyses were performed at the study intersections under the following scenarios:

- Existing (2023) AM and PM Peak Hour
- No-Build (2035) AM and PM Peak Hour
- Buildout (2035) Alternative 1 (Reverse RCI) with widening AM and PM Peak Hour with Recommended Improvements
- Buildout (2035) Alternative 1a (Reverse RCI) without widening AM and PM Peak Hour with Recommended Improvements
- Buildout (2035) Alternative 2 (Standard Turn Lane Improvements) with widening AM and PM Peak Hour with Recommended Improvements

- Buildout (2035) Alternative 2a (Standard Turn Lane Improvements) without widening AM and PM Peak Hour with Recommended Improvements
- Buildout (2035) Alternative 3 (Reverse RCI at Burlington Mills Road Only) without widening AM and PM Peak Hour with Recommended Improvements

US 1 Traffic Study

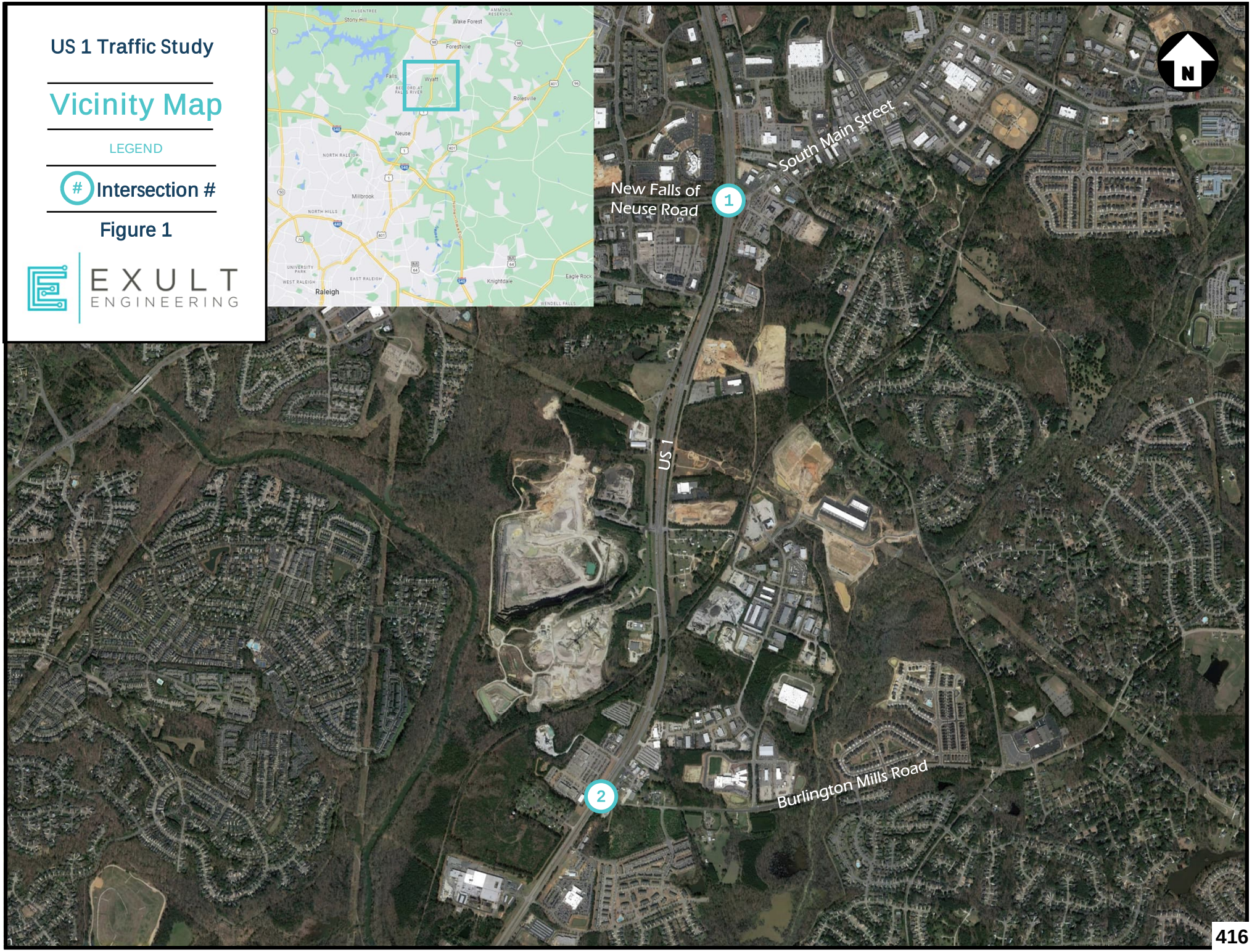
Vicinity Map

LEGEND

Intersection

Figure 1

EXULT ENGINEERING



EXISTING CONDITIONS

The study area for the US 1 traffic study includes the following existing intersections:

- US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road
- US 1 (Capital Boulevard) at Burlington Mills Road

A site visit was performed on Thursday, May 11, 2023, to observe existing field conditions, such as lane geometry, posted speed limits, and traffic operations. Figure 2 shows the Existing Lane Geometry at the above existing study intersections.

Peak-hour turning movement traffic counts were performed at the existing study intersections during the AM (7:00 – 9:00) and PM (4:00 – 6:00) peak periods on Tuesday May 2, 2023. Traffic count data is included in the Appendix (starting on page 67) of this report. Volume imbalances were justified due to the number of access points and land uses located between study intersections. Figure 3 depicts the 2023 AM and PM Peak Hour Existing Traffic Volumes.

US 1 (Capital Boulevard) is currently a 4-lane divided roadway at the intersection with Burlington Mills Road, and 6-lane divided roadway at the intersection with South Main Street/Falls of Neuse Road with a posted speed limit of 55 miles per hour (mph) in the project vicinity. US 1 is classified as an Other Principal Arterial on the *NCDOT Functional Class Map.* US 1 has a 2019 average annual daily traffic (AADT) volume of 47,000 – 58,500 vehicles per day on the *NCDOT Annual Average Daily Traffic Map* in the project vicinity.

South Main Street is currently a 4-lane divided roadway with a posted speed limit of 35 mph in the project vicinity. It is classified as a Major Collector on the *NCDOT Functional Class Map*. South Main Street has a 2019 AADT of 27,500 vehicles per day according to the *NCDOT Annual Average Daily Traffic Map.*

Falls of Neuse Road is currently a 4-lane divided roadway with a posted speed limit of 45 mph in the project vicinity. It is classified as a Minor Arterial on the *NCDOT Functional Class Map*. Falls of Neuse Road has a 2021 AADT of 24,500 vehicles per day according to the *NCDOT Annual Average Daily Traffic Map.*

Burlington Mills Road is currently a 2-lane undivided roadway with a posted speed limit of 45 mph in the project vicinity. It is classified as a Major Collector on the *NCDOT Functional Class Map*. Burlington Mills Road has a 2019 AADT of 14,500 vehicles per day according to the *NCDOT Annual Average Daily Traffic Map.*

US 1 Traffic Study

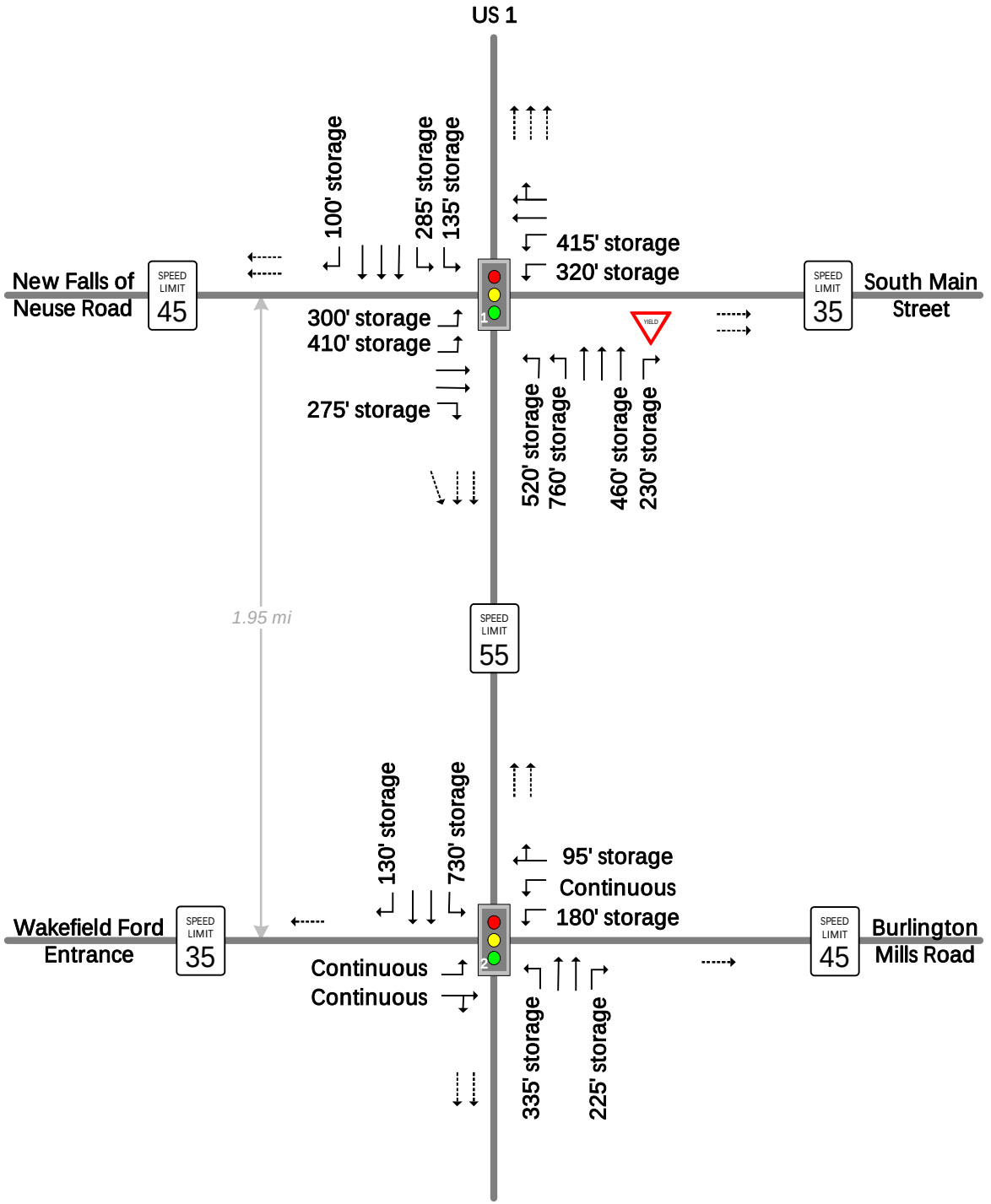
Existing Lane Geometry

LEGEND

Yield Control
Speed Limit XX
Signal Control
Approach Lane
Departure Lane
XX' Intersection Spacing
XX' - Full Storage Length

Figure 2

EXULT ENGINEERING



US 1 Traffic Study

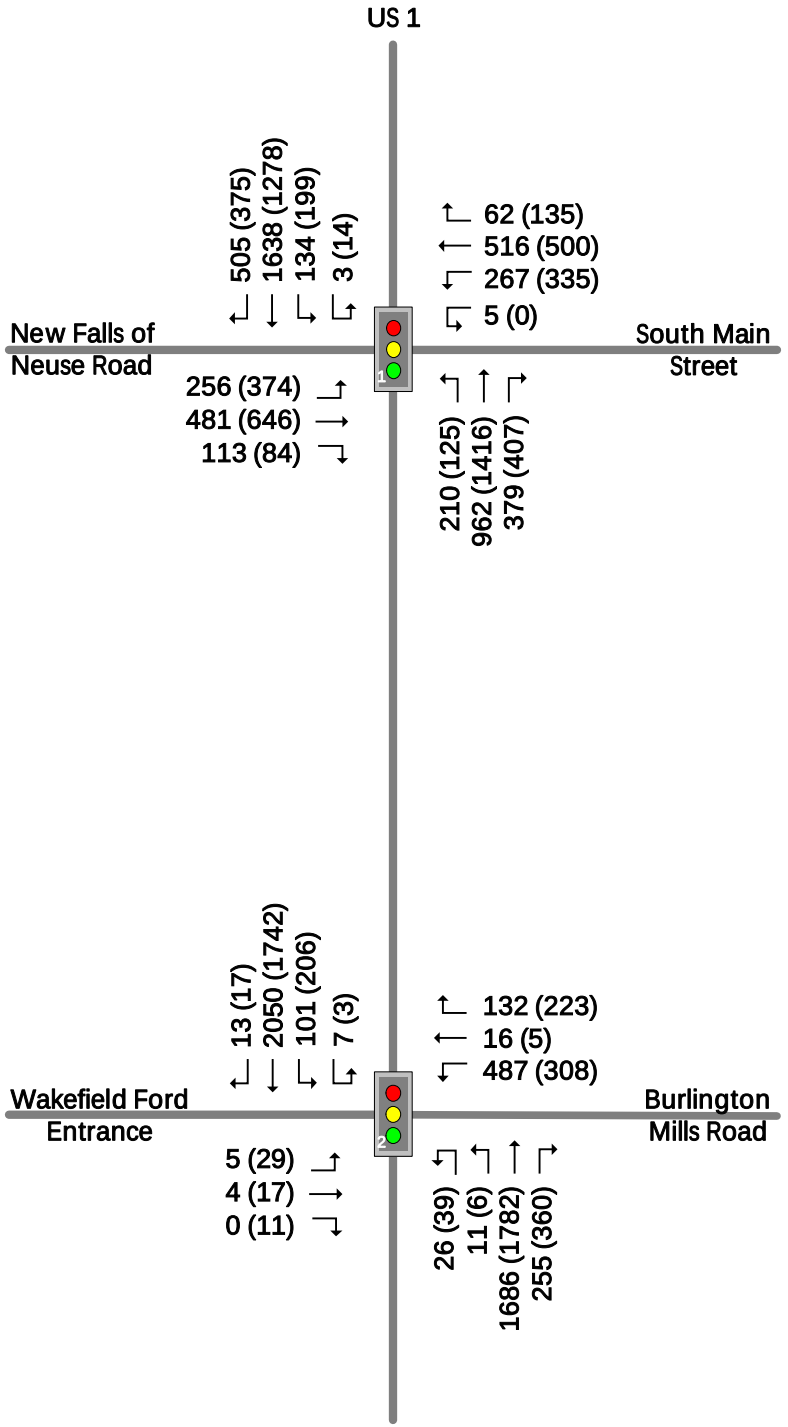
Existing 2023 AM and PM Traffic Volumes

LEGEND

XX (XX) – AM (PM) Traffic Volumes

Figure 3

EXULT ENGINEERING



EXISTING SAFETY ANALYSIS

Exult Engineering reviewed crash patterns and severities at the two study intersections as part of this analysis. Intersection crash analyses were provided by NCDOT Traffic Safety Unit for a five-year period from March 1, 2018 to February 28, 2023. Table 1 summarizes the collisions at the two study area intersections organized by type. Additional details from the crash summaries are provided in the Appendix (starting on page 67) for reference.

Table 1: Summary of Crash History At Study Area Intersections

Crash Type	US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road	US 1 (Capital Boulevard) at Burlington Mills Road
Angle	17	11
Fixed Object	0	0
Left Turn	9	5
Other	3	1
Pedestrian	0	0
Ran Off Road	2	1
Rear End	121	51
Right Turn	2	1
Sideswipe	25	9
Total Number of Crashes	**179**	**79**
Intersection Severity Index	**2.57**	**2.22**

Crash frequency indicates how often a crash occurs, and can sometimes identify recurring issues, trends, or patterns. Based on our analysis of the crash data, there were 179 total crashed reported at the intersection of US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road and 79 total crashes reported at the intersection of US 1 (Capital Boulevard) at Burlington Mills Road over the past five years. Predominant crash types at both intersections include rear end crashes (68% and 65%, respectively), sideswipe crashes (14% and 11%, respectively), and angle crashes (9% and 14%, respectively).

The crash severity index gives an indication of the crash severity at each intersection. Fatal and injury crashes are more severe than property-damage only (PDO) crashes and are weighted accordingly when calculating the crash severity index. Locations with a severity index greater than 8.4 indicate more severe injuries were sustained in crashes. Locations with a severity index less than 8.4 indicate less severe and/or infrequent injuries sustained in crashes. Intersections with a severity index greater than 8.4 should be further evaluated for possible safety countermeasures.

Based on our analysis of the crash data, there were no reported fatal or disabling Class “A” injury crashes at either intersection over the last five years. A severity index of 2.57 was calculated at the intersection of US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road and a severity index of 2.22 was calculated at the intersection of US 1 (Capital Boulevard) at Burlington Mills Road.

FUTURE TRAFFIC SAFETY PREDICITIONS

All Alternatives are expected to reduce the number of crashes at the study intersections as outlined below.

Alternative 1, 1a, and 3 (Reverse RCI's)

A conventional intersection has 32 conflict points, compared to 14 conflict points at a reverse RCI. According to FHWA, an RCI has potential to reduce the likelihood of crashes by 46%, with 63% fewer resulting in injuries and fatalities.

Alternative 2 and 2a (Standard Turn Lane Improvements)

While a conventional intersection does have more conflict points than an RCI, constructing additional turn lanes is still expected to reduce crashes according to the *Crash Modification Factor Clearinghouse* and NCDOT Traffic Safety Unit:

- Adding dual left turn lanes at an intersection is predicted to reduce rear end crashes in left turn lanes by 26-29%.
- Adding dual right turn lanes at an intersection is predicted to reduce rear end crashes in right turn lanes by 15%.
- Increasing the length of the turn lanes at an intersection is predicted to reduce rear end crashes and sideswipe crashes by 15%.

FUTURE CONDITIONS

Based on coordination with the Town and NCDOT, Transportation Improvement Program (TIP) project #U-5307 plans to convert Capital Boulevard to a controlled access facility from I-540 in Raleigh to Purnell Road/Harris Road in Wake Forest, with a Diamond or Partial Cloverleaf interchange at Capital Boulevard and Burlington Mills Road, and a Diverging Diamond Interchange (DDI) at Capital Boulevard and South Main Street. However, only TIP project #U-5307A, from I-540 to north of Durant Road, is funded for construction, with a planned construction year of 2026. TIP projects #U-5307B, #U-5307C, and #U-5307D are not yet funded for construction. Therefore, the TIP project was not considered in this analysis.

Future Year No-Build Conditions

Based on coordination with the Town, a 3% annual growth rate was applied to the existing traffic volumes to determine 2035 background volumes. Approved developments are developments in the vicinity of the proposed site that have been approved but not yet constructed. The traffic from these approved developments is expected to contribute to the background traffic volumes projected for the study intersections. According to the Town, the following approved and planned developments were to be considered in the future year analyses:

1. Burlington Mills Road Residential – A residential development consisting of 325 multifamily residential units, a drive-in bank with 3 lanes, and a 3,500 square foot fast food restaurant with drive in window with a buildout year of 2024.
2. Casa Esperanza – An urban charter school with a maximum of 754 students with a buildout year of 2022. At the time of data collection, Casa Esperanza was operational and 100 students away from full occupancy. Therefore, only 13% of the approved development traffic was included in the analysis.
3. Hawthorne/Evolve – A residential development consisting of 284 mid-rise multifamily residential units with a buildout year of 2021. At the time of data collection, no CO's had been issued, so 100% of the approved development traffic was included in the analysis.
4. Merritt Unicon – An industrial and office development consisting of 271,500 square feet of industrial park space and 180,000 square feet of general office space with a buildout year of 2025. At the time of data collection, about 14% of the development was built out, so only 86% of the approved development traffic was included in the analysis.
5. Kitchen Farms – A residential development consisting of 257 single family detached residential units and 25 residential townhome units with a buildout year of 2019. At the time of data collection, phases 1A and 2A were built out, so only traffic from phase 2B was included in the analysis.
6. Riverplace Mixed Use – a planned mixed use development to consist of 100,000 square feet of retail and 500 single family residential units, with a planned buildout year before 2035.

According to NCDOT and the Town, no roadway improvements are committed to by others at the study intersections.

The approved development traffic was added to 2035 background traffic growth to determine 2035 AM and PM peak hour no-build traffic volumes at the study intersections. The projected 2035 no-build traffic volumes for the study intersections are shown in Figure 4 (2035 AM Peak Hour No-Build Traffic Volumes)

and Figure 5 (2035 PM Peak Hour No-Build Traffic Volumes). Detailed traffic volume calculations are also included in the Appendix (starting on page 67) of this report.

A traffic forecast was completed in 2017 by RS&H for TIP # U-5307. Projected traffic from the traffic forecast was compared to the grown peak hour counts and approved development traffic for validity. As shown in Table 2 below, the traffic volumes used in this analysis were conservative when compared to the traffic forecast.

Table 2: Volume Comparison

Location	2023 Peak Hour Count	Approved Development Traffic	Estimated 2023 AADT	Estimated 2040 AADT (Grown by 3%)	2040 No-Build AADT from Traffic Forecast
Capital N of Main	3,791	331	41,220	68,130	55,900
Capital S of Main	3,645	572	42,170	69,700	57,500
Main E of Capital	2,222	171	23,930	39,550	36,500
Falls of Neuse W of Capital	2,104	213	23,170	38,300	35,100
Capital N of Burlington Mills	4,002	553	45,550	75,290	57,500
Capital S of Burlington Mills	4,248	423	46,710	77,200	59,800
Burlington Mills E of Capital	1,119	398	15,170	25,070	23,000
Crossroads W of Capital	85	608	6,930	11,450	1,500

US 1 Traffic Study

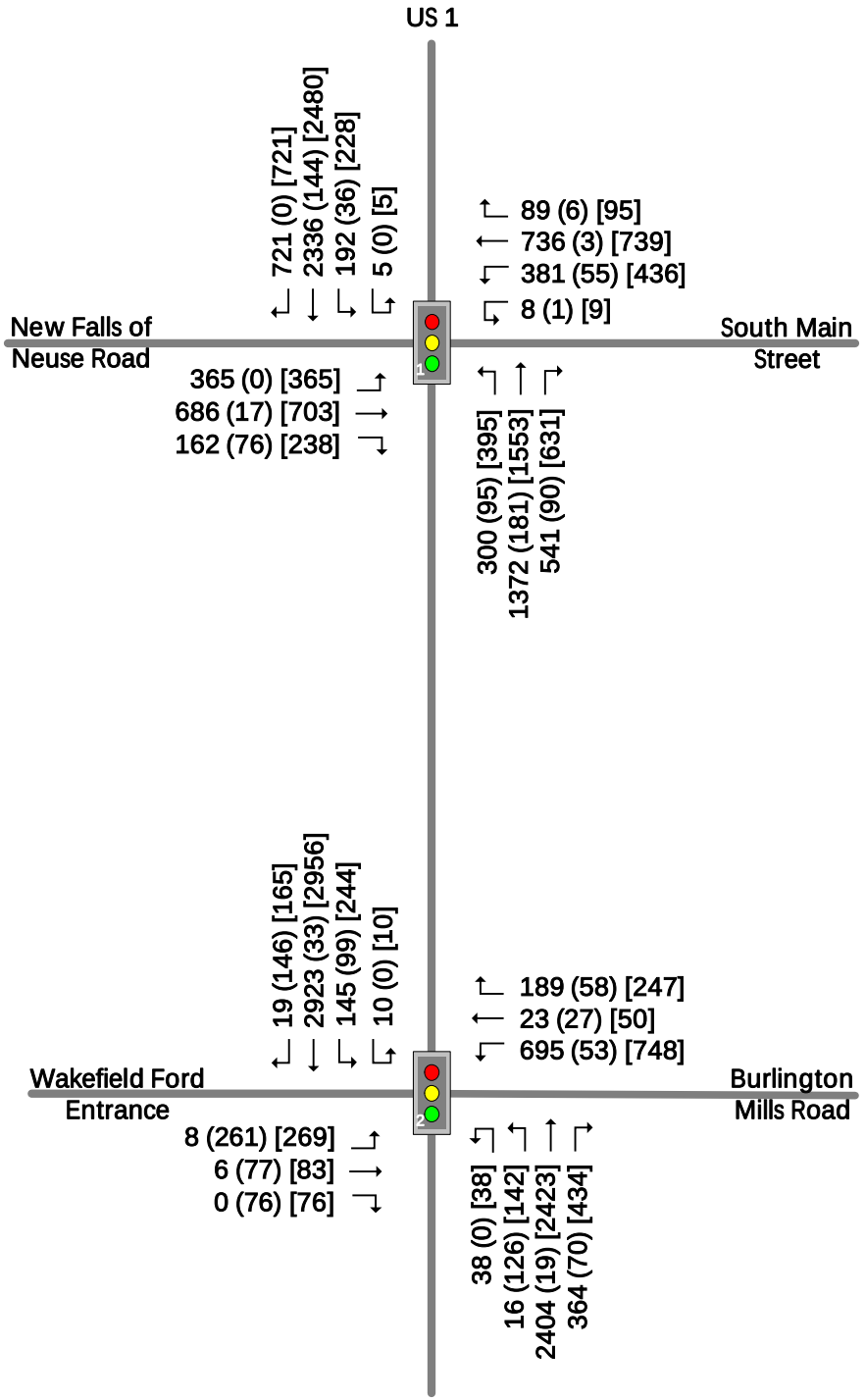
2035
AM Peak Hour
No-Build Traffic

LEGEND

XX – 2035 Background Traffic Due to Growth Rate
(XX) – Approved Development Traffic
[XX] – 2035 Total No-Build Traffic
XX + (XX) = [XX]

Figure 4

EXULT ENGINEERING



US 1 Traffic Study

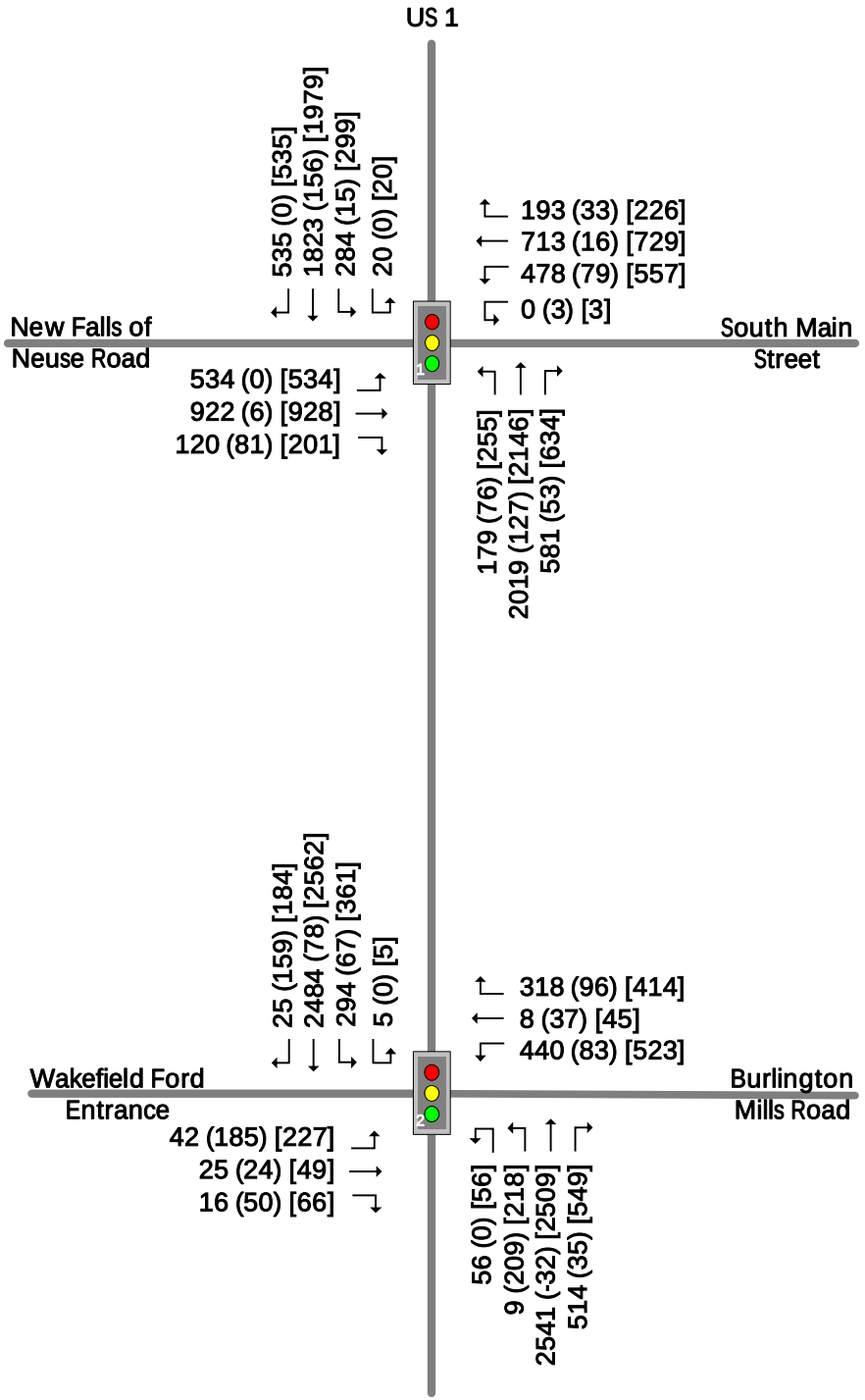
2035
PM Peak Hour
No-Build Traffic

LEGEND

XX – 2035 Background Traffic Due to Growth Rate
(XX) – Approved Development Traffic
[XX] – 2035 Total No-Build Traffic
XX + (XX) = [XX]

Figure 5

EXULT ENGINEERING



Future Year Buildout Conditions

Five build Alternatives were developed to address traffic and safety concerns at these two study intersections as follows:

- Alternative 1 consists of converting the two existing study intersections to reverse reduced conflict intersections (RRCI's) and constructing associated new U-turn locations along with widening Capital Boulevard from just south of Burlington Mills Road to the existing 6-lane section just south of South Main Street
- Alternative 1a consists of converting the two existing study intersections to reverse reduced conflict intersections (RRCI's) and constructing associated new U-turn locations without widening Capital Boulevard.
- Alternative 2 consists of constructing additional turn lanes at the two existing study intersections along with widening Capital Boulevard from just south of Burlington Mills Road to the existing 6-lane section just south of South Main Street.
- Alternative 2a consists of constructing additional turn lanes at the two existing study intersections without widening Capital Boulevard
- Alternative 3 consists of converting only the intersection with Burlington Mills Road to a reverse reduced conflict intersection (RRCI) without widening Capital Boulevard, and no improvements to the intersection with South Main Street.

To account for the Alternative 1, 1a, and 3 reverse RCI configurations, the future year traffic volumes at the standard geometry intersections were reassigned to the allowable movements and next available U-turn intersections being proposed. The 2035 Alternative 1 and 1a buildout traffic volumes with the reverse RCI configurations are shown on Figure 6 (2035 AM Peak Hour Buildout Traffic – Alternative 1 and 1a) and Figure 7 (2035 PM Peak Hour Buildout Traffic – Alternative 1 and 1a).

The 2035 Alternative 2 and 2a buildout traffic volumes are shown on Figure 8 (2035 AM and PM Peak Hour Buildout Traffic – Alternative 2 and 2a).

The 2035 Alternative 3 buildout traffic volumes are the same as the traffic volumes for Alternative 1/1a at the intersection with Burlington Mills Road, and the same as the traffic volumes for Alternative 2/2a at the intersection with South Main Street.

US 1 Traffic Study

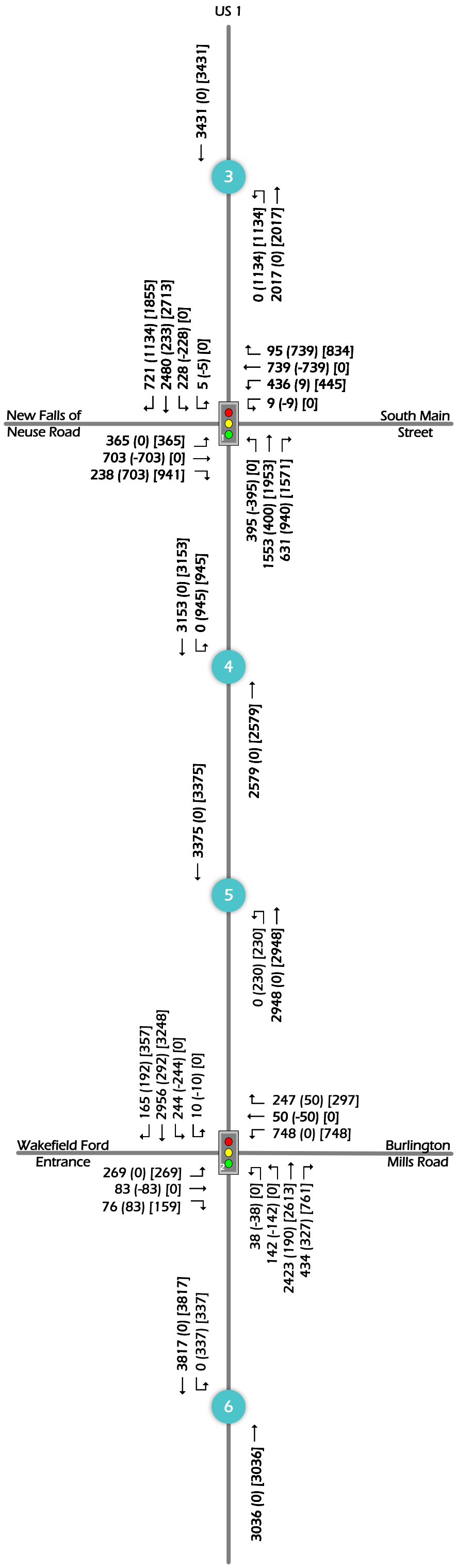
2035
AM Peak Hour Buildout Traffic (Alternative 1 and 1a)

LEGEND

XX – No-Build Traffic
(XX) – Reverse RCI Reassignment Traffic
[XX] – Total Buildout Traffic
XX + (XX) = [XX]

Figure 6

EXULT ENGINEERING



US 1 Traffic Study

2035

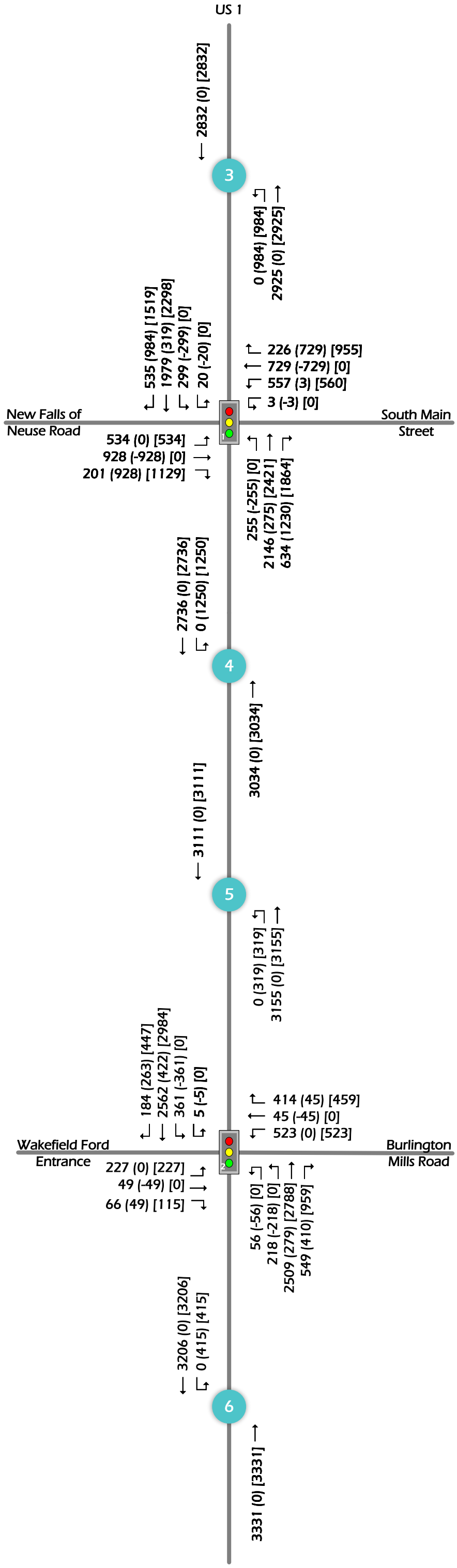
PM Peak Hour Buildout Traffic (Alternative 1 and 1a)

LEGEND

XX – No-Build Traffic
(XX) – Reverse RCI Reassignment Traffic
[XX] – Total Buildout Traffic
XX + (XX) = [XX]

Figure 7

EXULT ENGINEERING



US 1 Traffic Study

2035

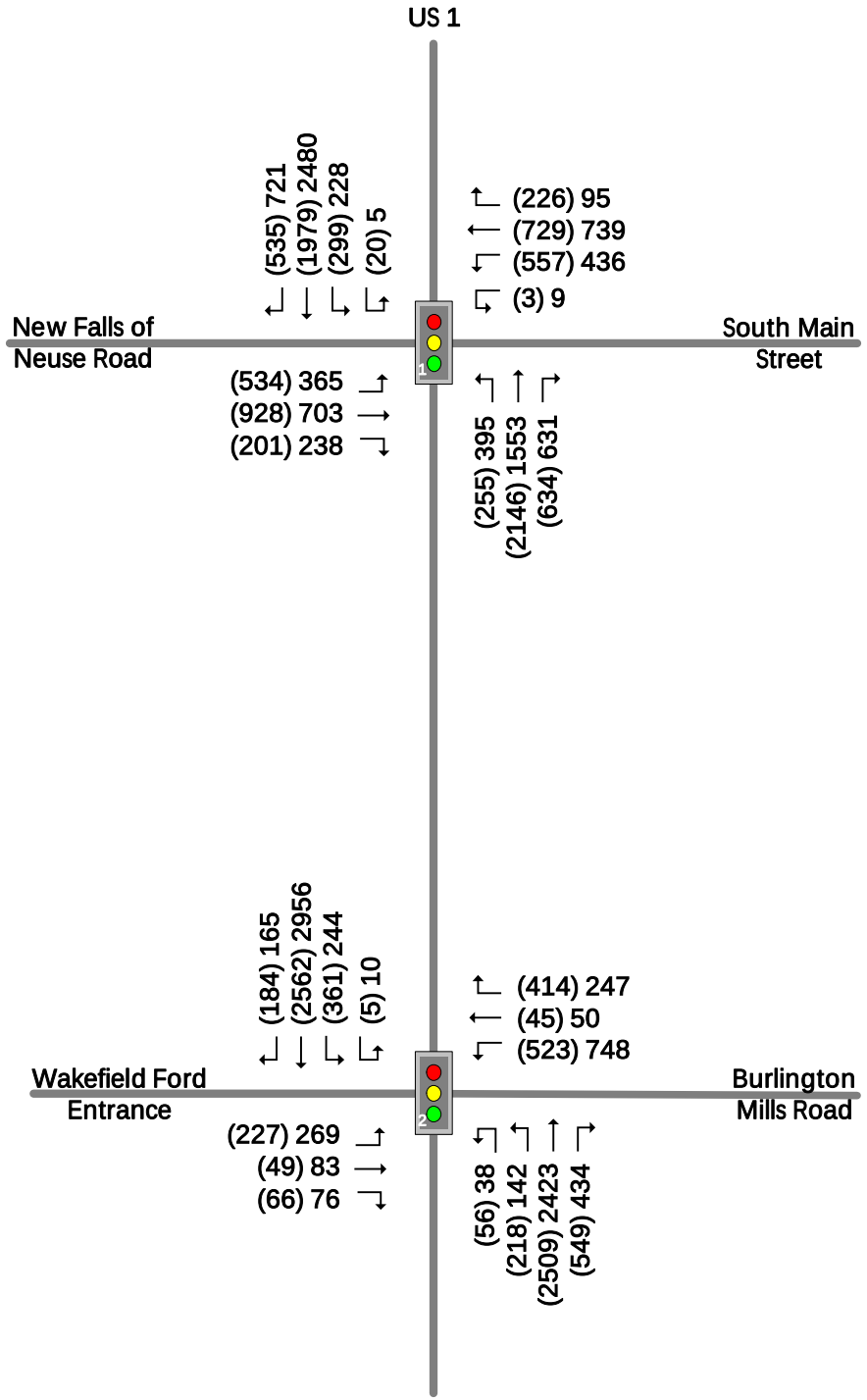
AM & PM Peak Hour Buildout Traffic (Alternative 2 and 2a)

LEGEND

XX – AM Buildout Traffic
(XX) – PM Buildout Traffic

Figure 8

EXULT ENGINEERING



CAPACITY ANALYSIS

The intersections identified within the study area were analyzed under 2023 existing, 2035 no-build, and 2035 buildout conditions to identify recommended roadway improvements. Roadway improvements were recommended based on the level-of-service (LOS), delay, queuing, and roadway feasibility results.

This study includes the analysis of the following traffic scenarios:

- Existing (2023) AM and PM Peak Hour
- No-Build (2035) AM and PM Peak Hour
- Buildout (2035) Alternative 1 (Reverse RCI) with widening AM and PM Peak Hour with Recommended Improvements
- Buildout (2035) Alternative 1a (Reverse RCI) without widening AM and PM Peak Hour with Recommended Improvements
- Buildout (2035) Alternative 2 (Standard Turn Lane Improvements) with widening AM and PM Peak Hour with Recommended Improvements
- Buildout (2035) Alternative 2a (Standard Turn Lane Improvements) without widening AM and PM Peak Hour with Recommended Improvements
- Buildout (2035) Alternative 3 (Reverse RCI at Burlington Mills Road Only) without widening AM and PM Peak Hour with Recommended Improvements

LOS is a qualitative measurement of traffic operations that is a measure of delay time. The Transportation Research Board's *Highway Capacity Manual* (HCM) defines six levels of service for intersections with LOS "A" representing the best operating condition and LOS "F" representing the worst. The following table summarizes the criteria for signalized intersections and stop-controlled intersections.

Table 3: Highway Capacity Manual (LOS and Delay)

Signalized Intersection		Stop-Controlled Intersection	
Level-of-Service (LOS)	Average Control Delay (Seconds per Vehicles)	Level-of-Service (LOS)	Average Control Delay (Seconds per Vehicle)
A	≤ 10.0	A	≤ 10.0
B	> 10.0 and ≤ 20.0	B	> 10.0 and ≤ 15.0
C	> 20.0 and ≤ 35.0	C	> 15.0 and ≤ 25.0
D	> 35.0 and ≤ 55.0	D	> 25.0 and ≤ 35.0
E	> 55.0 and ≤ 80.0	E	> 35.0 and ≤ 50.0
F	> 80.0	F	> 50.0

Version 11.1 of Synchro Professional software was used to determine the LOS, delay, and expected queue length at the signalized and unsignalized intersections. SimTraffic was also used to determine the

maximum queue length experienced at the study intersections. This software is based on the analysis procedures defined in the HCM and detailed reports are included in the Appendix (starting in page 67) of this report. Queue lengths for the turn lanes are shown in the summary tables. Detailed Synchro and SimTraffic reports are included in the Appendix (starting on page 67) of this report.

Capacity Analysis Inputs

The *NCDOT Congestion Management Capacity Analysis Guidelines* were referenced to perform this traffic study. The following inputs were used for all intersections:

- Peak Hour Factor (PHF) was based on existing count data for existing scenarios for each approach. For no-build and buildout scenarios, a PHF of 0.90 was used.
- Heavy vehicles percentage for existing scenarios was based on existing traffic count data for each intersection, or 2%, whichever was higher. For all future scenarios, heavy vehicle percentage was set to 2% for no-build and buildout scenarios.
- For allowable movements where zero (0) volumes are projected, a value of four (4) was used in the Synchro capacity analysis model.
- Default values for detectors, vehicle extension, and minimum gap were used.
- In accordance with NCDOT's *Capacity Analysis Guidelines Best Practices*, unless otherwise stated, U-turns were coded with permissive phasing when a conflicting right-turn overlap was present if existing signage indicates the U-turn must yield. It is important to note this creates a custom turn type and coding conflict in Synchro.
- Right-turns on red were not permitted with two exceptions:
    - For right-turn overlap movements that conflict with a U-turn movement at the signalized intersection in the buildout scenarios, permissive only phasing was applied with allowance of right-turn-on-red (RTOR) to accurately model the right-turn overlap phase.
    - For right-turn channelized yield-controlled movements, right-turn-on-red (RTOR) was allowed for the right turns to accurately model the yield-controlled conditions.
- Lost time set to 5 seconds, yellow time set to 5 seconds, and red time set to 2 seconds in future scenarios.

The following subsections summarize the LOS and queue length results for the capacity analysis under 2023 existing, 2035 no-build, and 2035 buildout traffic conditions as well as recommended improvements for each study intersection.

US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road

US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road is currently a four-legged signalized intersection that is part of the City of Raleigh coordinated signal system. Existing signal plans obtained from NCDOT were used for modeling the intersection. Based on correspondence with the City of Raleigh, the intersection currently runs in free operation all day. Therefore, the Max Greens shown on the signal plan were used to model the existing splits. It is important to note that the sum of the Max Greens do not equal a complete cycle length. Therefore, additional time was allocated to Phase 8 in the existing synchro models to accurately model this intersection. Based on NCDOT's *Capacity Analysis Guidelines*, in order to appropriately model this intersection, U-turns were coded with permissive phasing because a conflicting right-turn overlap was present and existing signage indicates the U-turn must yield. It is important to note this creates a custom turn type and coding conflict in Synchro.



Northbound Approach of Capital Boulevard at South Main Street/Falls of Neuse Road

For future no-build and buildout scenarios, the following input values were used in accordance with NCDOT Congestion Management guidelines:

- Cycle lengths were optimized by intersection for the no-build and Alternative 2, 2a, and 3 buildout scenarios. For Alternative 1 and 1a buildout scnearios, cycle lengths were optimized by two separate zones, where each zone consisted of the reverse RCI and its corresponding u-turns. The cycle length meets minimum and maximum cycle length guidelines. Offset, lead/lag phasing, and splits for each intersection were also optimized as described previously.
- Minimum initial was set to 14 seconds for the major street through movements and 7 seconds for the major street left-turns and minor street.
- Left-turn treatment for exclusive left-turn lane movements was set to protected only.
- Default values for detectors, vehicle extension and minimum gap were used.

Five buildout Alternatives were considered at this intersection:

- Alternative 1 considered widening Capital Boulevard and re-configuring the intersection to a reverse RCI and adding corresponding U-turn locations located to the north and south of the intersection.
- Alternative 1a considered re-configuring the intersection to a reverse RCI and adding corresponding U-turn locations located to the north and south of the intersection without widening Capital Boulevard. The 6-lane section was dropped at the southern U-turn location.
- Alternative 2 considered widening Capital Boulevard and constructing standard turn lane improvements at this intersection.
- Alternative 2a considered constructing standard turn lane improvements at this intersection without widening Capital Boulevard.
- Alternative 3 did not consider any improvements at this intersection.

At the onset of this project, a standard RCI was also considered at this intersection. However, based on preliminary results, it was determined that a standard RCI (restricting the side-streets to right turns only and allowing mainline leftovers) would not operate well in this location. The preliminary results of the standard RCI are included in the appendix (starting on page 67) of this report. After further evaluation, it was determined that a reverse RCI (allowing left and right turns from the side-streets, but restricting main leftovers) would improve operations more than a standard RCI. Therefore, a reverse RCI was evaluated further in place of the standard RCI.

Table 4 summarizes the capacity analysis results for the signalized intersection of US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road under 2023 existing and 2035 no-build scenarios. As shown in Table 4 below, the intersection currently operates at LOS F during the AM peak hour and LOS E during the PM peak hour. The intersection is expected to operate at LOS F during both the AM and PM peak hours under 2035 no-build conditions. It should also be noted that the existing and no-build northbound and southbound lefts at the intersection may be overestimated due to modeling the u-turns with permissive phasing per NCDOT's *Capacity Analysis Guidelines.* If the u-turns were modeled with protected phasing, delays may be reduced.

Table 4: Level-of-Service: Existing and No-Build Results – US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2023 Existing	Overall – F (120.3) EB – F (87.3) WB – F (445.3) NB – D (38.0) SB – E (67.3)	EBL – 320'/430' EBR – 187'/211' WBL/U – 474'/325' NBL – 245'/468' NBR – 228'/282' SBL/U – 246'/270' SBR – 581'/340'	Overall – E (72.1) EB – E (63.8) WB – E (59.7) NB – D (41.0) SB – F (115.0)	EBL – 159'/291' EBR – 118'/257' WBL – 257'/341' NBL – 112'/128' NBR – 230'/258' SBL/U – 313'/302' SBR – 357'/332'
2035 No-Build	Overall – F (365.4) EB – F (266.0) WB – F (532.7) NB – F (273.5) SB – F (409.8)	EBL – 206'/281' EBR – 285'/348' WBL/U – 429'/260' NBL – 350'/410' NBR – 558'/241' SBL/U – 252'/248' SBR – 904'/340'	Overall – F (421.2) EB – F (501.9) WB – F (742.5) NB – F (401.1) SB – F (231.1)	EBL – 208'/306' EBR – 242'/460' WBL – 546'/336' NBL – 218'/89' NBR – 684'/192' SBL/U – 342'/279' SBR – 550'/340'

Buildout Alternative 1:

Table 5 summarizes the capacity analysis results for the signalized intersection under 2035 Buildout Alternative 1 conditions. The main intersection is expected to operate at LOS D during the AM peak hour and LOS E during the PM peak hour under Alternative 1 buildout conditions. The U-turn north of South Main Street is expected to operate at LOS F during the AM peak hour and LOS D during the PM peak hour.

The U-turn south of South Main Street is expected to operate at LOS C during the AM peak hour and LOS F during the PM peak hour.

While the u-turn north of South Main Street is expected to operate at LOS F during the AM peak hour, and the u-turn south of South Main Street is expected to operate at LOS F during the PM peak hour, there are no additional improvements that can be made to achieve LOS D without additional widening along Capital Boulevard.

Additionally, while the eastbound and westbound approaches are still expected to operate at LOS F, the eastbound approaches delay is expected to decrease by 52% during the AM peak hour and 69% during the PM peak hour, and the westbound approach delay is expected to decrease by 76% during the AM peak hour and 77% during the PM peak hour when compared to the no-build scenario. However, it should be noted that the existing and no-build delays may be overestimated due to modeling the u-turns with permissive phasing per NCDOT's *Capacity Analysis Guidelines*.

The recommendations to accommodate future year traffic for Alternative 1 below are based on Synchro and SimTraffic results, as well as roadway feasibility constraints. It is important to note that:

- The reported SimTraffic eastbound left and right turn queues in the PM peak hour exceeds the recommended storage lengths. However, one of the eastbound left turn lanes and one of the eastbound right turn lanes will have continuous storage.
- The reported SimTraffic westbound left queue in the AM and PM peak hours exceed the recommended storage length. However, one of the westbound left turn lanes will have continuous storage.
- The reported Synchro and SimTraffic northbound U-turn queue in the AM peak hour at the U-turn north of South Main Street exceeds the recommended storage length. However, this is the maximum amount of storage available to still retain the existing leftover at Popes Creek Drive.

Table 5: Level-of-Service: Alt 1: Reverse RCI – With Widening – US 1 (Capital Boulevard) at Main Street/Falls of Neuse Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2035 Buildout – Alternative 1 (Reverse RCI Main Intersection)	Overall – D (54.7) EB – F (126.9) WB – F (124.3) NB – B (10.9) SB – D (48.5)	EBL – 364'/806' EBR – 745'/712' WBL – 481'/1106' WBR – 627'/613' NBR – 0'/67' SBR – 0'/ 198'	Overall – E (71.4) EB – F (153.4) WB – F (169.8) NB – C (30.4) SB – D (42.8)	EBL – 551'/1191' EBR – 903'/1112' WBL – 589'/1118' WBR – 793'/941' NBR – 0'/49' SBR – 0'/191'
2035 Buildout – Alternative 1 (U-Turn North of South Main Street)	Overall – F (121.8) NBU – F (134.9) SB – F (117.6)	NBU – 1008'/758'	Overall – D (52.6) NBU – E (65.9) SB – D (48.0)	NBU – 573'/640'
2035 Buildout – Alternative 1 (U-Turn South of South Main Street)	Overall – C (33.3) SBU – D (39.4) NB – C (31.0)	SBU – 285'/364'	Overall – F (100.8) SBU – F (110.6) NB – F (96.7)	SBU – 805'/748'

The following improvements are recommended for Alternative 1 to accommodate future year traffic:

Capital Boulevard and South Main Street/Falls of Neuse Road (Reverse RCI):

- Extend the outside existing eastbound left turn lane on Falls of Neuse Road to accommodate 700' of storage and appropriate taper.
- Extend the inside existing eastbound left turn lane on Falls of Neuse Road to provide continuous storage.
- Restripe the existing eastbound through lane on Falls of Neuse Road to an eastbound right turn lane.
- Extend the existing eastbound right turn lane on Falls of Neuse Road to accommodate 900' of storage and appropriate taper.
- Construct an exclusive eastbound right turn lane on Falls of Neuse Road with 900' of storage and appropriate taper.
- Extend the outside existing westbound left turn lane on South Main Street to accommodate 600' of storage and appropriate taper.
- Extend the inside westbound left turn lane on South Main Street to provide continuous storage.
- Restripe the existing westbound through lane on South Main Street to a westbound right turn lane.
- Extend and restripe the existing westbound shared through/right lane on South Main Street to an exclusive right turn lane to accommodate 920' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on South Main Street with 450' of storage and appropriate taper.
- Remove the existing northbound left turn lanes on Capital Boulevard.

- Extend the existing northbound right turn lane on Capital Boulevard to provide 300' of storage and appropriate taper.
- Construct a second exclusive northbound right turn lane on Capital Boulevard with 300' of storage and appropriate taper.
- Remove the existing southbound left turn lanes on Capital Boulevard.
- Extend the existing southbound right turn lane on Capital Boulevard to provide 300' of storage and appropriate taper.
- Construct a second exclusive southbound right turn lane on Capital Boulevard with 300' of storage and appropriate taper.

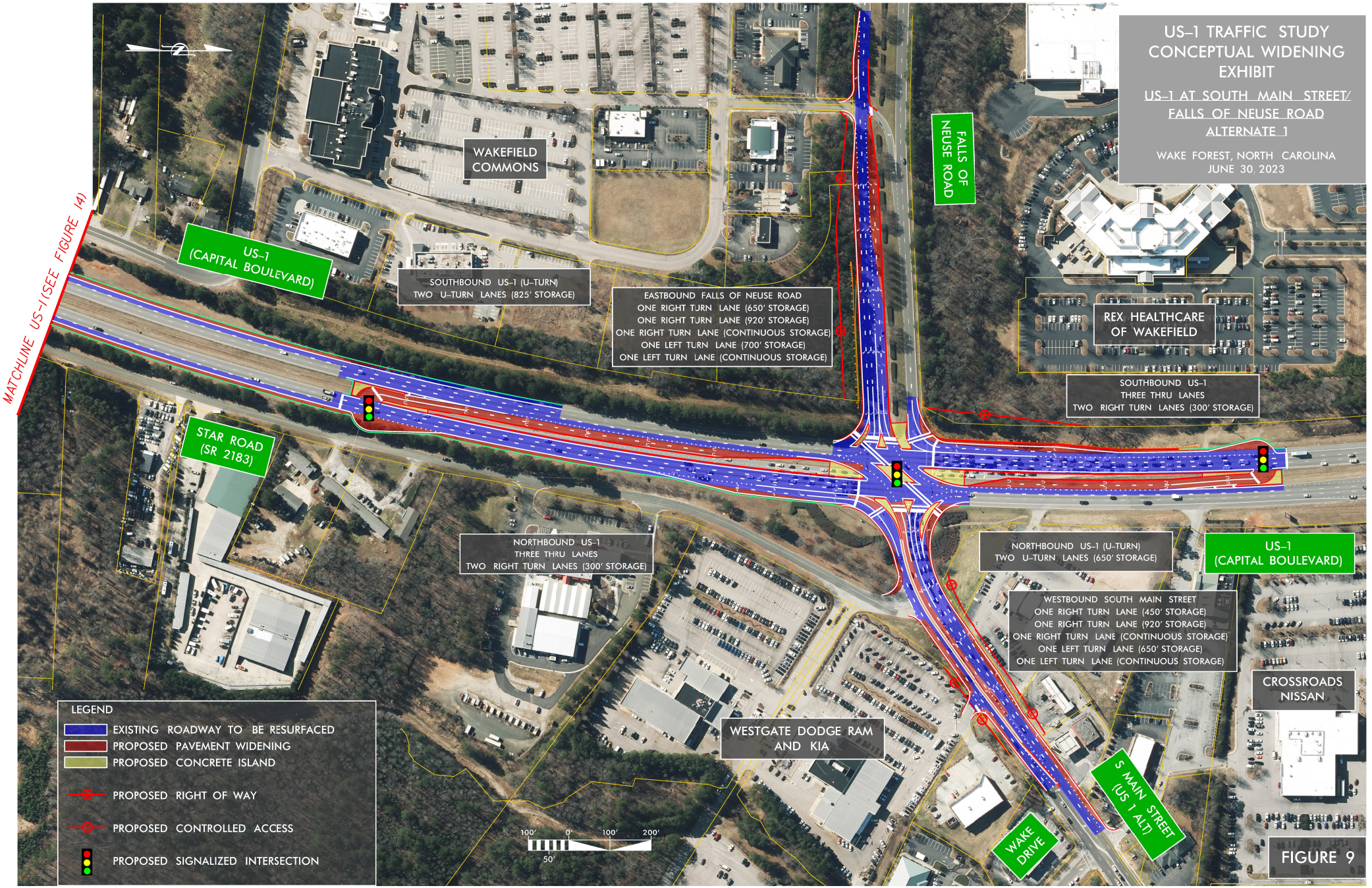
Capital Boulevard at U-turn north of South Main Street

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.
- Construct a u-turn intersection with dual northbound u-turn lanes on Capital Boulevard with 650' of storage and appropriate taper. Recommended intersection placement is approximately 900' north of the RCI intersection.

Capital Boulevard at U-turn south of South Main Street

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.
- Construct a u-turn intersection with dual southbound u-turn lanes on Capital Boulevard with 825' of storage and appropriate taper. Recommended intersection placement is approximately 1250' south of the RCI intersection.

The conceptual design exhibit for Alternative 1 is shown on Figure 9 below.


US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT
US–1 AT SOUTH MAIN STREET/ FALLS OF NEUSE ROAD ALTERNATE 1
WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023
MATCHLINE US–1 (SEE FIGURE 14)
US–1 (CAPITAL BOULEVARD)
WAKEFIELD COMMONS
SOUTHBOUND US–1 (U–TURN)
TWO U–TURN LANES (825' STORAGE)
EASTBOUND FALLS OF NEUSE ROAD
ONE RIGHT TURN LANE (650' STORAGE)
ONE RIGHT TURN LANE (920' STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (700' STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)
FALLS OF NEUSE ROAD
REX HEALTHCARE OF WAKEFIELD
SOUTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (300' STORAGE)
STAR ROAD (SR 2183)
NORTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (300' STORAGE)
NORTHBOUND US–1 (U–TURN)
TWO U–TURN LANES (650' STORAGE)
US–1 (CAPITAL BOULEVARD)
WESTBOUND SOUTH MAIN STREET
ONE RIGHT TURN LANE (450' STORAGE)
ONE RIGHT TURN LANE (920' STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (650' STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)
CROSSROADS NISSAN
WESTGATE DODGE RAM AND KIA
S MAIN STREET (US 1 ALT)
WAKE DRIVE
LEGEND
EXISTING ROADWAY TO BE RESURFACED
PROPOSED PAVEMENT WIDENING
PROPOSED CONCRETE ISLAND
PROPOSED RIGHT OF WAY
PROPOSED CONTROLLED ACCESS
PROPOSED SIGNALIZED INTERSECTION
100' 0' 100' 200'
50'
FIGURE 9

Buildout Alternative 1a:

Table 6 summarizes the capacity analysis results for the signalized intersection under 2035 Buildout Alternative 1a conditions, without widening Capital Boulevard. Since this intersection is already widening to a 6-lane section just south of the intersection, the results for Alternative 1a are similar to those of Alternative 1 at the main intersection and the u-tun north of South Main Street. Similarly to Alternative 1, the main intersection is expected to operate at LOS D during the AM peak hour and LOS E during the PM peak hour under Alternative 1a buildout conditions. The U-turn north of South Main Street is expected to operate at LOS F during the AM peak hour and LOS D during the PM peak hour. The U-turn south of South Main Street is expected to operate at LOS F during the both the AM and PM peak hours.

Table 6: Level-of-Service: Alt 1a: Reverse RCI – Without Widening – US 1 (Capital Boulevard) at Main Street/Falls of Neuse Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2035 Buildout – Alternative 1a (Reverse RCI Main Intersection)	Overall – D (54.8) EB – F (126.9) WB – F (124.3) NB – B (11.4) SB – D (48.5)	EBL – 364'/524' EBR – 745'/503' WBL – 481'/1091' WBR – 627'/917' NBR – 0'/24' SBR – 0'/ 191'	Overall – E (71.0) EB – F (153.4) WB – F (169.8) NB – C (29.4) SB – D (42.8)	EBL – 551'/1176' EBR – 903'/1088' WBL – 589'/1117' WBR – 793'/927' NBR – 0'/44' SBR – 0'/191'
2035 Buildout – Alternative 1a (U-Turn North of South Main Street)	Overall – F (122.0) NBU – F (135.5) SB – F (117.6)	NBU – 1068'/758'	Overall – D (52.7) NBU – E (65.9) SB – D (48.0)	NBU – 573'/630'
2035 Buildout – Alternative 1a (U-Turn South of South Main Street)	Overall – F (141.3) SBU – F (174.2) NB – F (129.2)	SBU – 423'/775'	Overall – F (230.1) SBU – F (247.6) NB – F (222.8)	SBU – 977'/1079'

The recommended improvements for Alternative 1a are the same as Alternative 1, with a recommendation to drop the 6-lane section of Capital Boulevard at the southern U-turn location. A conceptual exhibit was not prepared for Alternative 1a, however, the engineer's opinion of probable construction cost is presented in Table 16.

Buildout Alternative 2:

Table 7 summarizes the capacity analysis results for the intersection under 2035 Buildout Alternative 2 conditions. The intersection is expected to operate at LOS F during the AM and PM peak hours under Alternative 2 buildout conditions. However, with the recommended improvements in place, the intersection is expected to decrease the overall intersection delay by 12% in the AM peak hour and 11% in the PM peak hour when compared to the no-build scenario.

The recommendations to accommodate future year traffic for Alternative 2 below are based on Synchro and SimTraffic results, as well as roadway feasibility constraints.

It is important to note that the reported SimTraffic maximum for the southbound right-turn movement is not represented accurately due to the congested southbound through movement along Capital Boulevard. The recommended storage is expected to accommodate the southbound right-turning vehicles.

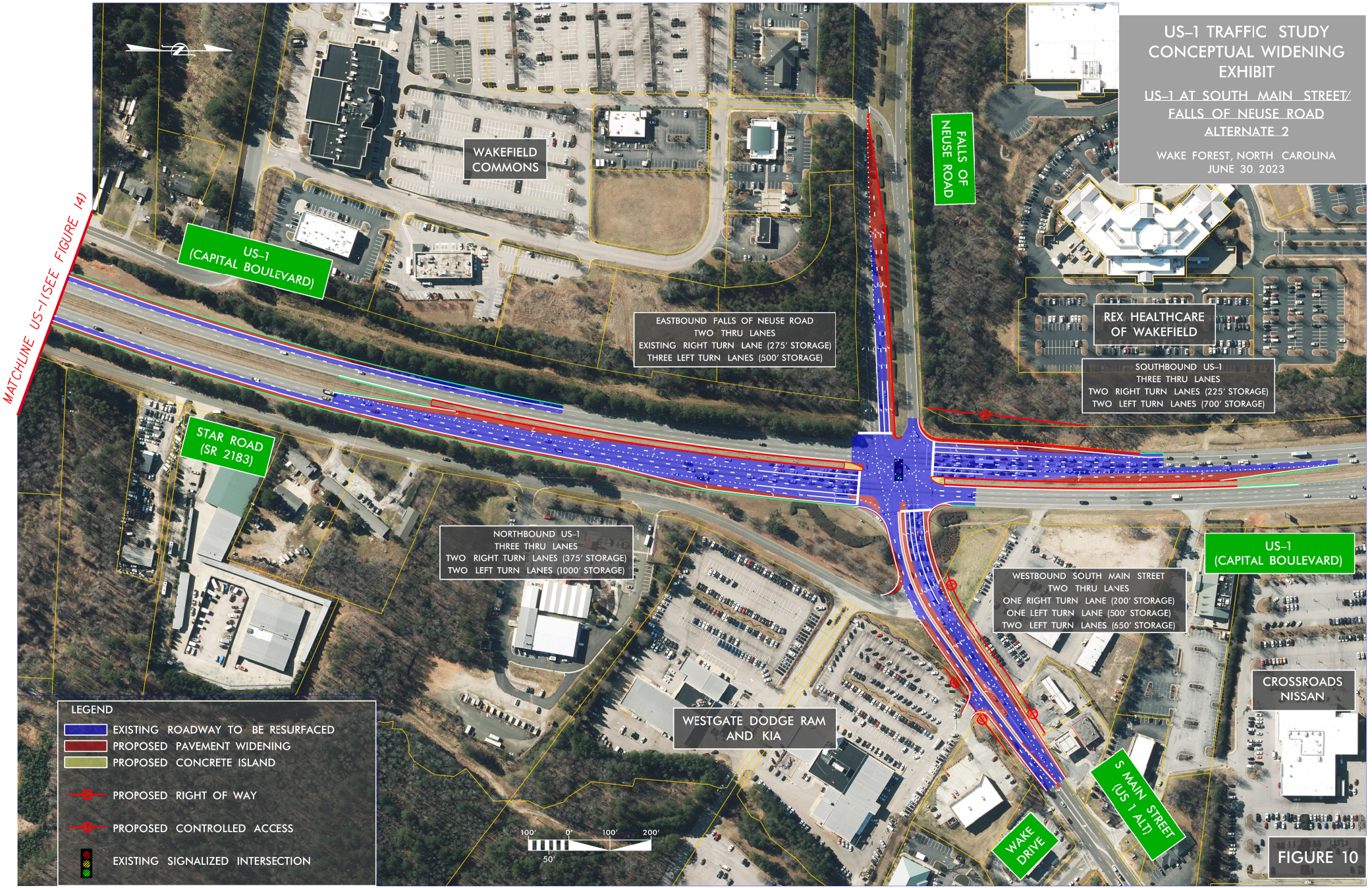
Table 7: Level-of-Service: Alt 2: Turn Lane Improvements – With Widening – US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2035 Buildout – Alternative 2 (Standard Turn Lane Improvements)	Overall – F (85.6) EB – F (130.2) WB – F (139.3) NB – E (57.9) SB – E (69.4)	EBL –278'/557' EBR – 293'/460' WBL/U – 332'/666' WBR – 12'/300' NBL – 387'/1135' NBR – 357'/91' SBL/U – 207'/522' SBR – 218'/354'	Overall – F (85.5) EB – F (109.9) WB – F (97.5) NB – F (81.0) SB – E (69.8)	EBL – 340'/458' EBR – 211'/460' WBL – 389'/666' WBR – 195'/300' NBL – 193'/558' NBR – 271'/358' SBL/U – 365'/778' SBR – 179'/322'

The following improvements are recommended for Alternative 2 to accommodate future year traffic:

- Extend the northbound left turn lanes on Capital Boulevard to accommodate 1000’ of storage and appropriate taper.
- Construct a second northbound right turn lane on Capital Boulevard with 375’ of storage and appropriate taper.
- Extend the existing northbound right turn lane on Capital Boulevard to accommodate 375’ of storage and appropriate taper.
- Extend the dual southbound left turn lanes on Capital Boulevard to accommodate 700’ of storage and appropriate taper.
- Construct a second southbound right turn lane on Capital Boulevard with 225’ of storage and appropriate taper.
- Extend the existing southbound right turn lane on Capital Boulevard to accommodate 225’ of storage and appropriate taper.
- Construct a third eastbound left turn lane on Falls of Neuse Road with 500’ of storage and appropriate taper.
- Extend the existing dual eastbound left turn lanes on Falls of Neuse Road to accommodate 500’ of storage and appropriate taper.
- Construct a third westbound left turn lane on South Main Street with 500’ of storage and appropriate taper.
- Extend the existing dual westbound left turn lanes on South Main Street to accommodate 600’ and 700’ of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on South Main Street with 200’ of storage and appropriate taper.
- Restripe the existing westbound shared through/right turn lane on South Main Street with an exclusive westbound through lane.
- Install signage for the right turns to yield to the protected u-turns.

The conceptual design exhibit for Alternative 2 is shown on Figure 10 below.


US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT
US–1 AT SOUTH MAIN STREET/ FALLS OF NEUSE ROAD
ALTERNATE 2
WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023
MATCHLINE US-1 (SEE FIGURE 14)
US–1 (CAPITAL BOULEVARD)
WAKEFIELD COMMONS
FALLS OF NEUSE ROAD
REX HEALTHCARE OF WAKEFIELD
EASTBOUND FALLS OF NEUSE ROAD
TWO THRU LANES
EXISTING RIGHT TURN LANE (275' STORAGE)
THREE LEFT TURN LANES (500' STORAGE)
SOUTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (225' STORAGE)
TWO LEFT TURN LANES (700' STORAGE)
STAR ROAD (SR 2183)
NORTHBOUND US–1
THREE THRU LANES
TWO RIGHT TURN LANES (375' STORAGE)
TWO LEFT TURN LANES (1000' STORAGE)
US–1 (CAPITAL BOULEVARD)
WESTBOUND SOUTH MAIN STREET
TWO THRU LANES
ONE RIGHT TURN LANE (200' STORAGE)
ONE LEFT TURN LANE (500' STORAGE)
TWO LEFT TURN LANES (650' STORAGE)
CROSSROADS NISSAN
WESTGATE DODGE RAM AND KIA
S MAIN STREET (US 1 ALT)
WAKE DRIVE
LEGEND
EXISTING ROADWAY TO BE RESURFACED
PROPOSED PAVEMENT WIDENING
PROPOSED CONCRETE ISLAND
PROPOSED RIGHT OF WAY
PROPOSED CONTROLLED ACCESS
EXISTING SIGNALIZED INTERSECTION
100' 0' 100' 200'
50'
FIGURE 10

Buildout Alternative 2a:

Table 8 summarizes the capacity analysis results for the intersection under 2035 Buildout Alternative 2a conditions, without widening Capital Boulevard. Since this intersection is already widening to a 6-lane section just south of the intersection, the results for Alternative 2 are similar to those of Alternative 2a at this intersection. The intersection is expected to operate at LOS F during the AM and PM peak hours under Alternative 2a buildout conditions.

Table 8: Level-of-Service: Alt 2a: Standard Turn Lane Improvements – Without Widening – US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length
2035 Buildout – Alternate 2a (Standard Turn Lane Improvements)	Overall – F (83.2) EB – F (130.2) WB – F (139.3) NB – D (50.0) SB – E (69.4)	EBL –278'/551' EBR – 293'/460' WBL/U – 332'/666' WBR – 12'/300' NBL – 264'/699' NBR – 176/53' SBL/U – 207'/517' SBR – 218'/338'	Overall – F (82.7) EB – F (109.9) WB – F (97.5) NB – E (72.5) SB – E (69.8)	EBL – 340'/466' EBR – 211'/460' WBL – 389'/667' WBR – 195'/300' NBL – 143'/244' NBR – 110'/102' SBL/U – 365'/692' SBR – 179'/331'

Since Capital Boulevard is already a 6-lane section starting just south of the intersection, the recommended improvements for Alternative 2a are the same as Alternative 2.

A conceptual exhibit was not prepared for Alternative 2a, however, the engineer's opinion of probable construction cost is presented in Table 16.

Buildout Alternative 3:

Table 9 summarizes the capacity analysis results for the intersection under 2035 Buildout Alternative 3 conditions. Alternative 3 does not consider any widening along Capital Boulevard, or any improvements to the intersection with South Main Street. The results for Alternative 3 are similar to those of the no-build scenario at this intersection. The intersection is expected to operate at LOS F during the AM and PM peak hours under Alternative 3 buildout conditions. There are no recommended improvements for Alternative 3.

A conceptual exhibit was not prepared for Alternative 3, however, the engineer's opinion of probable construction cost is presented in Table 16.

Table 9: Level-of-Service: Alt 3: No Improvements – No Widening – US 1 (Capital Boulevard) at South Main Street/Falls of Neuse Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2035 Buildout Alternate 3 (No Improvements)	Overall – F (103.7) EB – F (113.2) WB – F (166.8) NB – E (65.0) SB – F (105.7)	EBL – 352'/27' EBR – 322'/248' WBL/U – 430'/265' NBL – 425'/804' NBR – 530'/195204' SBL/U – 207'/243' SBR – 818'/340'	Overall – F (118.7) EB – F (138.3) WB – F (159.6) NB – F (113.3) SB – F (90.9)	EBL – 566'/430' EBR – 281'/460' WBL/U – 590'/443' NBL – 293'/157' NBR – 798'/292' SBL/U – 378'/336' SBR – 604'/340'

US 1 (Capital Boulevard) at Burlington Mills Road

US 1 (Capital Boulevard) at Burlington Mills Road is currently a four-legged signalized intersection that is part of the City of Raleigh coordinated signal system. Existing signal plans obtained from NCDOT and existing coordinated timings obtained from the City of Raleigh were used for modeling the intersection. Based on NCDOT's *Capacity Analysis Guidelines*, in order to appropriately model this intersection, U-turns were coded with permissive phasing because a conflicting right-turn overlap was present and existing signage indicates the U-turn must yield. It is important to note this creates a custom turn type and coding conflict in Synchro.



Westbound Approach of US 1 (Capital Boulevard) at Burlington Mills Road

For future no-build and buildout scenarios, the following input values were used in accordance with NCDOT Congestion Management guidelines:

- Cycle lengths were optimized by intersection for the no-build and Alternative 2 and 2a buildout scenarios. For Alternative 1, 1a, and 3 buildout scenarios, cycle lengths were optimized by two separate zones, where each zone consisted of the reverse RCI and its corresponding u-turns. The cycle length meets minimum and maximum cycle length guidelines. Offset, lead/lag phasing, and splits for each intersection were also optimized as described previously.
- Minimum initial was set to 14 seconds for the major street through movements and 7 seconds for the major street left-turns and minor street.
- Left-turn treatment for exclusive left-turn lane movements was set to protected only.
- Default values for detectors, vehicle extension and minimum gap were used.

Five buildout Alternatives were considered at this intersection:

- Alternative 1 considered widening Capital Boulevard and re-configuring the intersection to a reverse RCI and adding corresponding U-turn locations located to the north and south of the intersection.
- Alternative 1a considered re-configuring the intersection to a reverse RCI and adding corresponding U-turn locations located to the north and south of the intersection without widening Capital Boulevard.
- Alternative 2 considered widening Capital Boulevard and constructing standard turn lane improvements at this intersection.
- Alternative 2a considered constructing standard turn lane improvements at this intersection without widening Capital Boulevard.
- Alternative 3 considered re-configuring the intersection to a reverse RCI and adding corresponding U-turn locations located to the north and south of the intersection without widening Capital Boulevard.

At the onset of this project, a standard RCI was also considered at this intersection. However, based on preliminary results, it was determined that a standard RCI (restricting the side-streets to right turns only and allowing mainline leftovers) would not operate as well in this location. The preliminary results of the standard RCI are included in the appendix (starting on page 67) of this report. After further evaluation, it was determined that a reverse RCI (allowing left and right turns from the side-streets, but restricting main leftovers) would improve operations more than a standard RCI. Therefore, a reverse RCI was evaluated further in place of the standard RCI.

Table 10 summarizes the capacity analysis results for the signalized intersection of US 1 (Capital Boulevard) at South Main Street/Burlington Mills Road under 2023 existing and 2035 no-build scenarios. As shown in Table 11 below, the intersection currently operates at LOS F during both the AM and PM peak hours. The intersection is expected to operate at LOS F during the AM peak hour and PM peak hour under 2035 no-build conditions. It should also be noted that the existing and no-build northbound and southbound lefts at the intersection may be overestimated due to modeling the u-turns with permissive phasing per NCDOT's *Capacity Analysis Guidelines.* If the u-turns were modeled with protected phasing, delays may be reduced.

Table 10: Level-of-Service: Existing and No-Build – US 1 (Capital Boulevard) at Burlington Mills Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2023 Existing	Overall – F (132.8) EB – F (112.4) WB – F (100.1) NB – F (110.2) SB – F (163.0)	EBL – 26'/34' WBL – 457'/642' NBL/U – 203'/479' NBR – 160'/525' SBL/U – 478'/627' SBR – 23'/155'	Overall – F (207.0) EB – F (145.7) WB – F (115.9) NB – D (51.9) SB – F (405.8)	EBL – 106'/100' WBL – 332'/653' NBL/U – 262'/574' NBR – 236'/525' SBL/U – 981'/756' SBR – 24'/252'
2035 No-Build	Overall – F (688.1) EB – F (306.6) WB – F (864.6) NB – F (613.5) SB – F (748.8)	EBL – 531'/1100' WBL – 709'/668' NBL/U – 385'/575' NBR – 371'/525' SBL/U – 541'/748' SBR – 162'/340'	Overall – F (740.6) EB – F (278.5) WB – F (600.2) NB – F (682.3) SB – F (898.0)	EBL – 456'/1087' WBL – 490'/666' NBL/U – 583'/575' NBR – 605'/525' SBL/U – 771'/865' SBR – 195'/340'

Buildout Alternative 1:

Table 11 summarizes the capacity analysis results for the signalized intersection under 2035 Buildout Alternative 1 conditions. The main intersection is expected to operate at LOS D during both the AM and PM peak hours under Alternative 1 buildout conditions. The U-turn north of Burlington Mills Road is expected to operate at LOS D during the AM peak hour and LOS C during the PM peak hour. The U-turn south of Burlington Mills Road is expected to operate at LOS B during the AM peak hour and LOS C during the PM peak hour.

Additionally, while the eastbound and westbound approaches are still expected to operate at LOS E or F, the eastbound approaches delay is expected to decrease by 85% during the AM peak hour and 77% during the PM peak hour, and the westbound approach delay is expected to decrease by 87% during the AM peak hour and 81% during the PM peak hour when compared to the no-build scenario. However, it should be noted that the existing and no-build delays may be overestimated due to modeling the u-turns with permissive phasing per NCDOT's *Capacity Analysis Guidelines.*

The recommendations to accommodate future year traffic for Alternative 1 below are based on Synchro and SimTraffic results, as well as roadway feasibility constraints. It is important to note that:

- The reported SimTraffic eastbound left turn queue in the AM peak hour exceeds the recommended storage lengths. However, one of the eastbound right turn lanes will have continuous storage.
- The reported SimTraffic eastbound right turn queue in the AM peak hour exceeds the recommended storage lengths. However, one of the eastbound right turn lanes will have continuous storage.
- The reported SimTraffic northbound u-turn queue in the PM peak hour exceeds the recommended storage lengths. However, no issues were observed during the SimTraffic runs with the recommended stoage length.

Table 11: Level-of-Service: Alt 1: Reverse RCI – With Widening – US 1 (Capital Boulevard) at Burlington Mills Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2035 Buildout – Alternate 1 – (Reverse RCI Main Intersection)	Overall – D (52.6) EB – F (85.2) WB – F (105.2) NB – C (30.0) SB – D (54.6)	EBL – 191'/220' EBR – 188'/365' WBL – 401'/614' WBR – 300'/308' NBR – 0'/-' SBR – 0'/34'	Overall – D (41.4) EB – E (63.3) WB – F (114.2) NB – D (49.9) SB – A (9.1)	EBL – 143'/194' EBR – 92'/151' WBL – 256'/422' WBR – 375'/369' NBR – 0'/-' SBR – 0'/-'
2035 Buildout – Alternate 1 – (U-Turn North of Burlington Mills Road)	Overall – D (52.0) NBU – E (76.9) SB – D (50.3)	NBU – 268'/401'	Overall – C (31.2) NBU – D (51.7) SB – C (29.1)	NBU – 260'/463'
2035 Buildout – Alternate 1 – (U-Turn Burlington Mills Road)	Overall – B (18.7) SBU – E (64.9) NB – B (13.6)	SBU – 168'/308'	Overall – C (23.1) SBU – D (53.1) NB – B (19.3)	SBU – 190'/263'

The following improvements are recommended for Alternative 1 to accommodate future year traffic:

Capital Boulevard at Burlington Mills Road (Reverse RCI)

- Construct an exclusive eastbound left turn lane on Burlington Mills Road to accommodate 200' of storage and appropriate taper.
- Extend the inside existing eastbound left turn lane on Burlington Mills Road to provide continuous storage.
- Restripe the existing eastbound through lane on Burlington Mills Road to an eastbound right turn lane.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 200' of storage and appropriate taper.
- Construct an exclusive westbound left turn lane on Burlington Mills Road with 600' of storage and appropriate taper.
- Extend the outside existing westbound left turn lane on Burlington Mills Road to accommodate 600' of storage and appropriate taper.
- Extend the inside westbound left turn lane on Burlington Mills Road to provide continuous storage.
- Extend and restripe the existing westbound shared through/right lane on Burlington Mills Road to an exclusive right turn lane to accommodate 400' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on Burlington Mills Road with 400' of storage and appropriate taper.
- Remove the existing northbound left turn lanes on Capital Boulevard.
- Reconfigure the northbound right turn lane on Capital Boulevard to allow for a free-flow movement.
- Remove the existing southbound left turn lanes on Capital Boulevard.
- Reconfigure the southbound right turn lane on Capital Boulevard to allow for a free-flow movement.

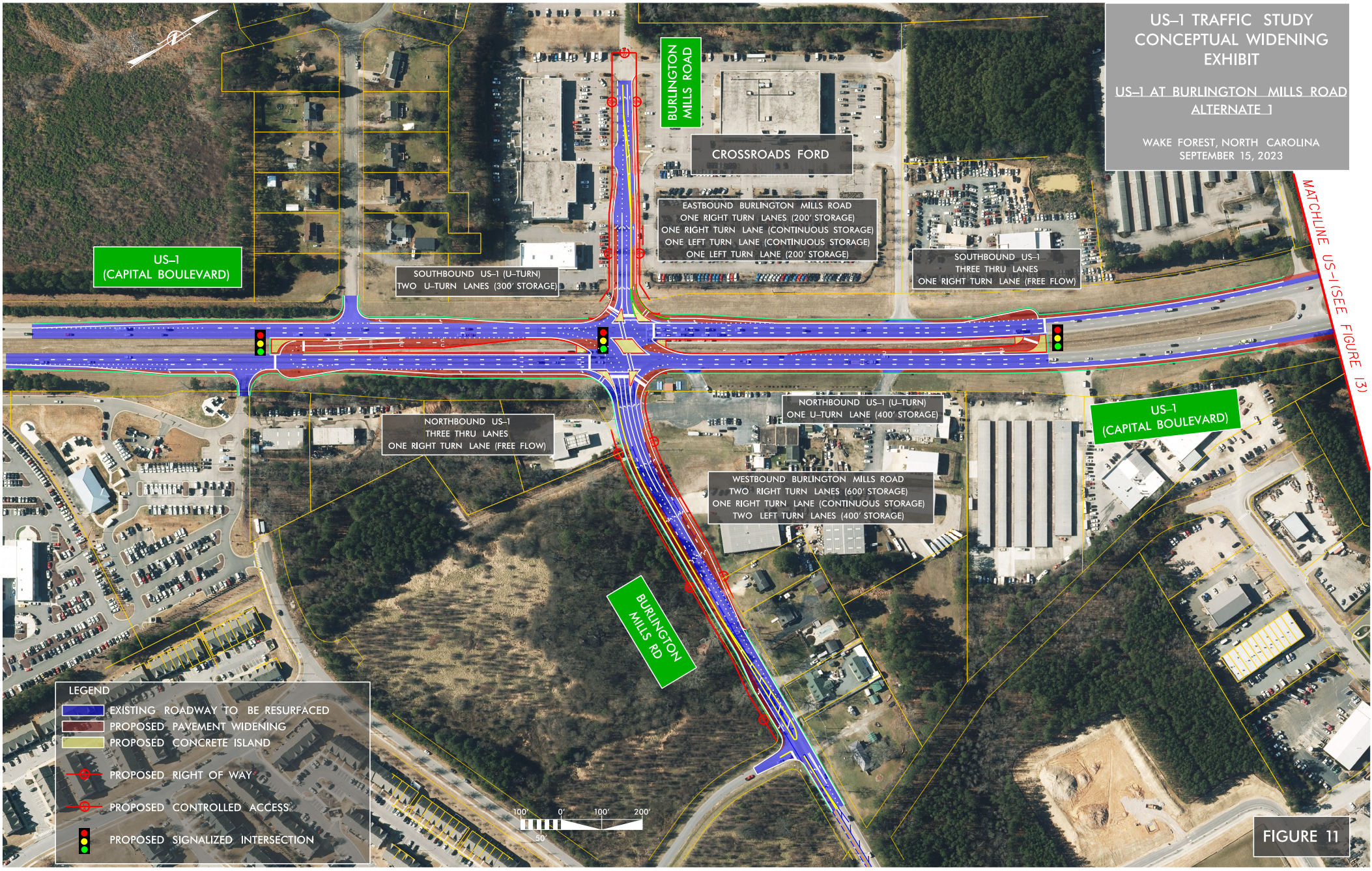
Capital Boulevard at U-turn north of Burlington Mills Road

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.
- Construct a u-turn intersection with one northbound u-turn lane on Capital Boulevard with 400' of storage and appropriate taper.

Capital Boulevard at U-turn south of Burlington Mills Road

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.
- Construct a u-turn intersection with dual southbound u-turn lanes on Capital Boulevard with 300' of storage and appropriate taper.

The conceptual design exhibit for Alternative 1 is shown on Figure 11 below.


US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT
US–1 AT BURLINGTON MILLS ROAD
ALTERNATE 1
WAKE FOREST, NORTH CAROLINA
SEPTEMBER 15, 2023
BURLINGTON MILLS ROAD
CROSSROADS FORD
US–1 (CAPITAL BOULEVARD)
SOUTHBOUND US–1 (U–TURN)
TWO U–TURN LANES (300' STORAGE)
EASTBOUND BURLINGTON MILLS ROAD
ONE RIGHT TURN LANES (200' STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)
ONE LEFT TURN LANE (200' STORAGE)
SOUTHBOUND US–1
THREE THRU LANES
ONE RIGHT TURN LANE (FREE FLOW)
MATCHLINE US–1 (SEE FIGURE 13)
NORTHBOUND US–1
THREE THRU LANES
ONE RIGHT TURN LANE (FREE FLOW)
NORTHBOUND US–1 (U–TURN)
ONE U–TURN LANE (400' STORAGE)
US–1 (CAPITAL BOULEVARD)
WESTBOUND BURLINGTON MILLS ROAD
TWO RIGHT TURN LANES (600' STORAGE)
ONE RIGHT TURN LANE (CONTINUOUS STORAGE)
TWO LEFT TURN LANES (400' STORAGE)
BURLINGTON MILLS RD
LEGEND
EXISTING ROADWAY TO BE RESURFACED
PROPOSED PAVEMENT WIDENING
PROPOSED CONCRETE ISLAND
PROPOSED RIGHT OF WAY
PROPOSED CONTROLLED ACCESS
PROPOSED SIGNALIZED INTERSECTION
100' 0' 100' 200'
50'
FIGURE 11

Buildout Alternative 1a:

Table 12 summarizes the capacity analysis results for the signalized intersection under 2035 Buildout Alternative 1a conditions, without widening Capital Boulevard. Without widening Capital Boulevard, the main intersection is expected to operate at LOS F during the AM and PM peak hour under Alternative 1a buildout conditions. The U-turn north of Burlington Mills Road is expected to operate at LOS F during the AM and PM peak hours. The U-turn south of Burlington Mills Road is expected to operate at LOS F during both the AM and PM peak hours.

Table 12: Level-of-Service: Alt 1a: Reverse RCI – Without Widening – US 1 (Capital Boulevard) at Burlington Mills Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length
2035 Buildout – Alternate 1a – (Reverse RCI Main Intersection)	Overall – F (168.8) EB – F (150.5) WB – F (265.7) NB – F (94.8) SB – F (212.1)	EBL – 284'/283' EBR – 309'/389' WBL – 1048'/1182' WBR – 530'/635' NBR – 0'/-' SBR – 0'/-'	Overall – F (134.8) EB – F (151.6) WB – F (231.2) NB – F (125.9) SB – F (115.2)	EBL – 254'/252' EBR – 238'/292' WBL – 744'/1179' WBR – 740'/784' NBR – 0'/-' SBR – 0'/-'
2035 Buildout – Alternate 1a – (U-Turn North of Burlington Mills Road)	Overall – F (107.6) NBU – F (171.3) SB – F (103.2)	NBU – 188'/277'	Overall – F (108.2) NBU – F (93.1) SB – F (109.7)	NBU – 215'/293'
2035 Buildout – Alternate 1a – (U-Turn South of Burlington Mills Road)	Overall – F (81.3) SBU – F (141.0) NB – E (74.7)	SBU – 214'/295'	Overall – F (135.3) SBU – F (191.5) NB – F (128.3)	SBU – 306'/399'

The following improvements are recommended for Alternative 1a to accommodate future year traffic:

Capital Boulevard at Burlington Mills Road (Reverse RCI)

- Construct an exclusive eastbound left turn lane on Burlington Mills Road to accommodate 300' of storage and appropriate taper.
- Extend the inside existing eastbound left turn lane on Burlington Mills Road to provide continuous storage.
- Restripe the existing eastbound through lane on Burlington Mills Road to an eastbound right turn lane.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 325' of storage and appropriate taper.
- Extend the outside existing westbound left turn lane on Burlington Mills Road to accommodate 925' of storage and appropriate taper.
- Extend the inside westbound left turn lane on Burlington Mills Road to provide continuous storage.

- Extend and restripe the existing westbound shared through/right lane on Burlington Mills Road to an exclusive right turn lane to accommodate 750' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on Burlington Mills Road with 750' of storage and appropriate taper.
- Remove the existing northbound left turn lanes on Capital Boulevard.
- Reconfigure the northbound right turn lane on Capital Boulevard to allow for a free-flow movement.
- Remove the existing southbound left turn lanes on Capital Boulevard.
- Reconfigure the southbound right turn lane on Capital Boulevard to allow for a free-flow movement.

Capital Boulevard at U-turn north of Burlington Mills Road

- Provide a 4-lane divided section on Capital Boulevard with two northbound through lanes and two southbound through lanes.
- Construct a u-turn intersection with dual northbound u-turn lanes on Capital Boulevard with 325' of storage and appropriate taper.

Capital Boulevard at U-turn south of Burlington Mills Road

- Provide a 4-lane divided section on Capital Boulevard with two northbound through lanes and two southbound through lanes.
- Construct a u-turn intersection with dual southbound u-turn lanes on Capital Boulevard with 425' of storage and appropriate taper.

A conceptual exhibit was not prepared for Alternative 1a, however, the engineer's opinion of probable construction cost is presented in Table 16.

Buildout Alternative 2:

Table 13 summarizes the capacity analysis results for the intersection under 2035 Buildout Alternative 2 conditions.

The intersection is expected to operate at LOS D during the AM and PM peak hours under Alternative 2 buildout conditions.

The recommendations to accommodate future year traffic for Alternative 2 below are based on Synchro and SimTraffic results, as well as roadway feasibility constraints. It is important to note that:

- The reported SimTraffic maximum for the northbound right and left-turn movements is not represented accurately due to the congested northbound through movement along Capital Boulevard. The recommended storage is expected to accommodate the northbound right and left-turning vehicles.
- The reported SimTraffic eastbound left turn queue in the PM peak hour exceeds the recommended storage length. However, one of the eastbound left turn lanes will have continuous storage.
- The reported SimTraffic maximum for the eastbound right movement is not represented accurately due to the congested eastbound through movement along Burlington Mills Road. The recommended storage is expected to accommodate the eastbound right-turning vehicles.

- The reported SimTraffic maximum queue for the westbound left turn movement is not represented accurately due to vehicles not fully utilizing all of the available turn length storage. Additionally, one of the westbound left turn lanes will have continuous storage. The recommended storage is expected to accommodate the westbound left-turning vehicles.

Table 13: Level-of-Service: Alt 2: Standard Turn Lane Improvements – With Widening – US 1 (Capital Boulevard) at Burlington Mills Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length
2035 Buildout – Alternative 2 (Traditional Turn Lanes)	Overall – D (51.9) EB – F (93.1) WB – F (96.7) NB – D (41.1) SB – D (42.6)	EBL – 255'/271' EBR – 0'/259' WBL – 469'/770' WBR – 42'/201' NBL/U – 213'/422' NBR – 229'/230' SBL/U – 175'/229' SBR – 15'/340'	Overall – D (46.0) EB – F (97.9) WB – F (83.2) NB – D (47.7) SB – C (26.7)	EBL – 251'/327' EBR – 0'/115' WBL – 305'/421' WBR – 206'/356' NBL/U – 286'/469' NBR – 387'/444' SBL/U – 265'/350' SBR – 19'/340'

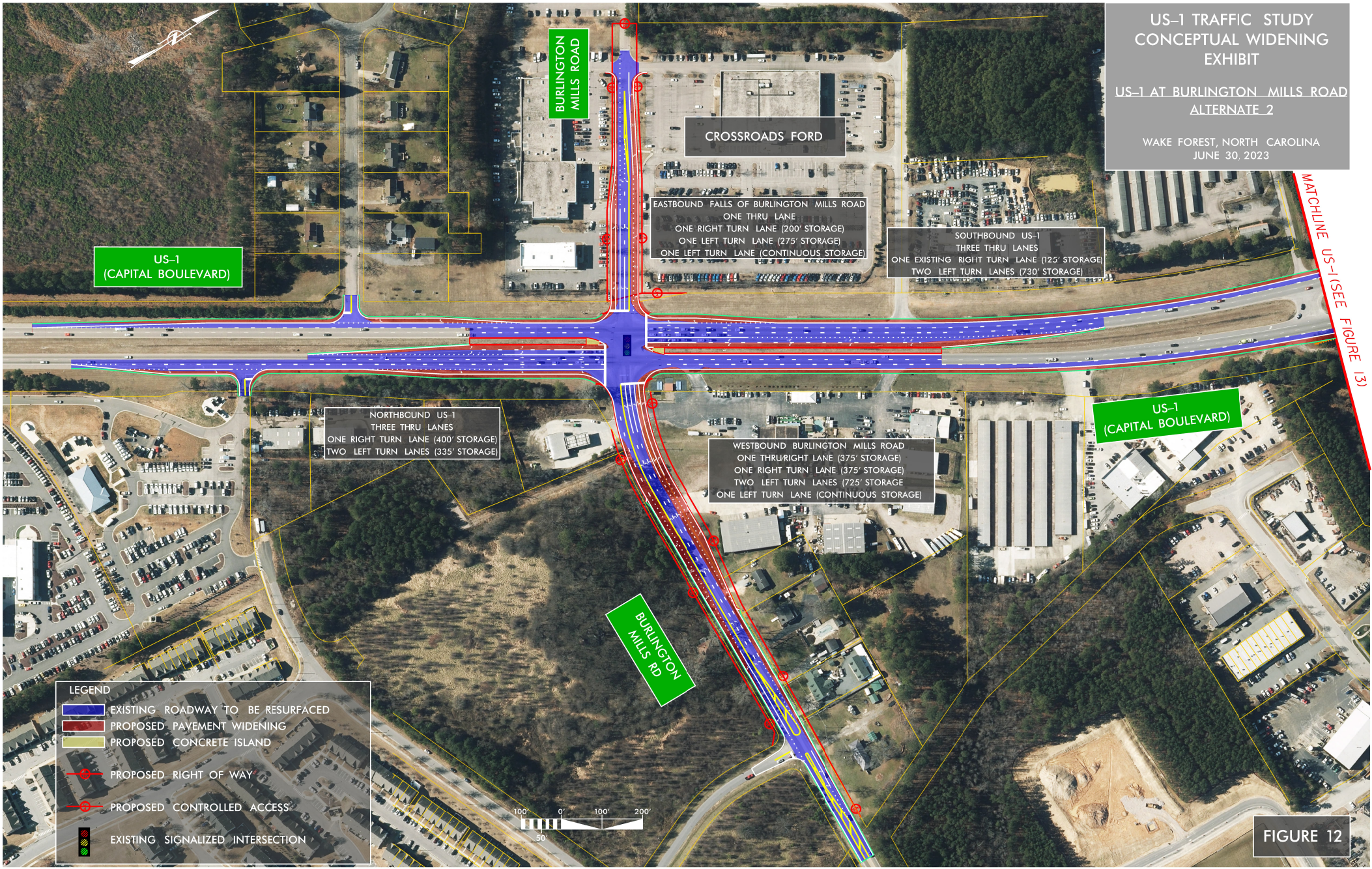
The following improvements are recommended for Alternative 2 to accommodate future year traffic:

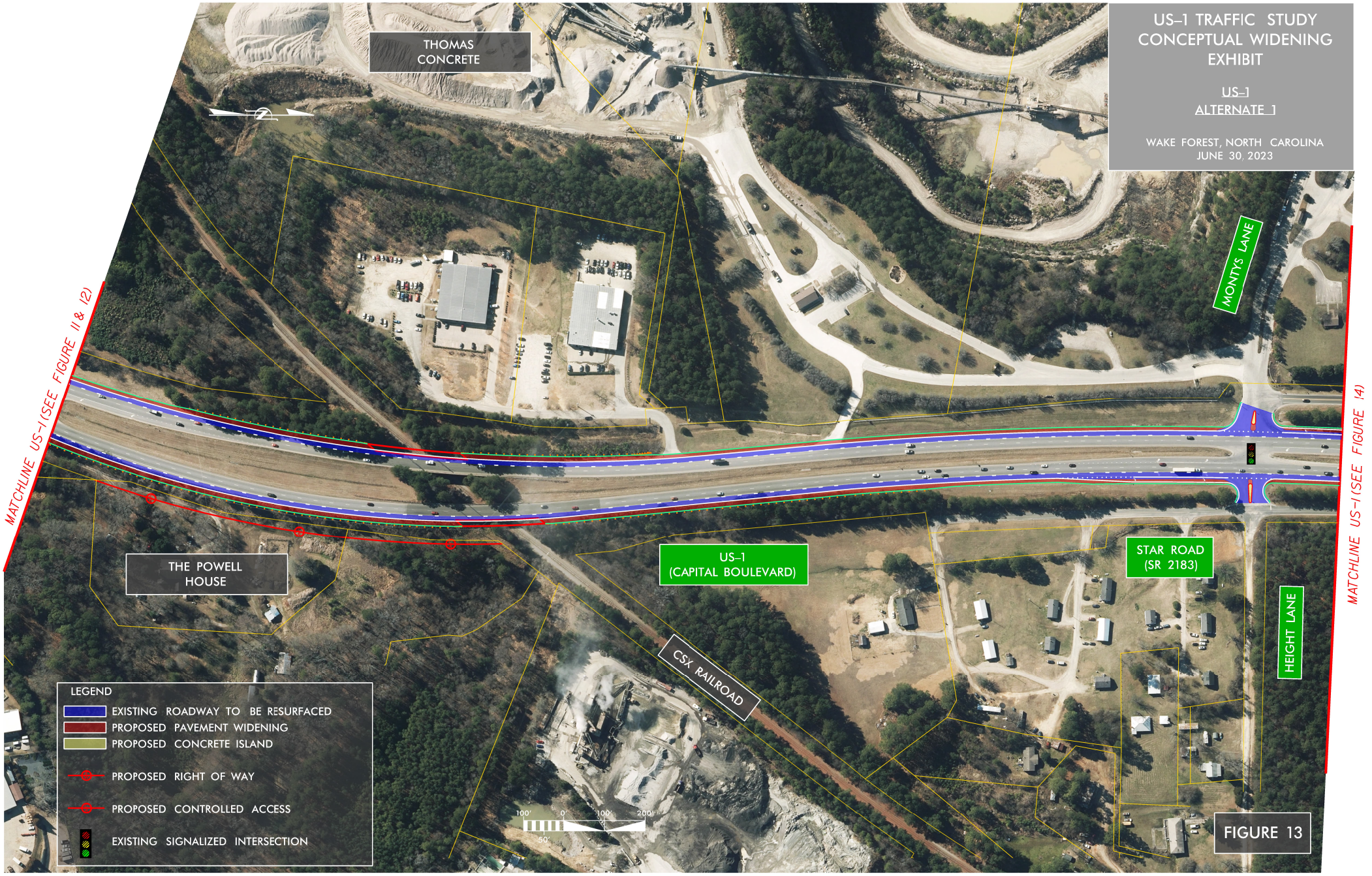
- Construct an additional northbound through lane on Capital Boulevard from 1000' south of the intersection until the existing three lane section south of South Main Street
- Construct an additional northbound left turn lane on Capital Boulevard with 335' of storage and appropriate taper.
- Extend the northbound right turn lane on Capital Boulevard to accommodate 400' of storage and appropriate taper.
- Construct an additional southbound through lane on Capital Boulevard from the existing three lane section south of South Main Street to 1000' south of the intersection.
- Construct an additional southbound left turn lane on Capital Boulevard with 730' of storage and appropriate taper.
- Construct an additional eastbound left turn lane on Burlington Mills Road with 275' of storage and appropriate taper.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 200' of storage and appropriate taper.
- Restripe the existing eastbound shared through/right turn lane on Burlington Mills Road to be an exclusive eastbound through lane.
- Construct an additional westbound receiving lane on Burlington Mills Road.
- Construct an additional westbound left turn lane on Burlington Mills Road with 725' of storage and appropriate taper.
- Extend the existing dual westbound left turn lane on Burlington Mills Road to accommodate 725' of storage and appropriate taper.

- Construct an exclusive westbound right turn lane on Burlington Mills Road with 375’ of storage and appropriate taper.
- Extend the existing shared through/right on Burlington Mills Road with 375’ of storage and appropriate taper.
- Construct an additional eastbound receiving lane on Burlington Mills Road that terminates at Urial Drive.
- Install signage for the right turns to yield to the protected u-turns.

The conceptual design exhibit for Alternative 2 is shown on Figure 12 below.

Figure 13 and Figure 14 show the conceptual design for the recommended widening along Capital Boulevard between Burlington Mills Road and South Main Street/Falls of Neuse Road.


US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT
US–1 AT BURLINGTON MILLS ROAD
ALTERNATE 2
WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023
BURLINGTON MILLS ROAD
CROSSROADS FORD
US–1 (CAPITAL BOULEVARD)
EASTBOUND FALLS OF BURLINGTON MILLS ROAD
ONE THRU LANE
ONE RIGHT TURN LANE (200' STORAGE)
ONE LEFT TURN LANE (275' STORAGE)
ONE LEFT TURN LANE (CONTINUOUS STORAGE)
SOUTHBOUND US–1
THREE THRU LANES
ONE EXISTING RIGHT TURN LANE (125' STORAGE)
TWO LEFT TURN LANES (730' STORAGE)
MATCHLINE US–1 (SEE FIGURE 13)
NORTHBOUND US–1
THREE THRU LANES
ONE RIGHT TURN LANE (400' STORAGE)
TWO LEFT TURN LANES (335' STORAGE)
WESTBOUND BURLINGTON MILLS ROAD
ONE THRU/RIGHT LANE (375' STORAGE)
ONE RIGHT TURN LANE (375' STORAGE)
TWO LEFT TURN LANES (725' STORAGE
ONE LEFT TURN LANE (CONTINUOUS STORAGE)
US–1 (CAPITAL BOULEVARD)
BURLINGTON MILLS RD
LEGEND
EXISTING ROADWAY TO BE RESURFACED
PROPOSED PAVEMENT WIDENING
PROPOSED CONCRETE ISLAND
PROPOSED RIGHT OF WAY
PROPOSED CONTROLLED ACCESS
EXISTING SIGNALIZED INTERSECTION
100' 0' 100' 200'
50'
FIGURE 12


US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING
EXHIBIT
US–1
ALTERNATE 1
WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023
THOMAS CONCRETE
MONTYS LANE
MATCHLINE US-1 (SEE FIGURE 11 & 12)
MATCHLINE US-1 (SEE FIGURE 14)
THE POWELL HOUSE
US–1 (CAPITAL BOULEVARD)
STAR ROAD (SR 2183)
HEIGHT LANE
CSX RAILROAD
LEGEND
EXISTING ROADWAY TO BE RESURFACED
PROPOSED PAVEMENT WIDENING
PROPOSED CONCRETE ISLAND
PROPOSED RIGHT OF WAY
PROPOSED CONTROLLED ACCESS
EXISTING SIGNALIZED INTERSECTION
100' 0' 100' 200'
50'
FIGURE 13


US–1 TRAFFIC STUDY
CONCEPTUAL WIDENING EXHIBIT
US–1
ALTERNATE 1
WAKE FOREST, NORTH CAROLINA
JUNE 30, 2023
HANSON AGGREGATES
PONDEROSA SERVICE ROAD SR (2182)
US–1 (CAPITAL BOULEVARD)
STAR ROAD (SR 2183)
LIVING WORD FAMILY CHURCH
MATCHLINE US–1 (SEE FIGURE 13)
MATCHLINE US–1 (SEE FIGURE 9 & 10)
LEGEND
EXISTING ROADWAY TO BE RESURFACED
PROPOSED PAVEMENT WIDENING
PROPOSED CONCRETE ISLAND
PROPOSED RIGHT OF WAY
PROPOSED CONTROLLED ACCESS
EXISTING SIGNALIZED INTERSECTION
100′ 0′ 100′ 200′
50′
FIGURE 14

Buildout Alternative 2a:

Table 14 summarizes the capacity analysis results for the intersection under 2035 Buildout Alternative 2a conditions, without widening Capital Boulevard. The intersection is expected to operate at LOS F during the AM and PM peak hours under Alternative 2a buildout conditions.

Table 14: Level-of-Service: Alt 2a: Standard Turn Lane Improvements – Without Widening – US 1 (Capital Boulevard) at Burlington Mills Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length
2035 Buildout – Alternate 2a (Traditional Turn Lanes)	Overall – F (175.8) EB – F (115.2) WB – F (374.7) NB – F (101.7) SB – F (188.5)	EBL – 291'/278' EBR – 0'/221' WBL – 921'/990' WBR – 98'/183' NBL/U – 237'/356' NBR – 191'/625' SBL/U – 205'/463' SBR – 25'/340'	Overall – F (138.3) EB – F (146.8) WB – F (253.6) NB – F (119.2) SB – F (121.4)	EBL – 287'/637' EBR – 0'/144' WBL – 645'/990' WBR – 328'/382' NBL/U – 334'/377' NBR – 316'/625' SBL/U – 325'/610' SBR – 33'/340'

The following improvements are recommended for Alternative 2a to accommodate future year traffic:

- Construct an additional northbound left turn lane on Capital Boulevard with 100' of storage and appropriate taper.
- Construct an additional southbound left turn lane on Capital Boulevard with 350' of storage and appropriate taper.
- Construct an additional eastbound left turn lane on Burlington Mills Road with 500' of storage and appropriate taper.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 200' of storage and appropriate taper.
- Restripe the existing eastbound shared through/right turn lane on Burlington Mills Road to be an exclusive eastbound through lane.
- Construct an additional westbound receiving lane on Burlington Mills Road.
- Extend the existing dual westbound left turn lane on Burlington Mills Road to accommodate 925' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on Burlington Mills Road with 375' of storage and appropriate taper.
- Extend the existing shared through/right on Burlington Mills Road with 375' of storage and appropriate taper.
- Construct an additional eastbound receiving lane on Burlington Mills Road that terminates at Urial Drive.
- Install signage for the right turns to yield to the protected u-turns.

A conceptual exhibit was not prepared for Alternative 2a, however, the engineer's opinion of probable construction cost is presented in Table 16.

Buildout Alternative 3:

Table 15 summarizes the capacity analysis results for the intersection under 2035 Buildout Alternative 3 conditions. Alternative 3 does not consider any widening along Capital Boulevard, but does consider re-configuring the intersection with Burlington Mills Road to a reverse RCI. The results for Alternative 3 are similar to those of Alternative 1a at this intersection. Without widening Capital Boulevard, the main intersection is expected to operate at LOS F during the AM and PM peak hour under Alternative 3 buildout conditions. The U-turn north of Burlington Mills Road is expected to operate at LOS F during the AM and PM peak hours. The U-turn south of Burlington Mills Road is expected to operate at LOS F during both the AM and PM peak hours.

Table 15: Level-of-Service: Alt 3: Reverse RCI – Without Widening – US 1 (Capital Boulevard) at Burlington Mills Road

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length
2035 Buildout – Alternate 3 – (Reverse RCI Main Intersection)	Overall – F (168.8) EB – F (150.5) WB – F (265.7) NB – F (94.8) SB – F (212.1)	EBL – 284'/303' EBR – 309'/404' WBL – 1048'/1182' WBR – 530'/672' NBR – 0'/-' SBR – 0'/-'	Overall – F (134.8) EB – F (151.6) WB – F (231.2) NB – F (125.9) SB – F (115.2)	EBL – 254'/268' EBR – 238'/307' WBL – 744'/1181' WBR – 740'/758' NBR – 0'/-' SBR – 0'/-'
2035 Buildout – Alternate 3 – (U-Turn North of Burlington Mills Road)	Overall – F (107.6) NBU – F (171.3) SB – F (103.2)	NBU – 188'/262'	Overall – F (108.2) NBU – F (93.1) SB – F (109.7)	NBU – 215'/285'
2035 Buildout – Alternate 3 – (U-Turn South of Burlington Mills Road)	Overall – F (81.3) SBU – F (141.0) NB – E (74.7)	SBU – 214'/316'	Overall – F (135.3) SBU – F (191.5) NB – F (128.3)	SBU – 306'/403'

The recommendations and conceptual exhibit for Alternative 3 are the same as Alternative 1a. The engineer's opinion of probable construction cost is presented in Table 16.

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Planning level engineer's opinion of probable construction cost (EOPCC) for construction, utility relocation, and right-of-way were completed for each Build Alternative. These estimates are based on the conceptual designs prepared for the recommended improvements at each intersection. Table 16 summarizes the cost estimate for each Build Alternative.

Table 16: Opinion of Probable Construction Cost

Alternative	Description	Construction	Utility Relocation	Right-of-Way	Total
Alternative 1 (with widening)	US 1 at Burlington Mills Road – Reverse RCI	$12,982,650.00	$500,000.00	$650,000.00	$14,132,650.00
	US 1 at South Main Street/Falls of Neuse Road – Reverse RCI	$12,262,000.00	$650,000.00	$500,000.00	$13,412,000.00
	US 1 Widening to 3 lanes between Burlington Mills Road to South Main Street	$17,192,000.00	$100,000.00	$200,000.00	$17,492,000.00
	Total Cost of Alternative 1	**$42,436,650.00**	**$1,250,000.00**	**$1,350,000.00**	**$45,036,650.00**
Alternative 1a (without widening)	US 1 at Burlington Mills Road – Reverse RCI	$10,759,750.00	$500,000.00	$650,000.00	$11,909,750.00
	US 1 at South Main Street/Falls of Neuse Road – Reverse RCI	$11,909,340.00	$650,000.00	$500,000.00	$13,059,340.00
	Total Cost of Alternative 1a	**$22,669,090.00**	**$1,150,000.00**	**$1,150,000.00**	**$24,969,090.00**
Alternative 2 (with widening)	US 1 at Burlington Mills Road – Standard Turn Lanes	$12,212,000.00	$500,000.00	$915,000.00	$13,627,000.00
	US 1 at South Main Street/Falls of Neuse Road – Standard Turn Lanes	$8,469,000.00	$650,000.00	$200,000.00	$9,319,000.00
	US 1 Widening to 3 lanes between Burlington Mills Road to South Main Street	$17,192,000.00	$100,000.00	$200,000.00	$17,492,000.00
	Total Cost of Alternative 2	**$ 37,873,000.00**	**$ 1,250,000.00**	**$ 1,315,000.00**	**$ 40,438,000.00**
Alternative 2a (without widening)	US 1 at Burlington Mills Road – Standard Turn Lanes	$9,106,475.00	$500,000.00	$865,000.00	$10,471,475.00
	US 1 at South Main Street/Falls of Neuse Road – Standard Turn Lanes	$8,025,720.00	$650,000.00	$200,000.00	$8,875,720.00
	Total Cost of Alternative 2a	**$17,132,195.00**	**$1,150,000.00**	**$1,065,000.00**	**$19,347,195.00**
Alternative 3 (without widening)	US 1 at Burlington Mills Road – Reverse RCI	$10,759,750.00	$500,000.00	$650,000.00	$11,909,750.00
	US 1 at South Main Street/Falls of Neuse Road – No Improvements	$-	$-	$-	$-
	Total Cost of Alternative 3	**$10,759,750.00**	**$500,000.00**	**$650,000.00**	**$11,909,750.00**

RECOMMENDATIONS

The recommended lane geometry for Buildout Alternative 1, 1a, 2, 2a, and 3 are shown on Figures 15, 16, 17, 18, and 19, respectively.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed to accommodate 2035 future year traffic volumes for **Alternative 1**:

Capital Boulevard and South Main Street/Falls of Neuse Road (Reverse RCI):

- Extend the outside existing eastbound left turn lane on Falls of Neuse Road to accommodate 700' of storage and appropriate taper.
- Extend the inside existing eastbound left turn lane on Falls of Neuse Road to provide continuous storage.
- Restripe the existing eastbound through lane on Falls of Neuse Road to an eastbound right turn lane.
- Extend the existing eastbound right turn lane on Falls of Neuse Road to accommodate 900' of storage and appropriate taper.
- Construct an exclusive eastbound right turn lane on Falls of Neuse Road with 900' of storage and appropriate taper.
- Extend the outside existing westbound left turn lane on South Main Street to accommodate 600' of storage and appropriate taper.
- Extend the inside westbound left turn lane on South Main Street to provide continuous storage.
- Restripe the existing westbound through lane on South Main Street to a westbound right turn lane.
- Extend and restripe the existing westbound shared through/right lane on South Main Street to an exclusive right turn lane to accommodate 920' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on South Main Street with 450' of storage and appropriate taper.
- Remove the existing northbound left turn lanes on Capital Boulevard.
- Extend the existing northbound right turn lane on Capital Boulevard to provide 300' of storage and appropriate taper.
- Construct a second exclusive northbound right turn lane on Capital Boulevard with 300' of storage and appropriate taper.
- Remove the existing southbound left turn lanes on Capital Boulevard.
- Extend the existing southbound right turn lane on Capital Boulevard to provide 300' of storage and appropriate taper.
- Construct a second exclusive southbound right turn lane on Capital Boulevard with 300' of storage and appropriate taper.

Capital Boulevard at U-turn north of South Main Street

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.
- Construct a u-turn intersection with dual northbound u-turn lanes on Capital Boulevard with 650' of storage and appropriate taper. Recommended intersection placement is approximately 900' north of the RCI intersection.

Capital Boulevard at U-turn south of South Main Street

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.

- Construct a u-turn intersection with dual southbound u-turn lanes on Capital Boulevard with 825' of storage and appropriate taper. Recommended intersection placement is approximately 1250' south of the RCI intersection.

Capital Boulevard at Burlington Mills Road (Reverse RCI)

- Construct an exclusive eastbound left turn lane on Burlington Mills Road to accommodate 200' of storage and appropriate taper.
- Extend the inside existing eastbound left turn lane on Burlington Mills Road to provide continuous storage.
- Restripe the existing eastbound shared through/right lane on Burlington Mills Road to an eastbound right turn lane.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 200' of storage and appropriate taper.
- Construct an exclusive westbound left turn lane on Burlington Mills Road with 600' of storage and appropriate taper.
- Extend the outside existing westbound left turn lane on Burlington Mills Road to accommodate 600' of storage and appropriate taper.
- Extend the inside westbound left turn lane on Burlington Mills Road to provide continuous storage.
- Extend and restripe the existing westbound shared through/right lane on Burlington Mills Road to an exclusive right turn lane to accommodate 400' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on Burlington Mills Road with 400' of storage and appropriate taper.
- Remove the existing northbound left turn lanes on Capital Boulevard.
- Reconfigure the northbound right turn lane on Capital Boulevard to allow for a free-flow movement.
- Remove the existing southbound left turn lanes on Capital Boulevard.
- Reconfigure the southbound right turn lane on Capital Boulevard to allow for a free-flow movement.

Capital Boulevard at U-turn north of Burlington Mills Road

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.
- Construct a u-turn intersection with one northbound u-turn lane on Capital Boulevard with 400' of storage and appropriate taper.

Capital Boulevard at U-turn south of Burlington Mills Road

- Provide a 6-lane divided section on Capital Boulevard with three northbound through lanes and three southbound through lanes.
- Construct a u-turn intersection with dual southbound u-turn lanes on Capital Boulevard with 300' of storage and appropriate taper.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed to accommodate 2035 future year traffic volumes for **Alternative 1a**:

Capital Boulevard and South Main Street/Falls of Neuse Road

The recommended improvements for Alternative 1a are the same as Alternative 1, with a recommendation to drop the 6-lane section of Capital Boulevard at the southern U-turn location.

Capital Boulevard at Burlington Mills Road (Reverse RCI)

- Construct an exclusive eastbound left turn lane on Burlington Mills Road to accommodate 300' of storage and appropriate taper.
- Extend the inside existing eastbound left turn lane on Burlington Mills Road to provide continuous storage.
- Restripe the existing eastbound through lane on Burlington Mills Road to an eastbound right turn lane.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 325' of storage and appropriate taper.
- Extend the outside existing westbound left turn lane on Burlington Mills Road to accommodate 925' of storage and appropriate taper.
- Extend the inside westbound left turn lane on Burlington Mills Road to provide continuous storage.
- Extend and restripe the existing westbound shared through/right lane on Burlington Mills Road to an exclusive right turn lane to accommodate 750' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on Burlington Mills Road with 750' of storage and appropriate taper.
- Remove the existing northbound left turn lanes on Capital Boulevard.
- Reconfigure the northbound right turn lane on Capital Boulevard to allow for a free-flow movement.
- Remove the existing southbound left turn lanes on Capital Boulevard.
- Reconfigure the southbound right turn lane on Capital Boulevard to allow for a free-flow movement.

Capital Boulevard at U-turn north of Burlington Mills Road

- Provide a 4-lane divided section on Capital Boulevard with two northbound through lanes and two southbound through lanes.
- Construct a u-turn intersection with dual northbound u-turn lanes on Capital Boulevard with 325' of storage and appropriate taper.

Capital Boulevard at U-turn south of Burlington Mills Road

- Provide a 4-lane divided section on Capital Boulevard with two northbound through lanes and two southbound through lanes.
- Construct a u-turn intersection with dual southbound u-turn lanes on Capital Boulevard with 425' of storage and appropriate taper.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed to accommodate 2035 future year traffic volumes for **Alternative 2**:

Capital Boulevard at South Main Street/Falls of Neuse Road:

- Extend the northbound left turn lanes on Capital Boulevard to accommodate 1000' of storage and appropriate taper.
- Construct a second northbound right turn lane on Capital Boulevard with 375' of storage and appropriate taper.
- Extend the existing northbound right turn lane on Capital Boulevard to accommodate 375' of storage and appropriate taper.
- Extend the dual southbound left turn lanes on Capital Boulevard to accommodate 700' of storage and appropriate taper.
- Construct a second southbound right turn lane on Capital Boulevard with 225' of storage and appropriate taper.
- Extend the existing southbound right turn lane on Capital Boulevard to accommodate 225' of storage and appropriate taper.
- Construct a third eastbound left turn lane on Falls of Neuse Road with 500' of storage and appropriate taper.
- Extend the existing dual eastbound left turn lanes on Falls of Neuse Road to accommodate 500' of storage and appropriate taper.
- Construct a third westbound left turn lane on South Main Street with 500' of storage and appropriate taper.
- Extend the existing dual westbound left turn lanes on South Main Street to accommodate 600' and 700' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on South Main Street with 200' of storage and appropriate taper.
- Restripe the existing westbound shared through/right turn lane on South Main Street with an exclusive westbound through lane.
- Install signage for the right turns to yield to the protected u-turns.

Capital Boulevard at Burlington Mills Road:

- Construct an additional northbound through lane on Capital Boulevard from 1000' south of the intersection until the existing three lane section south of South Main Street
- Construct an additional northbound left turn lane on Capital Boulevard with 335' of storage and appropriate taper.
- Extend the northbound right turn lane on Capital Boulevard to accommodate 400' of storage and appropriate taper.
- Construct an additional southbound through lane on Capital Boulevard from the existing three lane section south of South Main Street to 1000' south of the intersection.
- Construct an additional southbound left turn lane on Capital Boulevard with 730' of storage and appropriate taper.
- Construct an additional eastbound left turn lane on Burlington Mills Road with 275' of storage and appropriate taper.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 200' of storage and appropriate taper.

- Restripe the existing eastbound shared through/right turn lane on Burlington Mills Road to be an exclusive eastbound through lane.
- Construct an additional westbound receiving lane on Burlington Mills Road.
- Construct an additional westbound left turn lane on Burlington Mills Road with 725' of storage and appropriate taper.
- Extend the existing dual westbound left turn lane on Burlington Mills Road to accommodate 725' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on Burlington Mills Road with 375' of storage and appropriate taper.
- Extend the existing shared through/right on Burlington Mills Road with 375' of storage and appropriate taper.
- Construct an additional eastbound receiving lane on Burlington Mills Road that terminates at Urial Drive.
- Install signage for the right turns to yield to the protected u-turns.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed to accommodate 2035 future year traffic volumes for **Alternative 2a**:

Capital Boulevard at South Main Street/Falls of Neuse Road:

Since Capital Boulevard is already a 6-lane section starting just south of the intersection, the recommended improvements for Alternative 2a are the same as Alternative 2.

Capital Boulevard at Burlington Mills Road:

- Construct an additional northbound left turn lane on Capital Boulevard with 100' of storage and appropriate taper.
- Construct an additional southbound left turn lane on Capital Boulevard with 350' of storage and appropriate taper.
- Construct an additional eastbound left turn lane on Burlington Mills Road with 500' of storage and appropriate taper.
- Construct an exclusive eastbound right turn lane on Burlington Mills Road with 200' of storage and appropriate taper.
- Restripe the existing eastbound shared through/right turn lane on Burlington Mills Road to be an exclusive eastbound through lane.
- Construct an additional westbound receiving lane on Burlington Mills Road.
- Extend the existing dual westbound left turn lane on Burlington Mills Road to accommodate 925' of storage and appropriate taper.
- Construct an exclusive westbound right turn lane on Burlington Mills Road with 375' of storage and appropriate taper.
- Extend the existing shared through/right on Burlington Mills Road with 375' of storage and appropriate taper.
- Construct an additional eastbound receiving lane on Burlington Mills Road that terminates at Urial Drive.
- Install signage for the right turns to yield to the protected u-turns.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed to accommodate 2035 future year traffic volumes for **Alternative 3**:

Capital Boulevard at South Main Street/Falls of Neuse Road:

There are no recommended improvements for Alternative 3.

Capital Boulevard at Burlington Mills Road:

The recommendations and conceptual exhibit for Alternative 3 are the same as Alternative 1a.

US 1 Traffic Study

Alternative 1 Recommended Lane Geometry

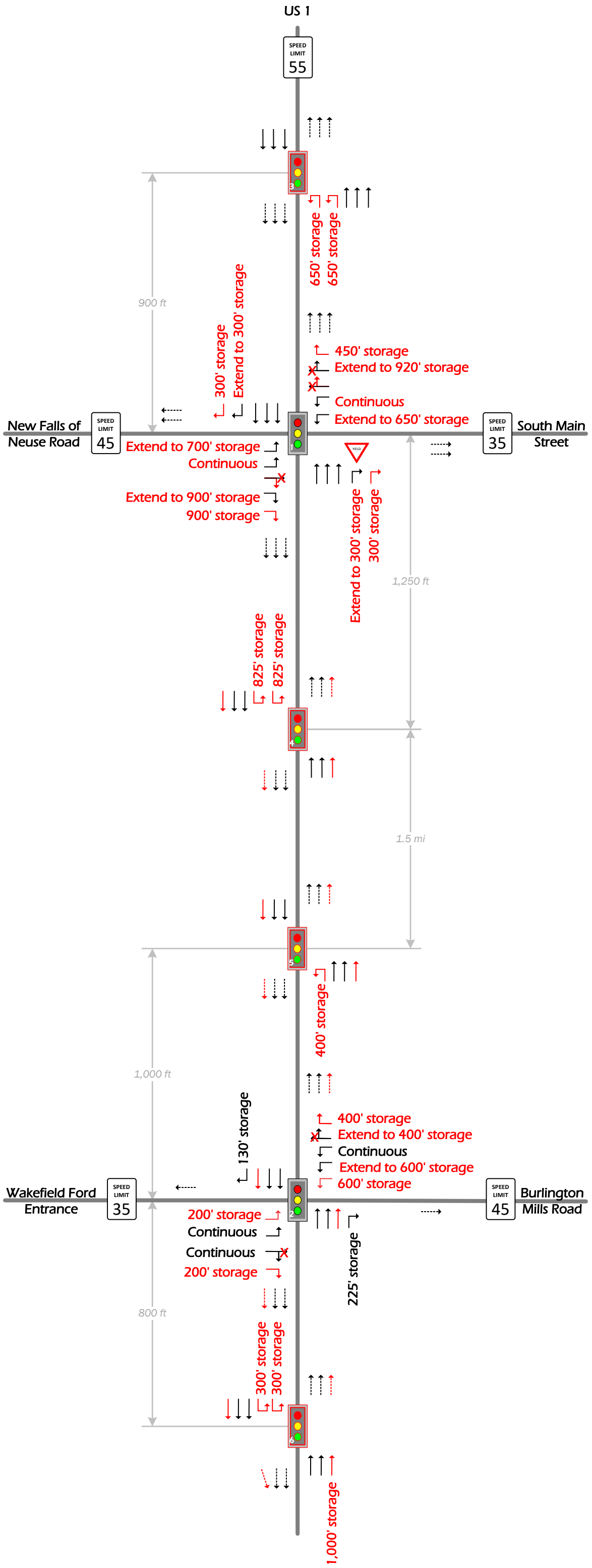
LEGEND

- Yield Control
- Speed Limit XX
- Signal Control
- Recommended Signal
- Existing Approach Lane
- Recommended Approach Lane
- Departure Lane
- XX' Intersection Spacing

XX' - FULL STORAGE LENGTH

Figure 15

EXULT ENGINEERING



US 1 Traffic Study

Alternative 1a Recommended Lane Geometry

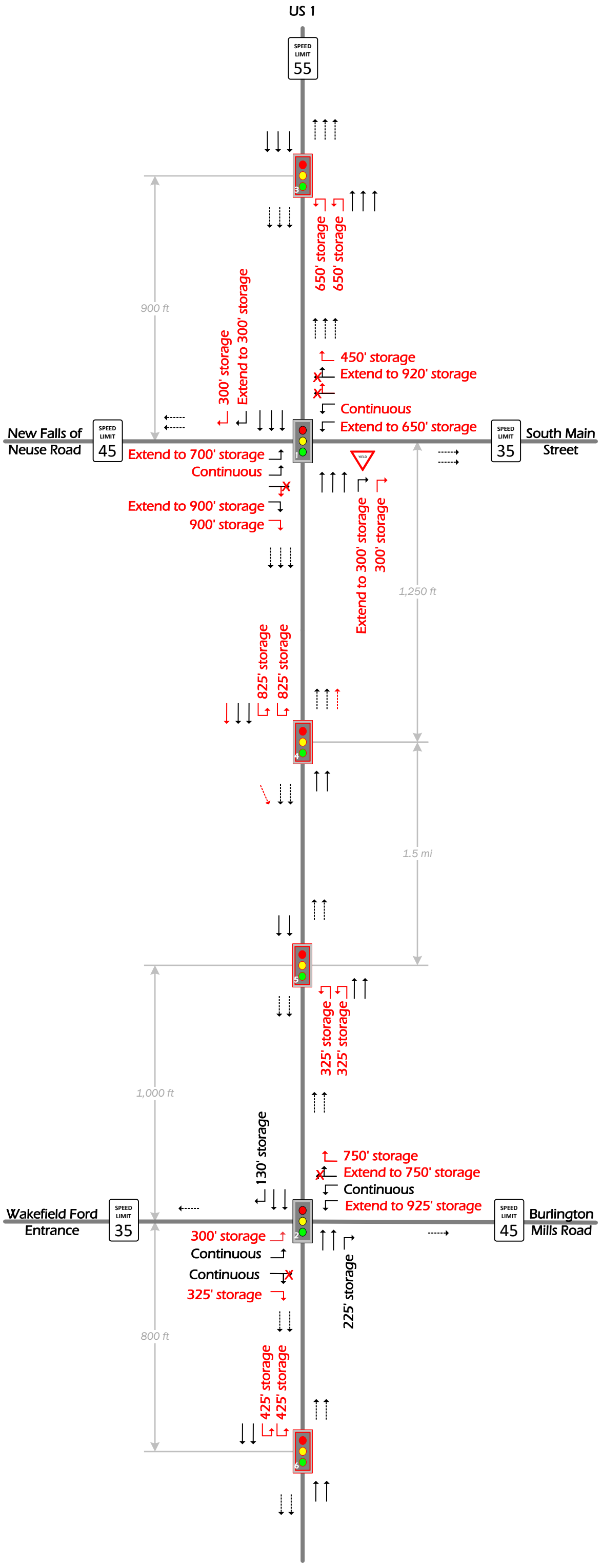
LEGEND

- Yield Control
- Speed Limit XX
- Signal Control
- Recommended Signal
- Existing Approach Lane
- Recommended Approach Lane
- Departure Lane
- XX' Intersection Spacing

XX' - FULL STORAGE LENGTH

Figure 16

EXULT ENGINEERING



US 1 Traffic Study

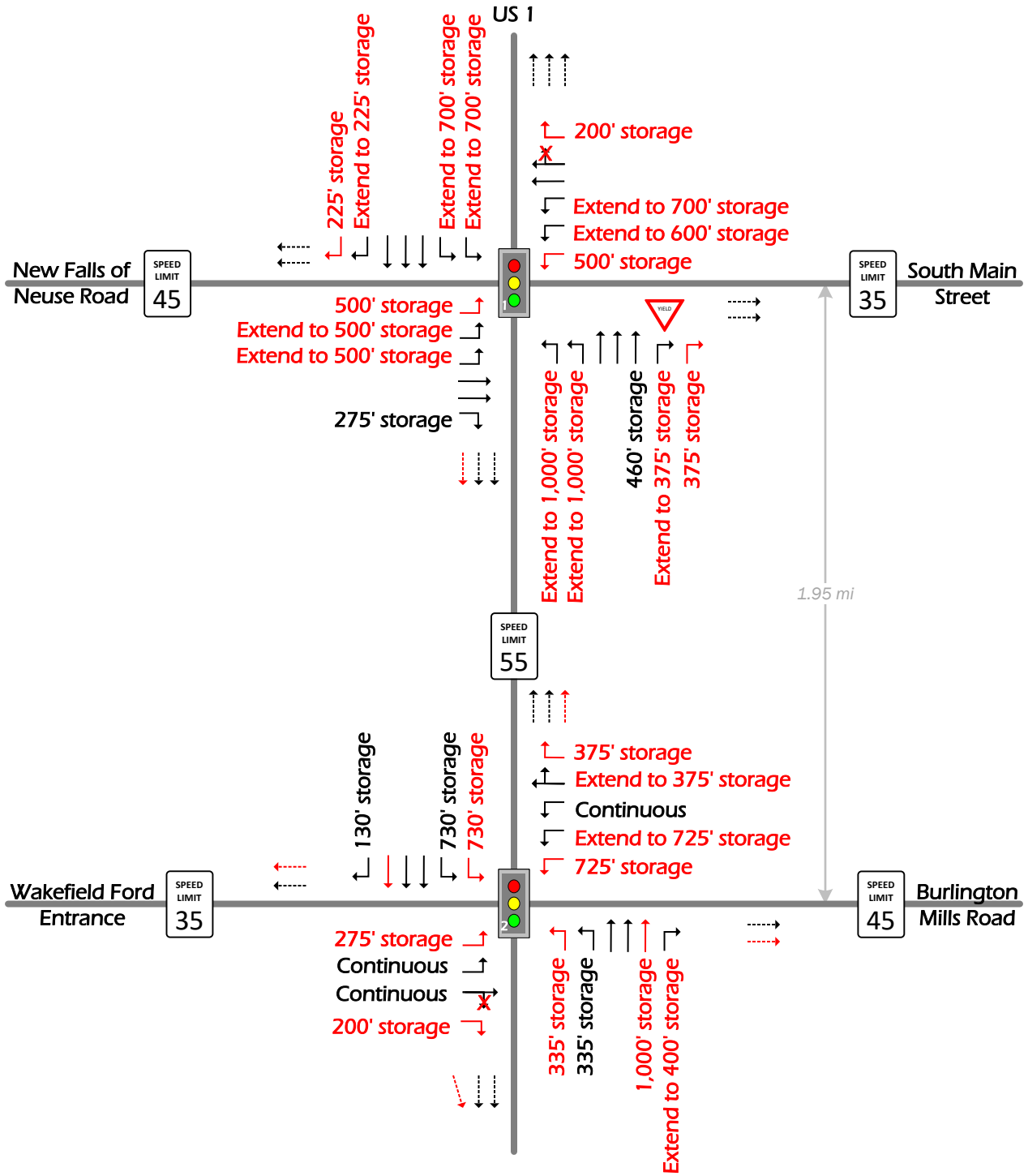
Alternative 2 Recommended Lane Geometry

LEGEND

Yield Control
Speed Limit XX
Signal Control
Existing Approach Lane
Recommended Approach Lane
Departure Lane
XX' Intersection Spacing
XX' - FULL STORAGE LENGTH

Figure 17

EXULT ENGINEERING



US 1 Traffic Study

Alternative 2a Recommended Lane Geometry

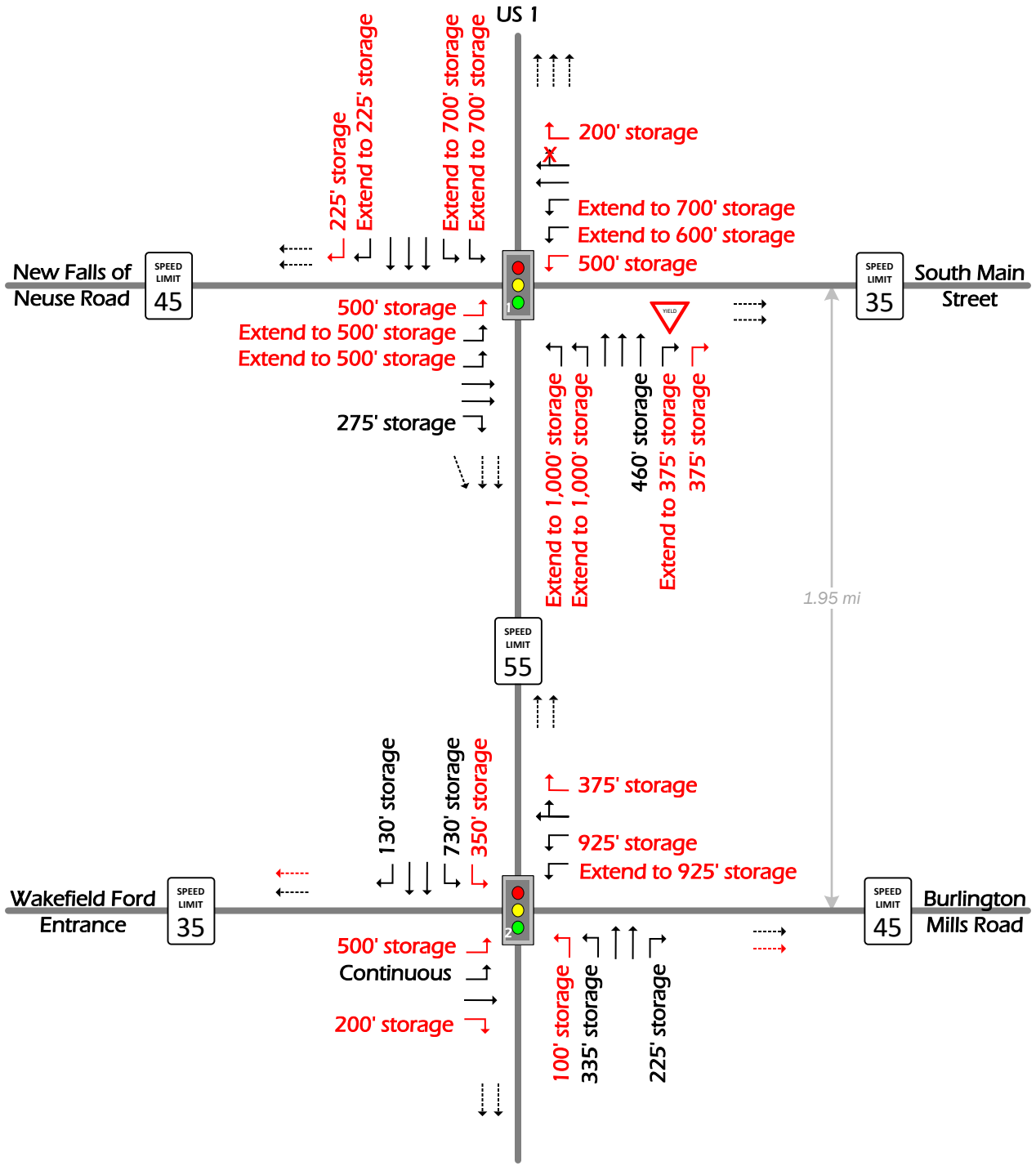
LEGEND

- Yield Control
- Speed Limit XX
- Signal Control
- Existing Approach Lane
- Recommended Approach Lane
- Departure Lane
- XX' Intersection Spacing

XX' - FULL STORAGE LENGTH

Figure 18

EXULT ENGINEERING



US 1 Traffic Study

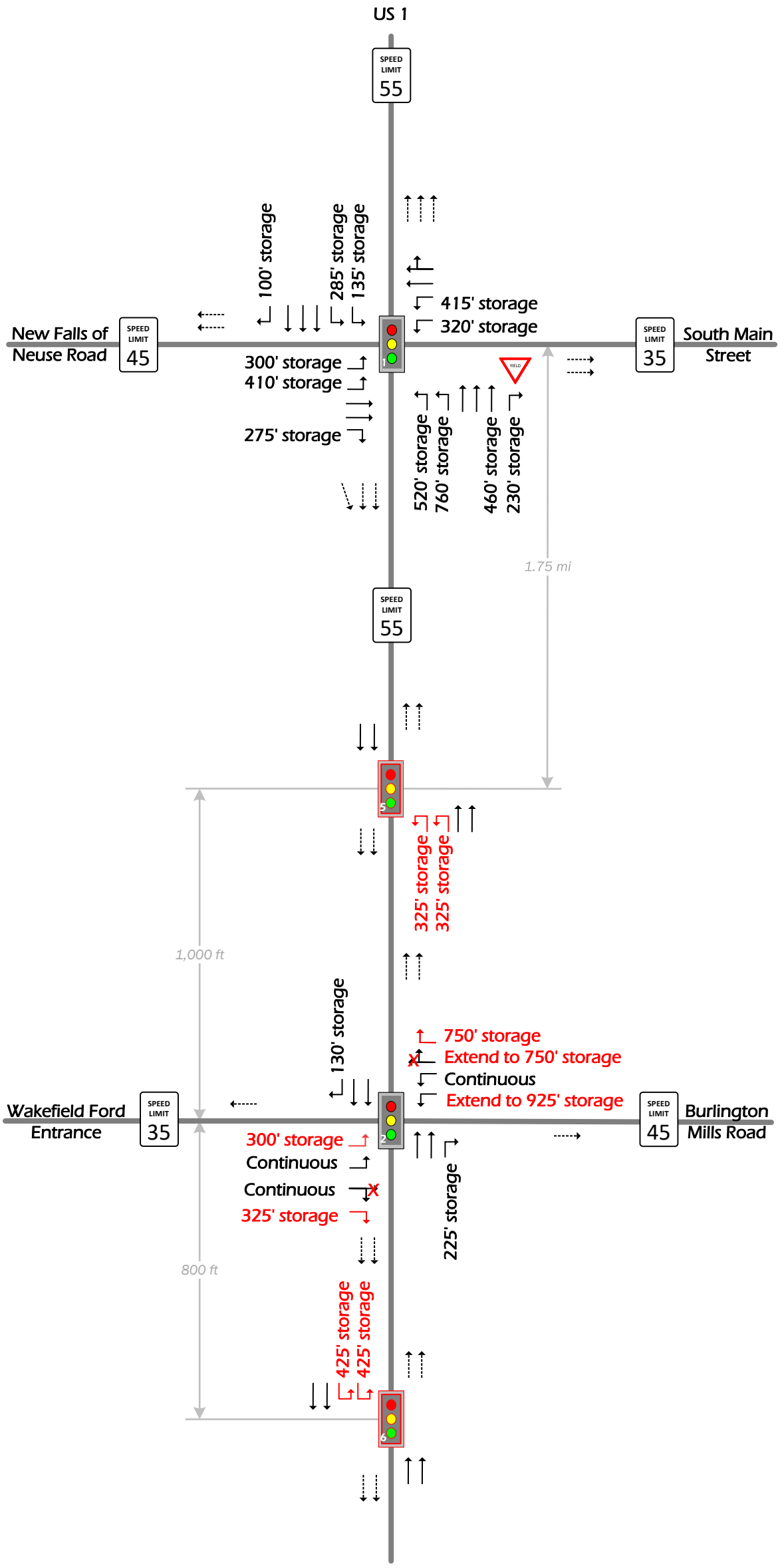
Alternative 3 Recommended Lane Geometry

LEGEND

- Yield Control
- Speed Limit XX
- Signal Control
- Recommended Signal
- Existing Approach Lane
- Recommended Approach Lane
- Departure Lane
- XX' Intersection Spacing
  XX' - FULL STORAGE LENGTH

Figure 19

EXULT ENGINEERING



APPENDIX

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-236-
Submitted by: Chris Glass
Submitting Department: Engineering
Meeting Date: October 3, 2023

SUBJECT
Presentation on Coach Lantern/ Forestville Road Signal Design

Recommendation:
Approval of to execute a contract with AMT engineering to develop construction plans for the traffic signal at Coach Lantern/ Forestville Road intersection.

Item Summary:

ATTACHMENTS

- Summary_Forestville Coach Lantern Signal Intersection.pdf
- Forestville Rd at Green Drake_Coach Lantern Warrant Study (9.15.23).pdf
- Agreement - 540 - A. Morton Thomas and Associates, Inc..pdf
- AMT_1_ MSA_Executed.pdf

Agenda Item: Approval of Design Cost, authorizing execution on the behalf of the Town of Wake Forest, a contract with A. Morton Thomas and Associates, Inc. for the warrant analysis, future planning options, design, and survey for the future signal, listed as a CIP project, at the intersection of Forestville Road (State Road 2049) and Coach Lantern Ave/Green Drake Drive.

Summary: A. Morton Thomas and Associates are through a Master Service Agreement Contract for On-Call Professional General Engineering Services. At the request of the Town, A. Morton Thomas and Associates performed a signal warrant analysis at the intersection of Forestville Road and Coach Lantern Ave./Green Drake Drive to determine if the signal was warranted before providing an executed contract for the signal design and planning.

The Town and A. Morton Thomas and Associates have explored all the potential constraints for the future signal, if poles are placed at the future road widening condition based on the Town's Comprehensive Transportation Plan. The (if required) tasks in the contract are based on the site constraints and congested underground utilities that may alter the design during construction plan development. The Town and A. Morton Thomas and Associates are in agreement that the survey limits for the future signal design will be most cost effective if future pole placement requires redesign of unground utilities. The attachments provided are the Supplemental Service Agreement, Master Service Agreement and the executed Warrant Analysis.

The project is estimated not to exceed amount cost $167,984.74. The amount excluding (if required) tasks is $124,049.74.

Attachment: Attachment_A_summary_AMT _1_MSA_Executed
Attachment_B_Agreement - 540 - A. Morton Thomas and Associates, Inc.
Attachment_C_Forestville Rd at Green Drake_Coach Lantern Warrant Study (9.15.23)

Town of Wake Forest

Forestville Road at Green Drake Drive/Coach Lantern Avenue Warrant Study

Town of Wake Forest AMT Project No. 22-0641



September 15, 2023

PREPARED FOR

Town of Wake Forest, NC

PREPARED BY

A. Morton Thomas and Associates, Inc. (AMT)

EXECUTIVE SUMMARY

1. PROJECT DESCRIPTION

This report summarizes the existing conditions signal warrant analyses conducted at the intersection of SR 2049 (Forestville Road), Green Drake Drive and Coach Lantern Avenue to determine whether this intersection meets any warrants for a traffic signal as defined by the Manual of Uniform Traffic Control Devices (MUTCD). A warrant is a condition that an intersection must meet to justify a signal installation. The study intersection currently features stop control on the side streets (Green Drake Drive and Coach Lantern Avenue) with an uncontrolled main approach along SR 2049. This warrant was requested by the Town of Wake Forest following historical reports of increasing congestion at the intersection and heavy queuing along Coach Lantern Avenue.

2. DATA COLLECTION

AMT collected full 13-hour turning movement counts for the intersection of Forestville Road and Green Drake Drive/Coach Lantern Avenue on Wednesday May 31, 2023, and Saturday June 3, 2023, between the hours of 6 AM and 7 PM.

3. SIGNAL WARRANT ANALYSIS

The signal warrant analysis will consider existing conditions for the year of 2023 and will be conducted for a typical weekday (Tuesday/Wednesday/Thursday) and weekend (Saturday). For the purpose of this study, warrants 1 through 4 AMT analyzed using the Warrant 10 software. Warrants 5, 6 were not analyzed due to missing required physical features (school, coordinated signal system). Warrant 7, 8, and 9 (crash history, roadway network) are not applicable based on the conclusions of Warrants 1 through 3.

It is important to understand that meeting a signal warrant simply justifies a traffic signal installation; it does not mandate or require the installation. Warrants 1, 2, 3, 6, and 8 are generally viewed as operational justification; whereas Warrants 5, 7, and 9 are generally viewed as safety justification. Warrant 4 can be viewed as operational or safety justification depending on context.

4. CONCLUSION

Based on the findings of the signal warrant analysis, a traffic signal meets the following MUTCD Warrants based on the 2023 existing conditions:

- Warrant 1 - Eight-hour Vehicular Volume: Weekday met; Weekend met.
- Warrant 2 – Four-Hour Vehicular Volume: Weekday met; Weekend met.
- Warrant 3 – Peak Hour Vehicular Volume: Weekday met; Weekend met.
- Warrant 4 – Pedestrian Volume: Weekday not met; Weekend not met.
- Warrant 5 – School Crossing: **Not applicable**.
- Warrant 6 – Coordinated Signal System: **Not applicable**.
- Warrant 7 – Crash Experience: **Not applicable**.
- Warrant 8 – Roadway Network: **Not applicable**.
- Warrant 9 – Intersection Near a Grade Crossing: **Not applicable**.

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1. INTRODUCTION

The contents of this report present the findings of the existing conditions signal warrant analyses conducted at the intersection of SR 2049 (Forestville Road), Green Drake Drive and Coach Lantern Avenue to determine whether a traffic signal can be installed at this intersection. A warrant is a condition that an intersection must meet to justify a signal installation. The study intersection currently features stop control on the side streets (Green Drake Drive and Coach Lantern Avenue) with an uncontrolled main approach along SR 2049. This warrant was requested by the Town of Wake Forest following historical reports of increasing congestion at the intersection and heavy queuing along Coach Lantern Avenue.

The Manual on Uniform Traffic Control Devices (MUTCD) specifies nine "traffic control signal needs studies," known as warrants:

- Warrant 1: Eight-Hour Vehicular Volume
- Warrant 2: Four-Hour Vehicular Volume
- Warrant 3: Peak Hour
- Warrant 4: Pedestrian Volume
- Warrant 5: School Crossing
- Warrant 6: Coordinated Signal System
- Warrant 7: Crash Experience
- Warrant 8: Roadway Network
- Warrant 9: Intersection Near a Grade Crossing

The signal warrant analysis will consider existing conditions for the year of 2023 and will be conducted for a typical weekday (Tuesday/Wednesday/Thursday) and weekend (Saturday). For the purpose of this study, warrants 1 through 4 will be analyzed using the Warrant 10 software. Warrants 5, 6, and 9 were not conducted due to missing required physical features (school, railroad, coordinated signal system). Warrant 7 and 8 (crash history, roadway network) were not specifically requested and are not likely required based on the conclusions of Warrants 1 through 3. It is important to understand that meeting a signal warrant simply justifies a traffic signal installation; it does not mandate or require the installation. Warrants 1, 2, 3, 6, and 8 are generally viewed as operational justification; whereas Warrants 5, 7, and 9 are generally viewed as safety justification. Warrant 4 can be viewed as operational or safety justification depending on context.

2. DATA COLLECTION

Full 13-hour turning movement counts were collected for the intersection of Forestville Road and Green Drake Drive/Coach Lantern Avenue on Wednesday May 31, 2023, and Saturday June 3, 2023, between the hours of 6 AM – 7 PM. Based on the traffic volume data, the traffic signal warrant analysis was conducted for the weekday and weekend existing conditions. The traffic count data is in **Appendix A.**

3. SIGNAL WARRANT ANALYSIS

3.1. MUTCD WARRANT EVALUATION

The Manual on Uniform Traffic Control Devices (MUTCD) contains nine (9) warrants for investigating the need for a traffic signal at a particular intersection. Three (3) of the warrants deal directly with traffic volumes; two (2) warrants focus on pedestrian issues; one (1) focuses on safety; one (1) on grade crossings; one (1) on traffic signal progression; and one (1) on a Planning level (non-data-based) analysis.

For this instance, warrants 1,2,3 and 4 were considered at the intersection of Forestville Road and Green Drake Drive/Coach Lantern Avenue. Warrants 5 through 9 are not applicable for this intersection.

A traffic control signal should not be installed unless one or more warrants are warrants are met. It is to be noted that the satisfaction of a signal warrant or warrants shall not in itself require the installation of a traffic control signal. A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection. A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.

Summary of the signal warrant analysis reports are in **Appendix B**.

3.2. WARRANT 1: 8-HOUR VEHICULAR VOLUME

This warrant is intended for application at locations where there is a large volume of intersecting traffic.

The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 of the MUTCD (shown in **Table 1** below) may be used in place of the 100 percent columns.

To meet Warrant 1, the major street traffic (total of both approaches) must meet or exceed 350 vehicles per hour while the minor street traffic (one direction only) must meet or exceed 140 vehicles per hour for any eight hours of the day (Condition A – Minimum Vehicular Volume), or the major street traffic (total of both approaches) must meet or exceed 525 vehicles per hour while the minor street traffic (one direction only) must meet or exceed 70 vehicles per hour for any 8 hours of the day (Condition B – Interruption of Continuous Traffic). The green boxes in Table 1 highlight these volumes.

Table 1: MUTCD Table 4C-1, Warrant 1 Eight-Hour Volume

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

After applying the warrant criteria for 2023 existing conditions for the weekday (Wednesday) counts, thirteen hours meet the criteria set for Condition A, and 8 hours meet the criteria for Condition B. 8 hours are required to meet either Condition A or Condition B, so this warrant is satisfied for the existing weekday conditions.

After applying the warrant criteria for 2023 existing conditions for the weekend (Saturday) counts, 10 hours meet the criteria set for Condition A, and 8 hours meet the criteria for Condition B. 8 hours are required to meet either Condition A or Condition B, so this warrant is satisfied for the existing weekend conditions.

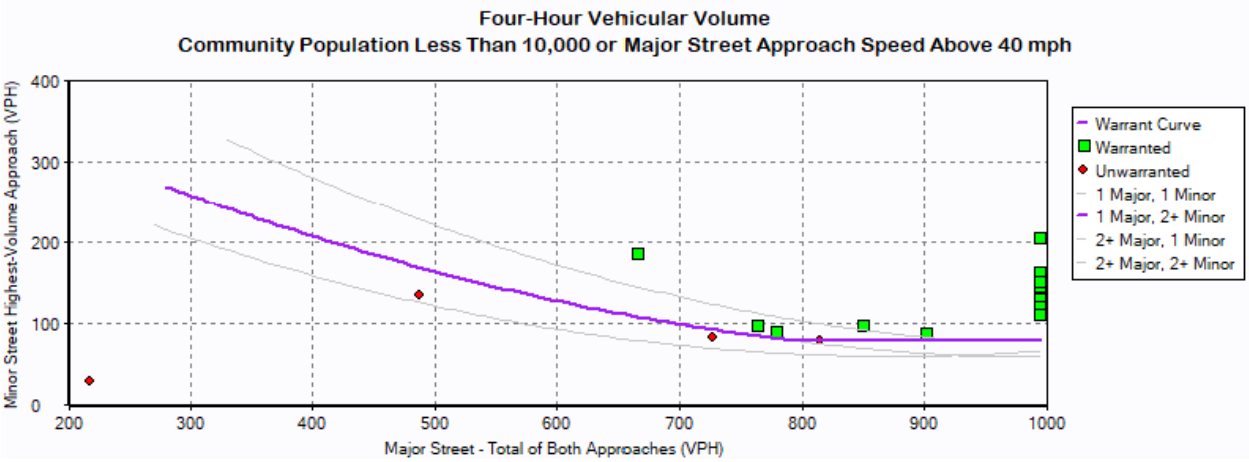
Warrant 1 for weekday is **Met**. Warrant 1 for weekend is **Met.** Signal warrant analysis reports are in **Appendix B-1.**

3.3. WARRANT 2: 4-HOUR VEHICULAR VOLUME

This warrant is intended for locations where, for a brief period of the day, minor road traffic experiences excessive delays in attempting to enter or cross the major street.

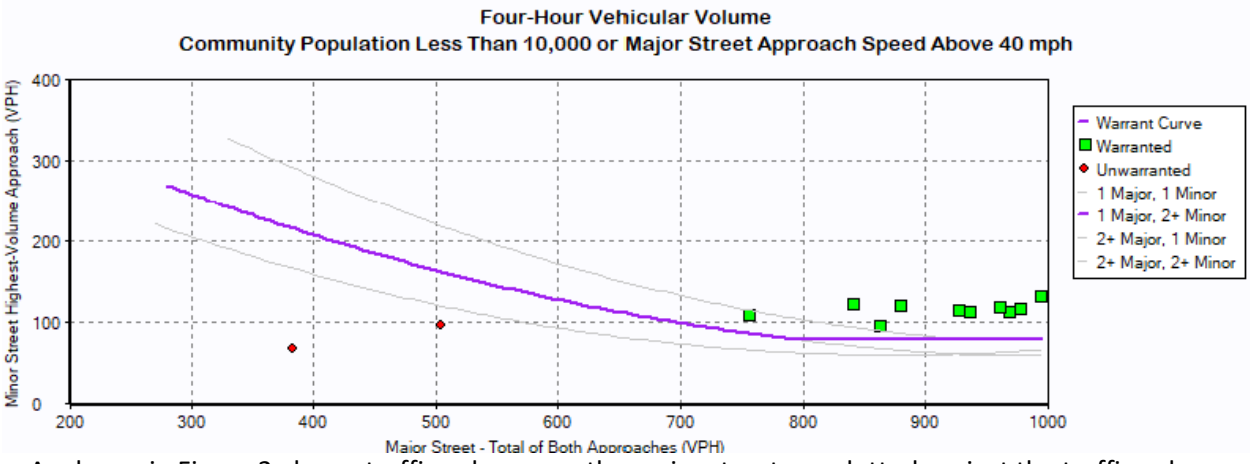
Warrant 2 requires that the combination of the major street traffic (total of both approaches) and minor street traffic (one direction only) reaches a designated minimum volume during any four hours of any average day. **Figure 1** and **Figure 2** illustrate the threshold values and results for Warrant 2 for the weekday and weekend, respectively.

Figure 1: Warrant 2: Four-Hour Vehicular Volumes – 2023 Weekday Analysis Results



As shown in Figure 1 above, traffic volumes on the major street are plotted against the traffic volumes on the minor street. The green dots indicate the hours where the traffic volumes meet the warrant as they are plotted above the warrant curve (as shown by the purple warrant curve). The red dots indicate the hours where the traffic volumes are below the warrant curve. After applying the warrant criteria for 2023 existing weekday conditions, 12 hours meet the combined criteria for Warrant 2. 4 hours are required to meet the criteria, so Warrant 2 is met based on the 2023 existing weekday Conditions.

Figure 2: Warrant 2: Four-Hour Vehicular Volumes – 2023 Weekend Analysis Results



As shown in Figure 2 above, traffic volumes on the major street are plotted against the traffic volumes on the minor street. The green dots indicate the hours where the traffic volumes meet the warrant as they are plotted above the warrant curve (as shown by the purple warrant curve). The red dots indicate the

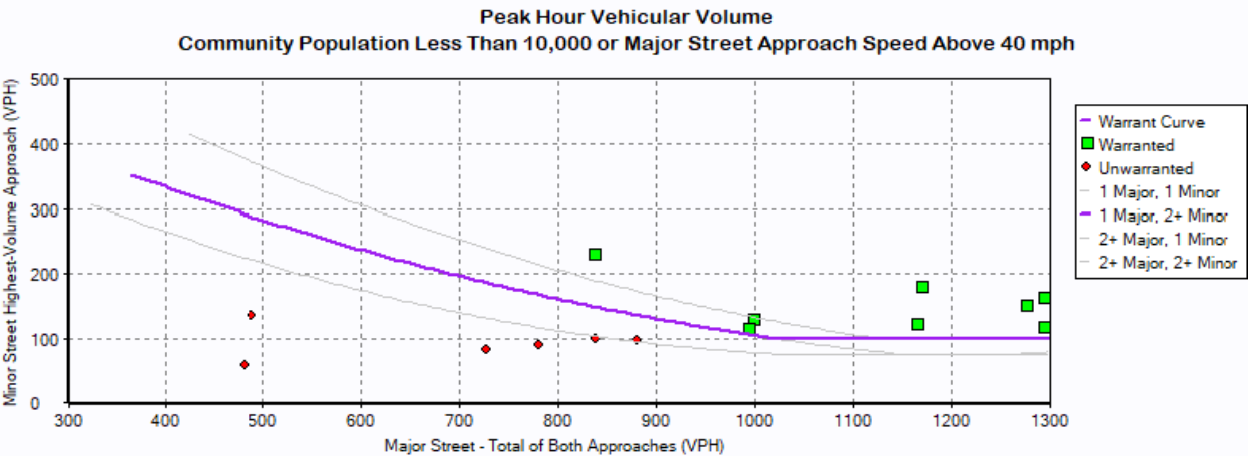
hours where the traffic volumes are below the warrant curve. After applying the warrant criteria for 2023 existing weekday conditions, 10 hours meet the combined criteria for warrant 2. 4 hours are required to meet the criteria, so Warrant 2 is met based on the 2023 existing weekend conditions.

Warrant 2 for weekdays is **Met**. Warrant 2 for the weekend is **Met.** Signal warrant analysis reports are in **Appendix B-2.**

3.4. WARRANT 3: PEAK-HOUR VEHICULAR VOLUME

This warrant is intended for locations where, traffic conditions are such that for a minimum of 1 hour of an average day, the minor street suffers undue delay when entering or crossing the major street. Warrant 3 requires that the combination of the major street traffic (total of both approaches) and minor street traffic (one direction only) reaches a designated minimum volume during any one hour of any average day. Figure 3 and Figure 4 illustrate the threshold values and results for Warrant 3 for the weekday and weekend, respectively.

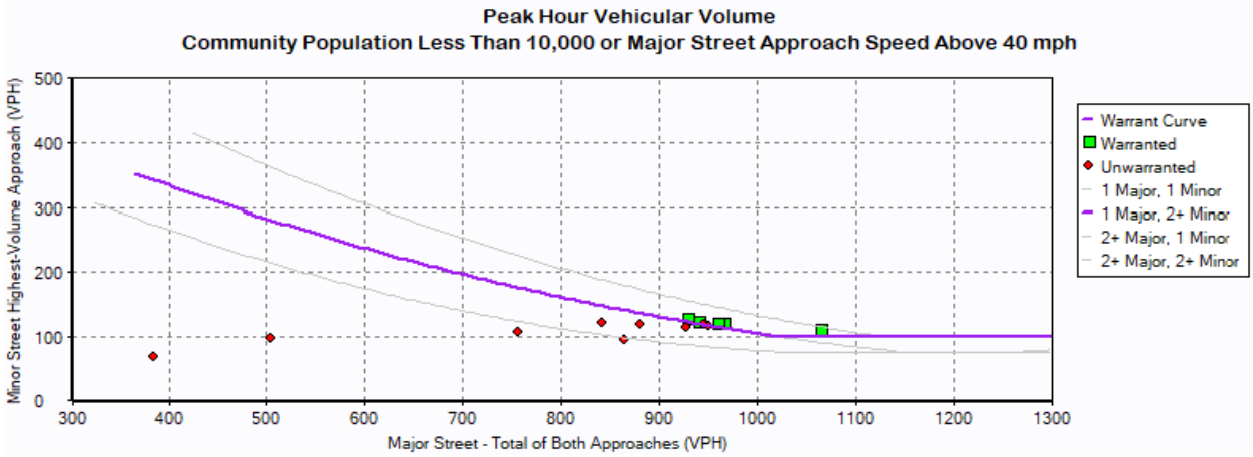
Figure 3: Warrant 3: Peak-Hour Vehicular Volumes – 2023 Weekday Analysis Results



As shown in Figure 3 above, traffic volumes on the major street are plotted against the traffic volumes on the minor street. The green dots indicate the hours where the traffic volumes meet the warrant as they are plotted above the warrant curve (as shown by the purple warrant curve). The red dots indicate the hours where the traffic volumes are below the warrant curve. After applying the warrant criteria for 2023 existing weekday conditions, 8 hours meet the combined criteria for Warrant 3.

1 hour is required to meet the criteria, so Warrant 3 **is Met** based on the 2023 existing weekday conditions.

Figure 4: Warrant 3: Peak-Hour Vehicular Volumes – 2023 Weekend Analysis Results



As shown in Figure 4 above, traffic volumes on the major street are plotted against the traffic volumes on the minor street. The green dots indicate the hours where the traffic volumes meet the warrant as they are plotted above the warrant curve (as shown by the purple warrant curve). The red dots indicate the hours where the traffic volumes are below the warrant curve. After applying the warrant criteria for 2023 existing weekend conditions, 5 hours meet the combined criteria for warrant 3.

1 hour is required to meet the criteria, so Warrant 3 **is Met** based on the 2023 existing weekend conditions.

3.5. WARRANT 4: PEDESTRIAN VOLUME

This warrant is intended for locations where, the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. Warrant 4 requires that the combination of vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) reaches a designated minimum volume during any four hours of any average day. Figure 5 and Figure 6 illustrate the threshold values and results for Warrant 4 for the weekday and weekend, respectively.

Figure 5: Warrant 4: Pedestrian Volumes – 2023 Weekday Analysis Results

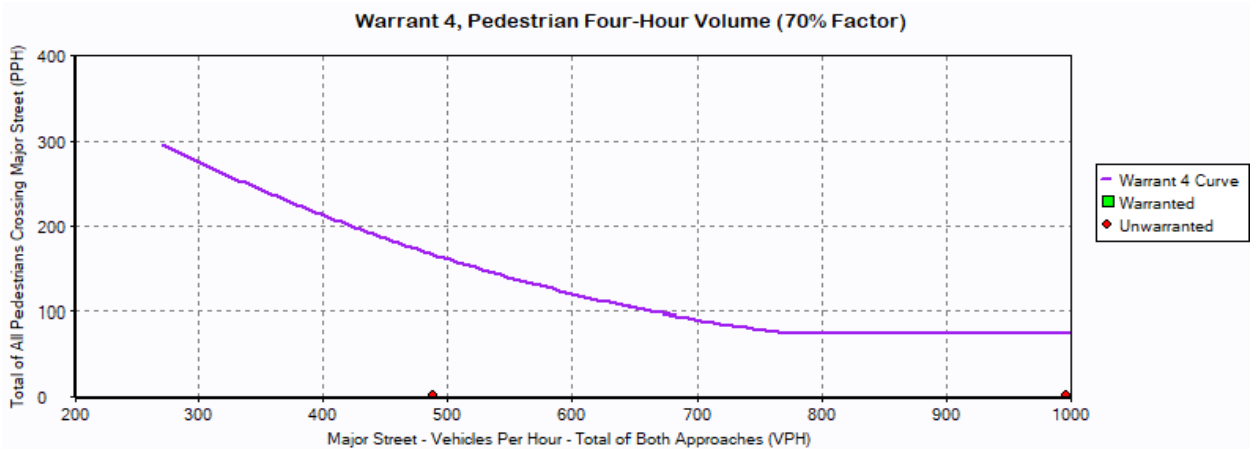
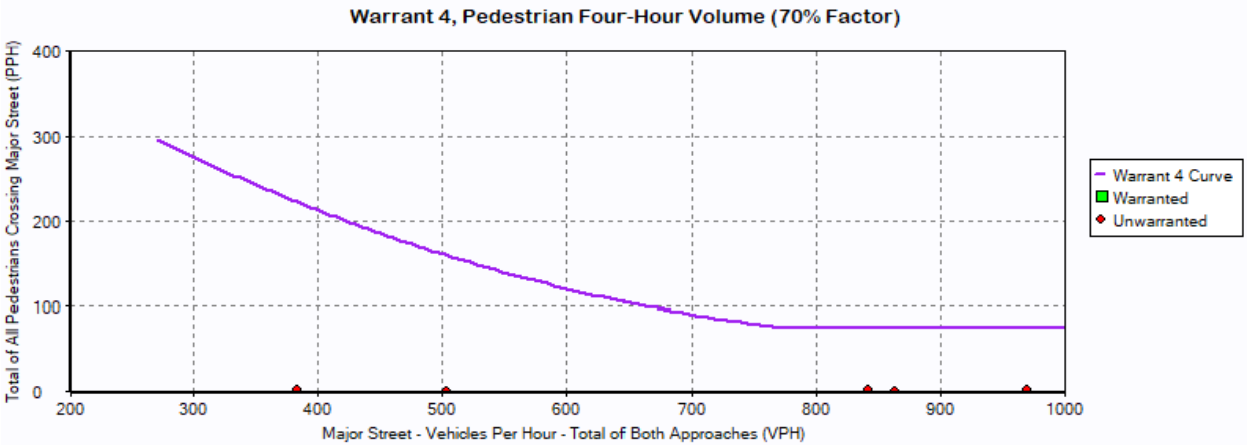


Figure 6: Warrant 4: Pedestrian Volumes – 2023 Weekend Analysis Results



As shown in Figures 5 and 6 above, traffic volumes on the major street are plotted against the pedestrians crossing the major street. The red dots indicate where the volumes are below the warrant curve. After applying the warrant criteria for 2023 existing weekend conditions, no hours meet the criteria for Warrant 4.

Warrant 4 **is not met** based on the 2023 existing weekday and weekend conditions.

3.6. WARRANT 5: SCHOOL CROSSING

This warrant is intended for application where the fact that schoolchildren cross the major street is the principal reason to consider installing a traffic control signal.

As no school is present at this location, Warrant 5 is **not applicable**.

3.7. WARRANT 6: COORDINATED SIGNAL SYSTEM

This warrant is intended for unsignalized intersections where installation of a traffic signal is necessitated to proper platoon vehicles and where other warrants are not met.

As this intersection meets other signal warrants, Warrant 6 is **not applicable**.

3.8. WARRANT 7: CRASH EXPERIENCE

This warrant is intended for application where the severity and frequency of crashes are the principal reason to consider installing a traffic signal. Publicly available crash data from the State of North Carolina does not show a significant crash history at this intersection and AMT was unable to find any citizen-reported history of crashes.

As this intersection meets other signal warrants, crash experience is not likely to be the principal reason to consider installing a traffic signal. Therefore, Warrant 7 is **not applicable**.

3.9. WARRANT 8: ROADWAY NETWORK

This warrant is intended to highlight intersections where a traffic signal might be justified to encourage concentration and organization of traffic flow on a roadway network.

The standard requires one or both of the following criteria is met for the common intersection of two or more major routes:

A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or
B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).

The term "major route" used in this signal warrant must meet one of the following characteristics:

A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.
B. It includes rural or suburban highways outside, entering, or traversing a city.
C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.

None of the routes present at this intersection qualify as a major route as defined above. Therefore, Warrant 7 is **not applicable**.

3.10. WARRANT 9: INTERSECTION NEAR A GRADE CROSSING

This warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a "Stop" or "Yield" sign is the principal reason to consider installing a traffic control signal.

As other signal warrants are met at this intersection, Warrant 9 is **not applicable**.

4. CONCLUSION

This report summarizes the 2023 existing conditions signal warrant analyses conducted at the intersection of Forestville Road and Green Lane Drive/Coach Lantern Avenue to determine whether a traffic signal can be installed at this intersection based on the Warrant analysis.

Based on the findings of the signal warrant analysis, a traffic signal meets the following MUTCD Warrants based on the 2023 existing conditions:

- Warrant 1 - Eight-hour Vehicular Volume: Weekday met; Weekend met.
- Warrant 2 – Four-Hour Vehicular Volume: Weekday met; Weekend met.
- Warrant 3 – Peak Hour Vehicular Volume: Weekday met; Weekend met.
- Warrant 4 – Pedestrian Volume: Weekday not met; Weekend not met.
- Warrant 5 – School Crossing: **Not applicable**.
- Warrant 6 – Coordinated Signal System: **Not applicable**.
- Warrant 7 – Crash Experience: **Not applicable**.
- Warrant 8 – Roadway Network: **Not applicable**.
- Warrant 9 – Intersection Near a Grade Crossing: **Not applicable**.

APPENDIX A: TRAFFIC VOLUMES

A. Morton Thomas & Associates, Inc.
Turning Movement Counts - Field Sheet

Job No.: P22-0641

Location: Forestville Road at Green Drake Drive - Coach Lantern Avenue
Date: 5/31/2023 Wednesday
Recorder: Video
Interval (dd) : 15 (In Minutes)

County: Wake
Town: Wake Forest
Weather: Clear/Warm

PEAK HOURS	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
	6:00AM-12:00PM	07:30	08:30	1387	A	0.42	12:00PM-7:00PM	16:45	17:45	1619	A	0.46

Street Name-->	Forestville Road					Forestville Road					Green Drake Drive					Coach Lantern Avenue					GRAND TOTAL
HOUR	From North					From South					From East					From West					
ENDING	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	
00:15					0					0					0					0	0
00:30					0					0					0					0	0
00:45					0					0					0					0	0
01:00					0					0					0					0	0
01:15					0					0					0					0	0
01:30					0					0					0					0	0
01:45					0					0					0					0	0
02:00					0					0					0					0	0
02:15					0					0					0					0	0
02:30					0					0					0					0	0
02:45					0					0					0					0	0
03:00					0					0					0					0	0
03:15					0					0					0					0	0
03:30					0					0					0					0	0
03:45					0					0					0					0	0
04:00					0					0					0					0	0
04:15					0					0					0					0	0
04:30					0					0					0					0	0
04:45					0					0					0					0	0
05:00					0					0					0					0	0
05:15					0					0					0					0	0
05:30					0					0					0					0	0
05:45					0					0					0					0	0
06:00					0					0					0					0	0
06:15	0	0	51	2	53	0	3	16	0	19	0	0	2	2	4	0	7	1	12	20	96
06:30	0	1	51	2	54	0	1	27	0	28	0	2	0	1	3	0	5	0	12	17	102
06:45	0	0	65	5	70	0	2	75	1	78	0	6	1	4	11	0	19	1	11	31	190
07:00	0	0	94	9	103	0	1	80	2	83	0	3	0	4	7	0	46	1	20	67	260
07:15	0	2	111	6	119	0	4	126	1	131	0	3	0	4	7	0	50	1	20	71	328
07:30	0	3	121	19	143	0	6	104	2	112	0	4	0	8	12	0	43	0	18	61	328
07:45	0	2	87	20	109	0	6	153	2	161	0	2	0	9	11	1	38	0	22	61	342
08:00	0	3	139	17	159	0	10	132	2	144	0	3	1	4	8	0	22	0	16	38	349
08:15	0	2	141	22	165	0	13	125	3	141	0	1	0	6	7	1	29	0	17	47	360
08:30	0	6	160	19	185	0	11	96	0	107	0	2	0	8	10	0	23	0	11	34	336
08:45	0	7	135	24	166	0	7	108	3	118	0	1	0	4	5	0	22	2	21	45	334
09:00	0	2	142	18	162	0	5	92	2	99	0	0	1	7	8	0	13	0	22	35	304
09:15	0	3	109	12	124	0	15	91	2	108	0	5	0	6	11	0	17	0	14	31	274
09:30	0	2	106	19	127	0	9	86	1	96	0	2	1	2	5	0	13	0	5	18	246
09:45	0	1	102	6	109	0	4	90	4	98	0	2	0	2	4	0	10	0	6	16	227
10:00	0	3	80	14	97	0	12	95	2	109	0	4	0	2	6	0	13	0	13	26	238
10:15	1	3	73	12	89	1	7	82	2	92	0	1	0	1	2	0	8	0	11	19	202
10:30	0	5	90	7	102	0	9	76	1	86	0	1	1	3	5	0	15	0	14	29	222
10:45	0	2	98	4	104	0	4	59	0	63	0	2	0	7	9	0	8	0	8	16	192
11:00	1	2	91	22	116	0	6	80	3	89	0	0	0	3	3	0	4	0	15	19	227
11:15	0	5	80	11	96	0	7	76	1	84	0	1	0	5	6	0	13	1	10	24	210
11:30	0	0	77	14	91	0	3	81	1	85	0	2	0	3	5	0	9	0	15	24	205
11:45	0	5	79	11	95	0	11	97	1	109	0	1	0	8	9	0	25	0	6	31	244
12:00	0	2	103	12	117	0	8	106	2	116	0	4	0	3	7	0	18	0	12	30	270
12:15	0	5	91	19	115	0	7	80	0	87	0	1	0	6	7	0	13	0	8	21	230
12:30	0	2	116	18	136	0	10	95	1	106	0	3	0	1	4	0	7	1	7	15	261
12:45	0	3	94	18	115	0	6	53	0	59	0	0	1	1	2	0	19	1	12	32	208
13:00	0	4	102	18	124	0	8	57	0	65	0	3	0	1	4	0	17	0	10	27	220
13:15	0	5	105	14	124	0	8	97	5	110	0	2	2	1	5	0	10	0	5	15	254
13:30	0	5	90	11	106	0	11	122	3	136	0	2	0	2	4	0	12	1	12	25	271
13:45	0	7	109	17	133	0	13	92	0	105	0	2	0	5	7	0	12	0	8	20	265
14:00	0	2	93	15	110	0	12	98	4	114	0	1	0	2	3	0	17	0	6	23	250
14:15	0	3	96	15	114	0	9	117	4	130	0	1	0	4	5	0	17	0	16	33	282
14:30	0	4	107	32	143	0	12	132	2	146	0	0	0	3	3	0	21	0	16	37	329
14:45	0	4	108	38	150	0	9	102	2	113	0	2	0	3	5	0	24	0	12	36	304
15:00	0	11	106	28	145	0	12	129	2	143	0	2	0	10	12	0	19	1	14	34	334
15:15	0	4	115	25	144	0	16	139	6	161	0	2	1	6	9	0	9	0	9	18	332
15:30	0	7	140	21	168	0	21	121	1	143	0	5	0	8	13	0	16	1	16	33	357
15:45	0	5	115	35	155	0	14	115	2	131	0	0	2	3	5	0	21	0	15	36	327
16:00	0	8	127	28	163	0	24	165	8	197	1	2	0	6	9	0	15	0	8	23	392
16:15	0	8	139	24	171	0	28	125	7	160	0	0	1	2	3	0	18	0	11	29	363
16:30	0	7	135	22	164	0	24	149	2	175	0	1	1	6	8	0	10	0	18	28	375
16:45	0	6	107	24	137	0	17	152	7	176	0	1	0	6	7	0	15	0	16	31	351
17:00	1	3	115	15	134	0	14	172	3	189	0	2	0	4	6	0	31	0	17	48	377
17:15	0	3	127	22	152	0	23	196	8	227	0	4	0	2	6	0	25	0	14	39	424
17:30	0	2	134	25	161	0	21	175	6	202	0	1	1	5	7	2	27	1	17	47	417
17:45	0	8	126	35	169	0	21	168	2	191	0	4	1	6	11	0	17	1	12	30	401
18:00	0	5	135	21	161	0	15	143	3	161	0	1	0	7	8	0	31	0	10	41	371
18:15	0	2	119	29	150	0	21	144	1	166	0	4	1	7	12	0	16	0	22	38	366
18:30	0	8	109	26	143	0	25	110	2	137	0	4	2	4	10	0	22	0	20	42	332
18:45	0	5	88	18	111	0	20	128	4	152	0	2	1	5	8	0	13	0	16	29	300
19:00	0	3	96	23	122	0	21	72	2	95	0	1	0	2	3	0	17	0	12	29	249
19:15					0					0					0					0	0
19:30					0					0					0					0	0
19:45					0					0					0					0	0
20:00					0					0					0					0	0
20:15					0					0					0					0	0
20:30					0					0					0					0	0
20:45					0					0					0					0	0
21:00					0					0					0					0	0
21:15					0					0					0					0	0
21:30					0					0					0					0	0
21:45					0					0					0					0	0
22:00					0					0					0					0	0
22:15					0					0					0					0	0
22:30					0					0					0					0	0
22:45					0					0					0					0	0
23:00					0					0					0					0	0
23:15					0					0					0					0	0
23:30					0					0					0					0	0
23:45					0					0					0					0	0
00:00					0					0					0					0	0
TOTAL	**3**	**200**	**5529**	**943**	**6675**	**1**	**606**	**5601**	**125**	**6333**	**1**	**105**	**21**	**224**	**351**	**4**	**961**	**14**	**690**	**1669**	**15028**
AM Peak Vol	0	13	527	78	618	0	40	506	7	553	0	8	1	27	36	2	112	0	66	180	1387
PM Peak Vol	1	16	502	97	616	0	79	711	19	809	0	11	2	17	30	2	100	2	60	164	1619

A. Morton Thomas & Associates, Inc.
Turning Movement Counts - Field Sheet

Job No.: P22-0641

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Date: 5/31/2023 Wednesday
Recorder: Video
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(In Minutes)

County: Wake
Town: Wake Forest
Weather: Clear/Warm

PEAK HOURS	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
	6:00AM-12:00PM	07:30	08:30	1387	A	0.42	12:00PM-7:00PM	16:45	17:45	1619	A	0.46

SCHOOL CHILDREN, PEDESTRIANS & BICYCLES

Hour Ending	From North: Forestville Road			From South: Forestville Road			From East: Green Drake Drive			From West: Coach Lantern Avenue		
	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
00:15												
00:30												
00:45												
01:00												
01:15												
01:30												
01:45												
02:00												
02:15												
02:30												
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05:30												
05:45												
06:00												
06:15	0	0	0	0	0	0	0	0	0	0	2	0
06:30	0	1	0	0	1	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0	0	0
07:00	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	2	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	2	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	1	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	1	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	1	0	0	0	0	0	0	0
14:30	0	1	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	1	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	1	0	0	0	0
16:15	0	0	0	0	0	0	0	1	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	2	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	2	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	1	0	0	1	0
19:15												
19:30												
19:45												
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22:15												
22:30												
22:45												
23:00												
23:15												
23:30												
23:45												
00:00												
TOTAL	**0**	**6**	**0**	**0**	**2**	**0**	**0**	**6**	**0**	**0**	**7**	**0**
AM Peak Vol	0	0	0	0	0	0	0	0	0	0	0	0
PM Peak Vol	0	2	0	0	0	0	0	0	0	0	0	0

A. Morton Thomas & Associates, Inc.
Turning Movement Counts - Field Sheet

Job No.: P22-0641

Location: Forestville Road at Green Drake Drive - Coach Lantern Avenue
Date: 6/3/2023 Saturday
Recorder: Video
Interval (dd) : 15 (In Minutes)

County: Wake
Town: Wake Forest
Weather: Clear/Warm

PEAK HOURS	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
	6:00AM-12:00PM	10:45	11:45	1148	A	0.42	12:00PM-7:00PM	12:15	13:15	1227	A	0.46

Street Name-->	Forestville Road					Forestville Road					Green Drake Drive					Coach Lantern Avenue					GRAND TOTAL
HOUR	From North					From South					From East					From West					
ENDING	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	
00:15					0					0					0					0	0
00:30					0					0					0					0	0
00:45					0					0					0					0	0
01:00					0					0					0					0	0
01:15					0					0					0					0	0
01:30					0					0					0					0	0
01:45					0					0					0					0	0
02:00					0					0					0					0	0
02:15					0					0					0					0	0
02:30					0					0					0					0	0
02:45					0					0					0					0	0
03:00					0					0					0					0	0
03:15					0					0					0					0	0
03:30					0					0					0					0	0
03:45					0					0					0					0	0
04:00					0					0					0					0	0
04:15					0					0					0					0	0
04:30					0					0					0					0	0
04:45					0					0					0					0	0
05:00					0					0					0					0	0
05:15					0					0					0					0	0
05:30					0					0					0					0	0
05:45					0					0					0					0	0
06:00					0					0					0					0	0
06:15	0	0	16	0	16	0	1	7	0	8	0	1	0	0	1	0	1	1	2	4	29
06:30	0	0	12	0	12	0	0	12	0	12	0	1	0	3	4	0	3	1	6	10	38
06:45	0	0	27	1	28	0	0	16	0	16	0	1	0	0	1	0	2	0	4	6	51
07:00	0	0	23	4	27	0	0	28	0	28	0	0	0	1	1	0	4	0	5	9	65
07:15	0	1	41	4	46	0	3	29	0	32	0	2	0	1	3	0	7	0	8	15	96
07:30	1	1	32	2	36	0	1	40	0	41	0	0	0	2	2	0	7	0	3	10	89
07:45	0	1	49	10	60	0	2	49	2	53	0	1	0	3	4	0	11	0	8	19	136
08:00	0	1	52	3	56	0	2	53	0	55	0	1	1	5	7	0	11	0	12	23	141
08:15	0	1	48	2	51	0	2	42	0	44	0	1	1	4	6	1	10	0	8	19	120
08:30	0	3	39	6	48	0	2	54	0	56	0	1	1	0	2	0	17	0	11	28	134
08:45	0	1	62	3	66	0	6	80	0	86	0	3	0	7	10	0	13	0	14	27	189
09:00	0	5	43	9	57	0	11	78	1	90	0	1	0	5	6	0	9	2	11	22	175
09:15	0	2	85	9	96	0	8	71	3	82	0	2	1	3	6	1	18	0	14	33	217
09:30	0	2	87	10	99	0	4	73	2	79	0	5	0	4	9	0	16	1	7	24	211
09:45	0	4	85	8	97	0	4	82	1	87	0	1	0	4	5	0	12	0	11	23	212
10:00	0	4	86	23	113	0	3	96	4	103	0	5	0	3	8	0	18	0	11	29	253
10:15	0	3	89	16	108	0	13	79	4	96	0	2	0	3	5	0	18	0	11	29	238
10:30	0	3	90	13	106	0	4	82	3	89	0	2	0	3	5	1	20	0	12	33	233
10:45	0	3	79	14	96	0	7	89	2	98	0	1	0	4	5	0	13	0	13	26	225
11:00	0	2	93	20	115	0	12	118	4	134	0	6	0	3	9	0	21	0	14	35	293
11:15	0	2	113	23	138	0	10	95	5	110	0	0	0	3	3	0	19	0	19	38	289
11:30	0	4	126	17	147	0	10	93	1	104	0	4	1	7	12	0	13	0	9	22	285
11:45	0	5	130	18	153	0	7	86	1	94	0	0	2	6	8	0	16	1	9	26	281
12:00	0	2	92	21	115	0	15	92	2	109	0	3	0	3	6	0	14	0	11	25	255
12:15	0	5	100	21	126	0	5	100	3	108	0	3	1	6	10	0	23	0	13	36	280
12:30	0	3	117	18	138	0	15	106	4	125	0	5	0	5	10	0	21	0	11	32	305
12:45	0	3	134	15	152	0	14	118	1	133	0	4	0	4	8	0	16	1	14	31	324
13:00	0	3	117	24	144	0	13	118	3	134	0	1	1	5	7	0	19	0	13	32	317
13:15	0	7	109	18	134	0	11	105	1	117	0	8	0	2	10	0	9	1	10	20	281
13:30	0	3	111	14	128	0	14	108	2	124	0	3	1	4	8	0	12	1	14	27	287
13:45	0	2	110	28	140	0	20	102	1	123	0	1	0	5	6	0	10	0	14	24	293
14:00	0	3	66	14	83	1	10	118	2	131	0	3	1	1	5	2	25	2	18	47	266
14:15	0	5	105	25	135	0	9	96	2	107	0	3	0	2	5	1	12	0	15	28	275
14:30	0	4	109	15	128	0	11	92	1	104	0	1	0	2	3	1	11	0	9	21	256
14:45	0	0	116	19	135	0	15	88	2	105	0	1	0	1	2	0	23	0	11	34	276
15:00	1	1	75	13	90	0	14	112	4	130	0	1	0	2	3	2	11	0	19	32	255
15:15	0	2	98	19	119	0	19	100	4	123	0	2	0	5	7	0	11	0	13	24	273
15:30	0	2	101	23	126	0	11	119	0	130	0	1	0	2	3	0	13	1	11	25	284
15:45	0	2	116	9	127	0	10	88	2	100	0	1	0	3	4	0	21	1	16	38	269
16:00	0	5	83	14	102	0	18	114	2	134	0	3	0	4	7	0	21	0	11	32	275
16:15	0	7	88	25	120	0	13	100	1	114	0	1	1	5	7	1	19	1	9	30	271
16:30	0	2	108	24	134	0	13	82	0	95	0	2	0	3	5	1	14	0	12	27	261
16:45	0	3	93	15	111	0	13	108	2	123	0	2	0	3	5	0	10	0	10	20	259
17:00	0	5	80	22	107	0	10	109	3	122	0	0	0	4	4	0	20	0	19	39	272
17:15	0	3	96	12	111	0	16	87	1	104	0	1	1	3	5	0	16	0	10	26	246
17:30	0	2	86	15	103	0	12	85	2	99	0	4	0	4	8	0	11	0	15	26	236
17:45	0	8	120	19	147	0	13	87	5	105	0	1	0	7	8	0	17	0	17	34	294
18:00	0	6	77	24	107	0	12	91	1	104	0	4	1	1	6	0	15	0	17	32	249
18:15	0	2	99	17	118	0	13	101	3	117	0	1	1	5	7	0	17	0	11	28	270
18:30	0	4	101	23	128	0	14	77	3	94	0	1	0	0	1	0	16	0	12	28	251
18:45	0	2	96	21	119	0	6	79	2	87	0	2	0	3	5	0	10	1	8	19	230
19:00	0	5	68	23	96	0	16	87	2	105	0	1	0	6	7	0	9	0	11	20	228
19:15					0					0					0					0	0
19:30					0					0					0					0	0
19:45					0					0					0					0	0
20:00					0					0					0					0	0
20:15					0					0					0					0	0
20:30					0					0					0					0	0
20:45					0					0					0					0	0
21:00					0					0					0					0	0
21:15					0					0					0					0	0
21:30					0					0					0					0	0
21:45					0					0					0					0	0
22:00					0					0					0					0	0
22:15					0					0					0					0	0
22:30					0					0					0					0	0
22:45					0					0					0					0	0
23:00					0					0					0					0	0
23:15					0					0					0					0	0
23:30					0					0					0					0	0
23:45					0					0					0					0	0
00:00					0					0					0					0	0
TOTAL	2	149	4378	765	5294	1	487	4321	94	4903	0	105	15	174	294	11	725	15	596	1347	11838
AM Peak Vol	0	13	462	78	553	0	39	392	11	442	0	10	3	19	32	0	69	1	51	121	1148
PM Peak Vol	0	16	477	75	568	0	53	447	9	509	0	18	1	16	35	0	65	2	48	115	1227

A. Morton Thomas & Associates, Inc.
Turning Movement Counts - Field Sheet

Job No.: P22-0641

Location: Forestville Road at Green Drake Drive - Coach Lantern Avenue
Date: 6/3/2023 Saturday
Recorder: Video
Interval (dd) : 15
(In Minutes)

County: Wake
Town: Wake Forest
Weather: Clear/Warm

PEAK HOURS	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
	6:00AM-12:00PM	10:45	11:45	1148	A	0.42	12:00PM-7:00PM	12:15	13:15	1227	A	0.46

SCHOOL CHILDREN, PEDESTRIANS & BICYCLES

Hour	From North			From South			From East			From West		
	Forestville Road			Forestville Road			Green Drake Drive			Coach Lantern Avenue		
Ending	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
00:15												
00:30												
00:45												
01:00												
01:15												
01:30												
01:45												
02:00												
02:15												
02:30												
02:45												
03:00												
03:15												
03:30												
03:45												
04:00												
04:15												
04:30												
04:45												
05:00												
05:15												
05:30												
05:45												
06:00												
06:15	0	0	0	0	0	0	0	1	0	0	0	0
06:30	0	1	0	0	1	0	0	2	0	0	0	0
06:45	0	0	0	0	0	0	0	1	0	0	0	0
07:00	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	1
07:30	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	1	0	0	1	0	0	0	0	0	1	0
08:00	0	1	0	0	0	0	0	0	0	0	3	0
08:15	0	0	0	0	1	0	0	1	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	2	0
09:45	0	0	0	0	0	0	0	0	0	0	1	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	2	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	2	1	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	1	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	1	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	1	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	1	0	0	0	0	0	0	0
19:15												
19:30												
19:45												
20:00												
20:15												
20:30												
20:45												
21:00												
21:15												
21:30												
21:45												
22:00												
22:15												
22:30												
22:45												
23:00												
23:15												
23:30												
23:45												
00:00												
TOTAL	**0**	**7**	**1**	**0**	**4**	**0**	**0**	**6**	**0**	**0**	**9**	**1**
AM Peak Vol	0	2	1	0	0	0	0	0	0	0	0	0
PM Peak Vol	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX B: SIGNAL WARRANT ANALYSIS

Warrants Summary Report

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lane	1	2
Approach Speed	45	25

Warrant	Met?	Notes
Warrant 1, Eight-Hour Vehicular Volume		
	Yes	
Condition A or B Met	Yes	13 Hours met (8 required)
Condition A and B M	Yes	8 Hours met (8 required)
Warrant 2, Four-Hour Vehicular Volume		
	Yes	12 Hours met (4 required)
Warrant 3, Peak Hour		
	Yes	
Condition A Met?	No	0 Hours met (1 required)
Condition B Met?	Yes	8 Hours met (1 required)
Warrant 4, Pedestrian Volume		
	No	
Condition A Met?	No	0 Hours met (4 required)
Condition B Met?	No	0 Hours met (1 required)

Warrants Summary Report

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lane	1	2
Approach Speed	45	25

Warrant	Met?	Notes
Warrant 1, Eight-Hour Vehicular Volume		
	Yes	
Condition A or B Met	Yes	10 Hours met (8 required)
Condition A and B M	Yes	8 Hours met (8 required)
Warrant 2, Four-Hour Vehicular Volume		
	Yes	10 Hours met (4 required)
Warrant 3, Peak Hour		
	Yes	
Condition A Met?	No	0 Hours met (1 required)
Condition B Met?	Yes	5 Hours met (1 required)
Warrant 4, Pedestrian Volume		
	No	
Condition A Met?	No	0 Hours met (4 required)
Condition B Met?	No	0 Hours met (1 required)

APPENDIX B-1: WARRANT 1 EIGHT-HOUR VEHICULAR VOLUME: 2023 EXISTING CONDITION

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Intersection Information

Major Street Name:	Forestville Rd
Major Street Direction:	NB/SB
Minor Street Direction:	EB/WB

WARRANT 1 MET? Yes

Details:

Condition A Met?	Yes	13 Hours met (8 required)
Condition B Met?	Yes	8 Hours met (8 required)

Hour	Major Street Vehicles (Total of Both Approaches)		High Volume Minor Approach Vehicles		70% Standard Met? Cond. A OR Cond. B		56% Standard Met? Cond. A AND Cond. B	
					Condition A 70% Column	Condition B 70% Column	Condition A 56% Column	Condition B 56% Column
06:00 to 07:00	**488**		**135**		No	No	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
06:15 to 07:15	**666**		**186**		Yes*	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
06:30 to 07:30	**839**		**230**		Yes	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

06:45 to 07:45	**961**		**259**		Yes	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
07:00 to 08:00	**1,078**		**230**		Yes	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
07:15 to 08:15	**1,134**		**205**		Yes*	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
07:30 to 08:30	**1,171**		**178**		Yes	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
07:45 to 08:45	**1,185**		**163**		Yes	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

08:00 to 09:00	**1,143**		**160**		Yes	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
08:15 to 09:15	**1,069**		**145**		Yes*	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
08:30 to 09:30	**1,000**		**129**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
08:45 to 09:45	**923**		**100**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
09:00 to 10:00	**868**		**91**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

09:15 to 10:15	**815**		**79**		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

09:30 to 10:30	**780**		**90**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

09:45 to 10:45	**740**		**90**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

10:00 to 11:00	**738**		**83**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

10:15 to 11:15	**739**		**88**		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

10:30 to 11:30	727		83		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

10:45 to 11:45	764		98		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

11:00 to 12:00	793		109		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

11:15 to 12:15	815		106		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

11:30 to 12:30	881		97		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

11:45 to 12:45	851		98		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

12:00 to 13:00	807		95		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

12:15 to 13:15	839		89		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

12:30 to 13:30	839		99		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

12:45 to 13:45	903		87		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

13:00 to 14:00	938		83		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

13:15 to 14:15	948		101		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

13:30 to 14:30	995		113		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

13:45 to 14:45	1,020		129		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

14:00 to 15:00	1,084		140		Yes*	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

14:15 to 15:15	**1,145**		**125**		No	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
14:30 to 15:30	**1,167**		**121**		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
14:45 to 15:45	**1,190**		**121**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
15:00 to 16:00	**1,262**		**110**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
15:15 to 16:15	**1,288**		**121**		No	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

15:30 to 16:30	**1,316**		**116**		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
15:45 to 16:45	**1,343**		**111**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
16:00 to 17:00	**1,305**		**136**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
16:15 to 17:15	**1,353**		**146**		Yes*	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
16:30 to 17:30	**1,377**		**163**		Yes	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

16:45 to 17:45	**1,424**		**162**		Yes	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
17:00 to 18:00	**1,424**		**155**		Yes	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
17:15 to 18:15	**1,361**		**154**		Yes*	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
17:30 to 18:30	**1,278**		**151**		Yes	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
17:45 to 18:45	**1,181**		**150**		Yes	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	Yes				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

18:00 to 19:00	**1,076**		**138**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
18:15 to 19:15	**760**		**100**		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
18:30 to 19:30	**480**		**58**		No	No	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
18:45 to 19:45	**217**		**29**		No	No	No	No
Condition A	Volume >= 70% column (350)?	No	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	No	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	No				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Intersection Information

Major Street Name:	Forestville Rd
Major Street Direction:	NB/SB
Minor Street Direction:	EB/WB

WARRANT 1 MET? Yes

Details:

Condition A Met?	Yes	10 Hours met (8 required)
Condition B Met?	Yes	8 Hours met (8 required)

Hour	Major Street Vehicles (Total of Both Approaches)		High Volume Minor Approach Vehicles		70% Standard Met? Cond. A OR Cond. B		56% Standard Met? Cond. A AND Cond. B	
					Condition A 70% Column	Condition B 70% Column	Condition A 56% Column	Condition B 56% Column
06:00 to 07:00	**159**		**31**		No	No	No	No
Condition A	Volume >= 70% column (350)?	No	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	No	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	No				
06:15 to 07:15	**212**		**43**		No	No	No	No
Condition A	Volume >= 70% column (350)?	No	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	No	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	No				
06:30 to 07:30	**262**		**43**		No	No	No	No
Condition A	Volume >= 70% column (350)?	No	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	No	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	No				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

06:45 to 07:45	**328**		**55**				No	No	No	No
Condition A	Volume >= 70% column (350)?	No	Volume >= 70% column (525)?	No						
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No						
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No						
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	No						
07:00 to 08:00	**383**		**68**				No	No	No	No
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No						
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No						
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No						
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	Yes						
07:15 to 08:15	**402**		**70**				No	No	No	No
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No						
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No						
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	Yes						
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	Yes						
07:30 to 08:30	**428**		**88**				No	No	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No						
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No						
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	Yes						
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes						
07:45 to 08:45	**470**		**98**				No	No	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No						
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No						
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	Yes						
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes						

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

08:00 to 09:00	**504**		**97**		No	No	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
08:15 to 09:15	**584**		**111**		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
08:30 to 09:30	**658**		**107**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
08:45 to 09:45	**687**		**101**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
09:00 to 10:00	**756**		**108**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

09:15 to 10:15	**782**		**105**		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
09:30 to 10:30	**799**		**113**		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
09:45 to 10:45	**809**		**116**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
10:00 to 11:00	**842**		**122**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
10:15 to 11:15	**886**		**132**		No	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

10:30 to 11:30	**942**		**122**		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
10:45 to 11:45	**995**		**122**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
11:00 to 12:00	**970**		**112**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
11:15 to 12:15	**956**		**109**		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
11:30 to 12:30	**968**		**120**		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

11:45 to 12:45	**1,006**		**125**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
12:00 to 13:00	**1,060**		**132**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
12:15 to 13:15	**1,077**		**116**		No	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
12:30 to 13:30	**1,066**		**110**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
12:45 to 13:45	**1,044**		**103**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

13:00 to 14:00	979		116		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

13:15 to 14:15	970		123		No	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

13:30 to 14:30	950		116		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

13:45 to 14:45	931		126		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

14:00 to 15:00	937		112		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

14:15 to 15:15	937		109		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

14:30 to 15:30	962		114		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

14:45 to 15:45	945		118		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

15:00 to 16:00	962		119		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

15:15 to 16:15	954		124		No	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

15:30 to 16:30	**928**		**125**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
15:45 to 16:45	**935**		**107**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
16:00 to 17:00	**928**		**114**		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
16:15 to 17:15	**909**		**111**		No	Yes*	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				
16:30 to 17:30	**880**		**112**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

16:45 to 17:45	**898**		**127**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

17:00 to 18:00	**880**		**120**		No	Yes	Yes*	Yes*
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

17:15 to 18:15	**900**		**122**		No	Yes*	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

17:30 to 18:30	**920**		**123**		No	Yes	Yes	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	Yes				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

17:45 to 18:45	**874**		**107**		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

Warrant 1: Eight-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

18:00 to 19:00	864		95		No	Yes	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	Yes				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

18:15 to 19:15	629		67		No	No	No	Yes
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	Yes	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	Yes	**Volume >= 56% column (56)?**	Yes				

18:30 to 19:30	407		39		No	No	No	No
Condition A	Volume >= 70% column (350)?	Yes	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	Yes	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	No				

18:45 to 19:45	201		20		No	No	No	No
Condition A	Volume >= 70% column (350)?	No	Volume >= 70% column (525)?	No				
	Volume >= 56% column (280)?	No	Volume >= 56% column (420)?	No				
Condition B	**Volume >= 70% column (525)?**	No	**Volume >= 70% column (70)?**	No				
	Volume >= 56% column (420)?	No	**Volume >= 56% column (56)?**	No				

APPENDIX B-2: WARRANT 2 FOUR-HOUR VEHICULAR VOLUME: 2023 EXISTING CONDITION

Warrant 2: Four-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

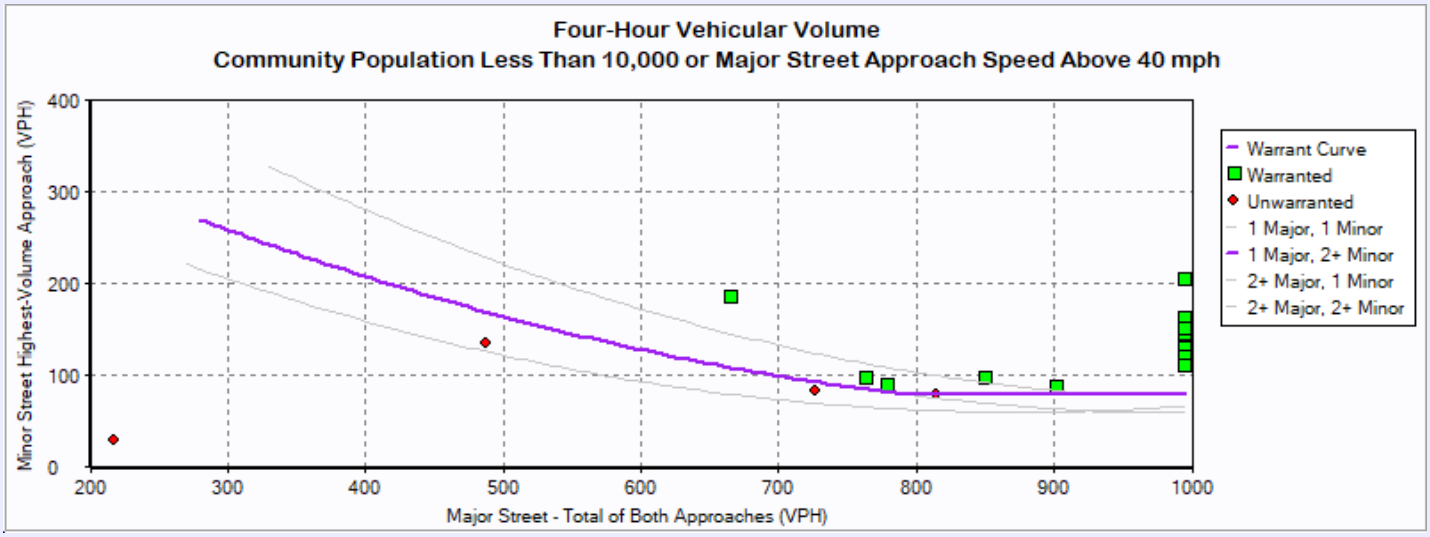
Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lanes	1	2
Approch Speed	45	25

Warrant 2 Met? **Yes**

Details:

Notes	12 Hours met (4 required)
Low population	No



Warrant 2: Four-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Hourly Volumes

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
00:00:00 - 01:00:00	0	0
01:00:00 - 02:00:00	0	0
02:00:00 - 03:00:00	0	0
03:00:00 - 04:00:00	0	0
04:00:00 - 05:00:00	0	0
05:00:00 - 06:00:00	0	0
06:00:00 - 07:00:00	488	135
07:00:00 - 08:00:00	1,078	230
08:00:00 - 09:00:00	1,143	160
09:00:00 - 10:00:00	868	91
10:00:00 - 11:00:00	738	83
11:00:00 - 12:00:00	793	109
12:00:00 - 13:00:00	807	95
13:00:00 - 14:00:00	938	83
14:00:00 - 15:00:00	1,084	140
15:00:00 - 16:00:00	1,262	110
16:00:00 - 17:00:00	1,305	136
17:00:00 - 18:00:00	1,424	155
18:00:00 - 19:00:00	1,076	138
19:00:00 - 20:00:00	0	0
20:00:00 - 21:00:00	0	0
21:00:00 - 22:00:00	0	0
22:00:00 - 23:00:00	0	0

23:00:00 - 00:00:00	0	0

Warranted Hours

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
06:15:00 - 07:15:00	666.00	186.00
07:15:00 - 08:15:00	1,134.00	205.00
08:15:00 - 09:15:00	1,069.00	145.00
09:30:00 - 10:30:00	780.00	90.00
10:45:00 - 11:45:00	764.00	98.00
11:45:00 - 12:45:00	851.00	98.00
12:45:00 - 13:45:00	903.00	87.00
13:45:00 - 14:45:00	1,020.00	129.00
14:45:00 - 15:45:00	1,190.00	121.00
15:45:00 - 16:45:00	1,343.00	111.00
16:45:00 - 17:45:00	1,424.00	162.00
17:45:00 - 18:45:00	1,181.00	150.00

Note: Only data of hours warranted is represented in the above table.

Warrant 2: Four-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

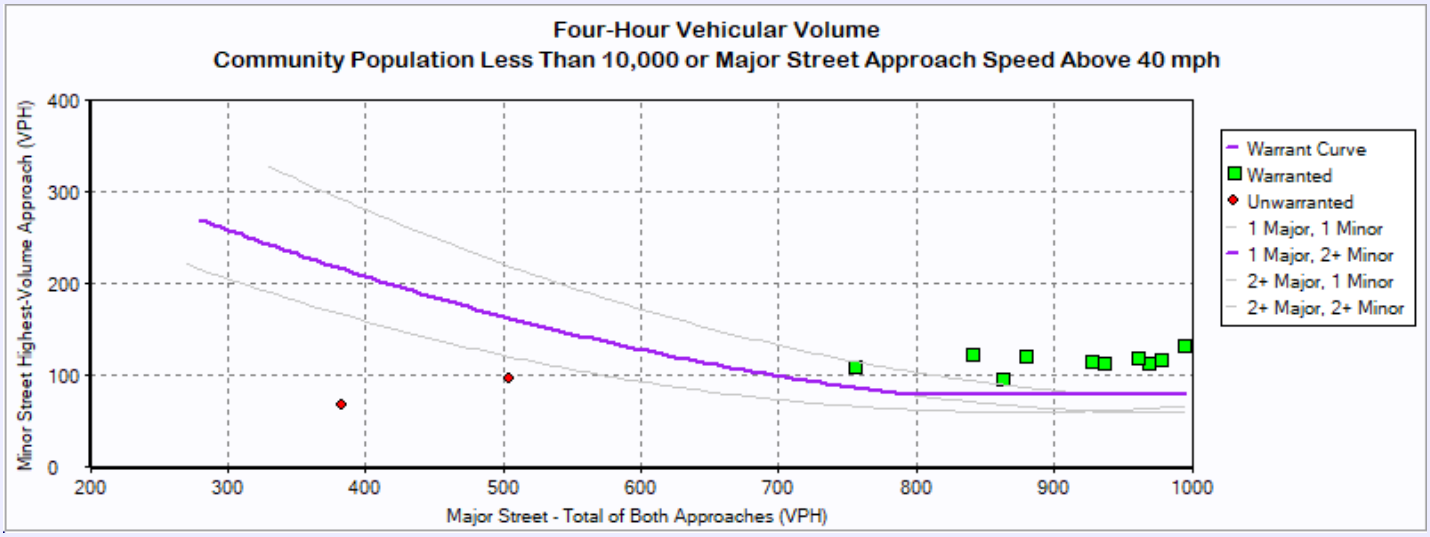
Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lanes	1	2
Approch Speed	45	25

Warrant 2 Met? **Yes**

Details:

Notes	10 Hours met (4 required)
Low population	No



Warrant 2: Four-hour Vehicular Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Hourly Volumes

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
00:00:00 - 01:00:00	0	0
01:00:00 - 02:00:00	0	0
02:00:00 - 03:00:00	0	0
03:00:00 - 04:00:00	0	0
04:00:00 - 05:00:00	0	0
05:00:00 - 06:00:00	0	0
06:00:00 - 07:00:00	159	31
07:00:00 - 08:00:00	383	68
08:00:00 - 09:00:00	504	97
09:00:00 - 10:00:00	756	108
10:00:00 - 11:00:00	842	122
11:00:00 - 12:00:00	970	112
12:00:00 - 13:00:00	1,060	132
13:00:00 - 14:00:00	979	116
14:00:00 - 15:00:00	937	112
15:00:00 - 16:00:00	962	119
16:00:00 - 17:00:00	928	114
17:00:00 - 18:00:00	880	120
18:00:00 - 19:00:00	864	95
19:00:00 - 20:00:00	0	0
20:00:00 - 21:00:00	0	0
21:00:00 - 22:00:00	0	0
22:00:00 - 23:00:00	0	0

23:00:00 - 00:00:00	0	0

Warranted Hours

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
09:00:00 - 10:00:00	756.00	108.00
10:00:00 - 11:00:00	842.00	122.00
11:00:00 - 12:00:00	970.00	112.00
12:00:00 - 13:00:00	1,060.00	132.00
13:00:00 - 14:00:00	979.00	116.00
14:00:00 - 15:00:00	937.00	112.00
15:00:00 - 16:00:00	962.00	119.00
16:00:00 - 17:00:00	928.00	114.00
17:00:00 - 18:00:00	880.00	120.00
18:00:00 - 19:00:00	864.00	95.00

Note: Only data of hours warranted is represented in the above table.

APPENDIX B-3: WARRANT 3 PEAK-HOUR VEHICULAR VOLUME: 2023 EXISTING CONDITION

Warrant 3: Peak Hour

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lanes	1	2
Approch Speed	45	25

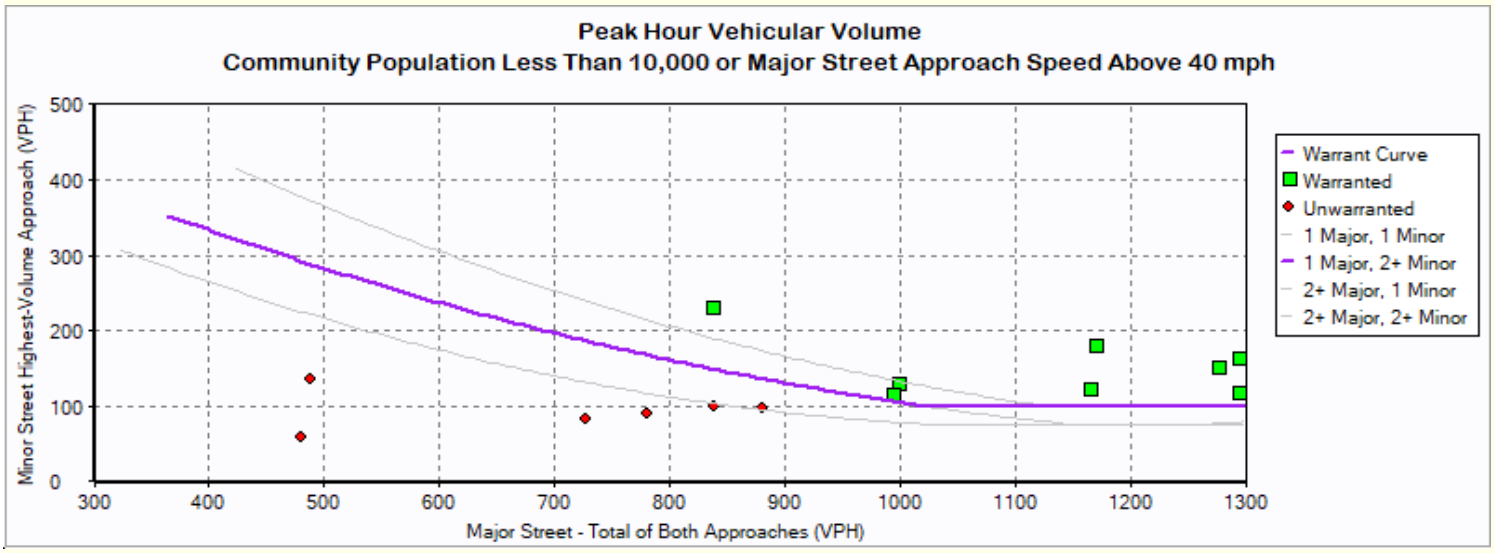
Warrant 3 Met? Yes

Details

Low Population? No

Condition A Met	No	**Condition B Met**	Yes
Notes	0 Hours met (1 required)	**Notes**	8 Hours met (1 required)

Minor Approach Time Delay Condition Met?	Not Met
Minor Approach Volume Condition Met?	Met
Total Entering Intersection Volume Condition Met?	Not Met



Warrant 3: Peak Hour

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
6:00	488	135
6:30	839	230
7:30	1,171	178
8:30	1,000	129
9:30	780	90
10:30	727	83
11:30	881	97
12:30	839	99
13:30	995	113
14:30	1,167	121
15:30	1,316	116
16:30	1,377	163
17:30	1,278	151
18:30	480	58

Warrant 3: Peak Hour

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lanes	1	2
Approch Speed	45	25

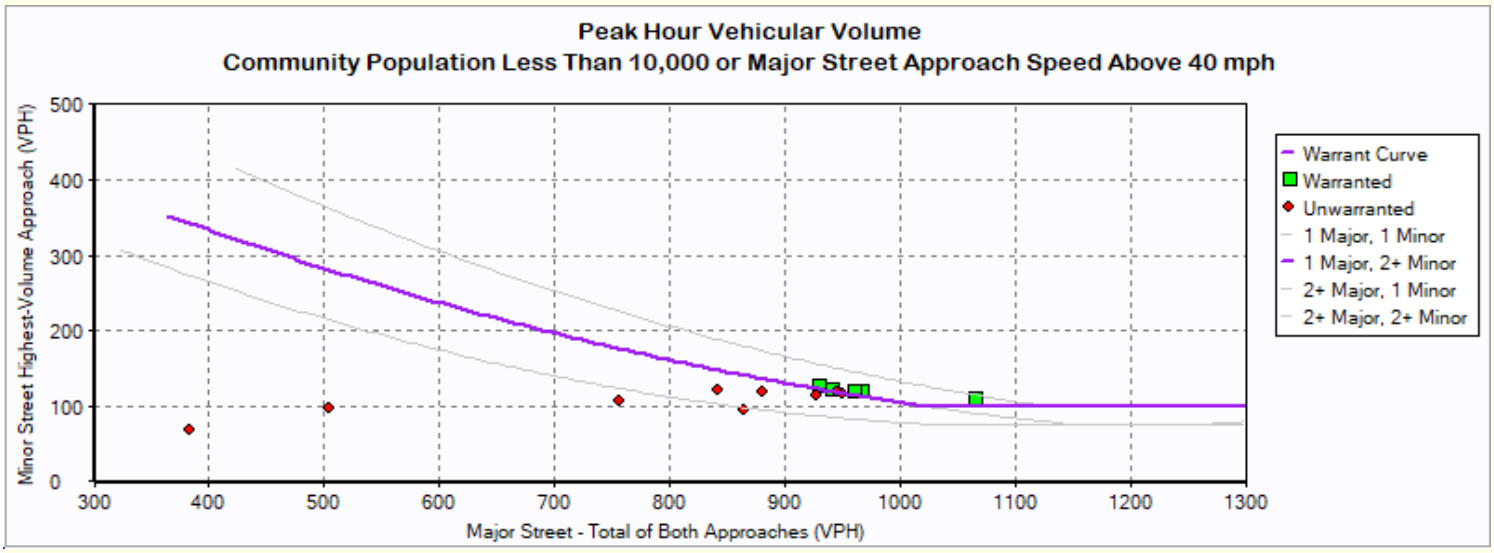
Warrant 3 Met? Yes

Details

Low Population? No

Condition A Met	No	**Condition B Met**	Yes
Notes	0 Hours met (1 required)	**Notes**	5 Hours met (1 required)

Minor Approach Time Delay Condition Met?	Not Met
Minor Approach Volume Condition Met?	Met
Total Entering Intersection Volume Condition Met?	Not Met



Warrant 3: Peak Hour

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
6:00	159	31
7:00	383	68
8:00	504	97
9:00	756	108
10:00	842	122
10:30	942	122
11:30	968	120
12:30	1,066	110
13:30	950	116
13:45	931	126
14:45	945	118
15:00	962	119
16:00	928	114
17:00	880	120
18:00	864	95

APPENDIX B-4: WARRANT 4 PEDESTRIAN VOLUME: 2023 EXISTING CONDITION

Warrant 4: Pedestrian Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

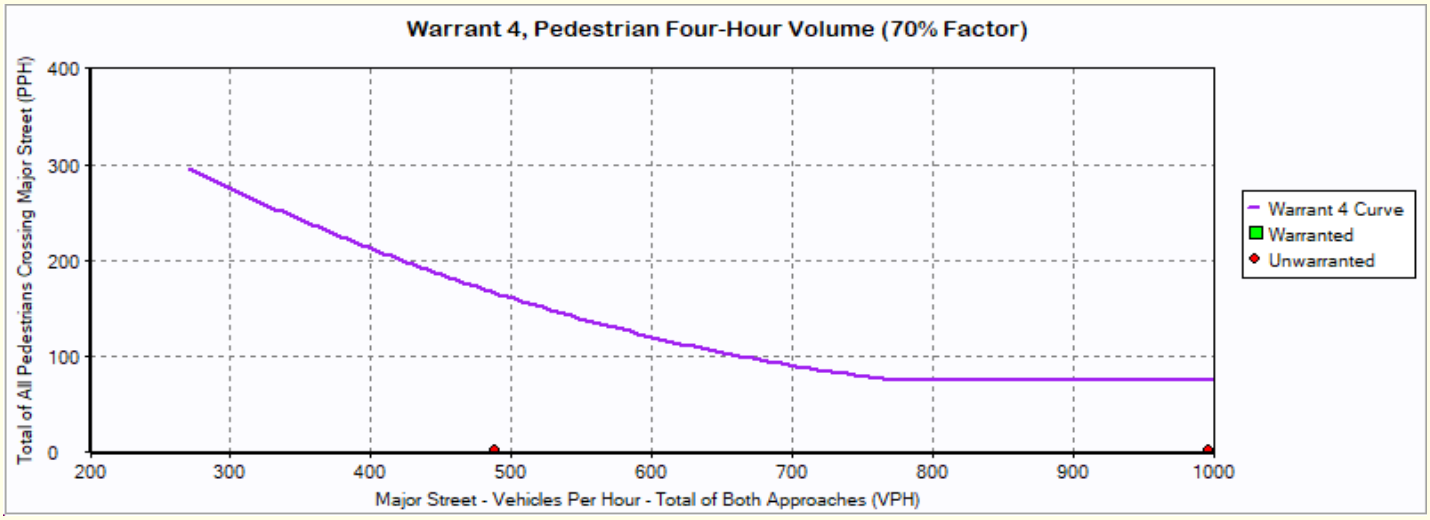
Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lanes	1	2
Approch Speed	45	25

WARRANT 4 MET ? No

Details

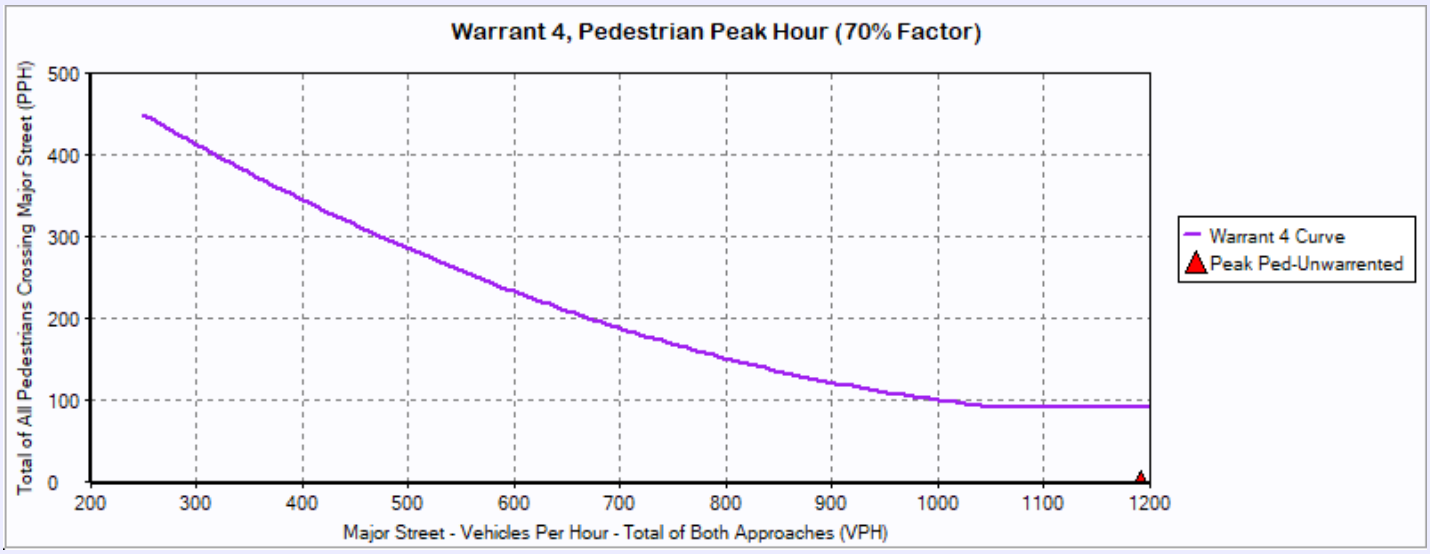
Pedestrian Four Hour Volume Warrant Met?	No		
Pedestrian Peak Hour Warrant Met?	No	**Notes**	0 Hours met (4 required)
Speed Limit or 85th Percentile Speed on Major Street > **35mph**, **or** Intersection lies within an **Isolated Community** with Population < 10,000?	Yes		



Hour	Major Street Vehicle Vol (vph)	Pedestrians Crossing Major
6:00	488	2
14:00	1,084	2
17:00	1,424	2
18:00	1,076	2

Warrant 4: Pedestrian Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave



Pedestrian Peak Hour

Hour	Vehiclar Volume	Pedestrian Volume
16:45:00	1424	2

Warrant 4: Pedestrian Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave

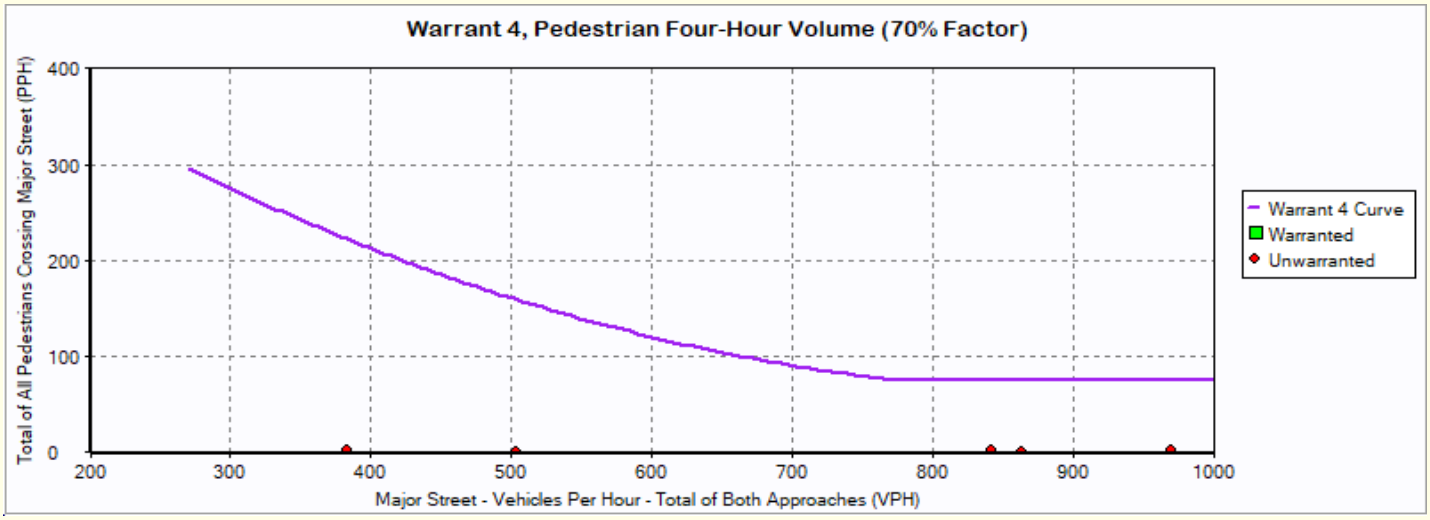
Intersection Information

	Major Street	Minor Street
Street Name	Forestville Rd	Green Drake Dr/Coach Lantern Ave
Direction	NB/SB	EB/WB
Number of Lanes	1	2
Approch Speed	45	25

WARRANT 4 MET ? **No**

Details

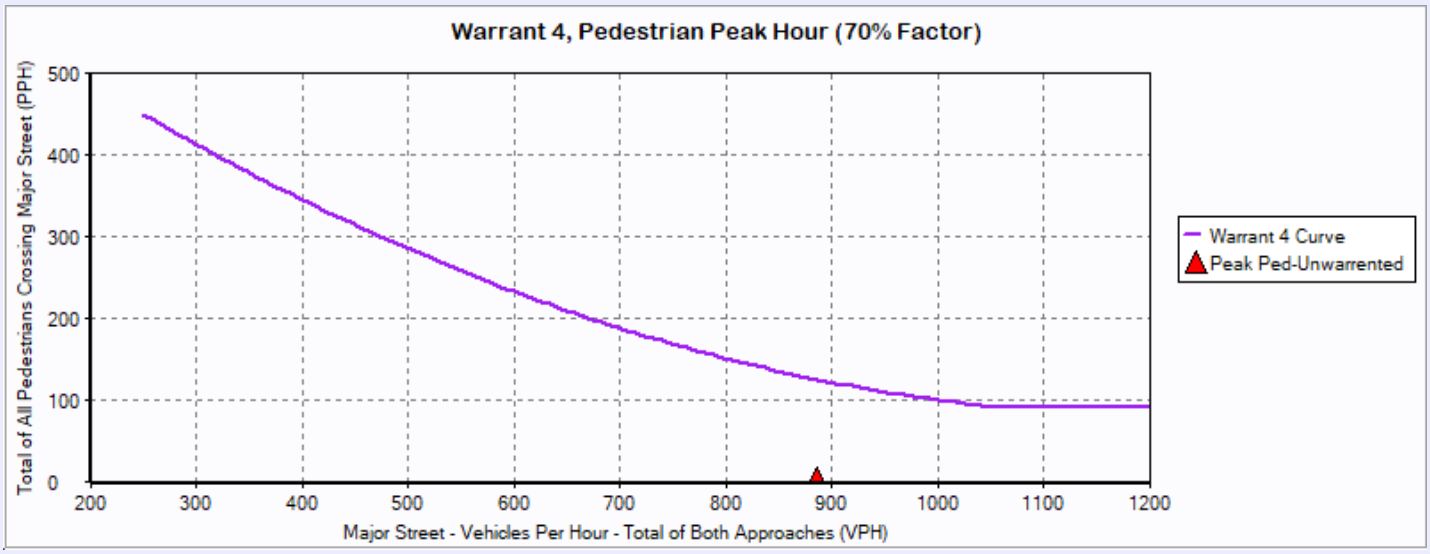
Pedestrian Four Hour Volume Warrant Met?	No		
Pedestrian Peak Hour Warrant Met?	No	**Notes**	0 Hours met (4 required)
Speed Limit or 85th Percentile Speed on Major Street > **35mph**, **or** Intersection lies within an **Isolated Community** with Population < 10,000?	Yes		



Hour	Major Street Vehicle Vol (vph)	Pedestrians Crossing Major
6:00	159	2
7:00	383	3
8:00	504	1
10:00	842	2
11:00	970	3
18:00	864	1

Warrant 4: Pedestrian Volume

1: Forestville Rd at Green Drake Dr/Coach Lantern Ave



Pedestrian Peak Hour

Hour	Vehiclar Volume	Pedestrian Volume
10:15:00	886	5

APPENDIX B

TOWN OF WAKE FOREST, NORTH CAROLINA
SUPPLEMENTAL SERVICES AGREEMENT NO. [1]
TO THE MASTER SERVICE AGREEMENT FOR
ON-CALL PROFESSIONAL ENGINEERING SERVICES

SECTION I: PURPOSE

The purpose of this Supplemental Services Agreement (hereinafter "SSA") is for, AMT Engineering, the Consultant, to provide On-Call general engineering Professional Services, as assigned, in accordance with the Agreement titled, "TOWN OF WAKE FOREST, NORTH CAROLINA MASTER SERVICES AGREEMENT FOR ON-CALL PROFESSIONAL ENGINEERING SERVICES" between the Town and AMT Engineering, dated March 6, 2023 (hereinafter "Master Services Agreement" or "MSA").

SECTION II: SCOPE

Consultant will perform On-Call General engineering Professional Services on an as-needed basis upon receipt of request and assignment from the Town representative. The Consultant shall comply with all terms of the MSA, which agreement is incorporated into this SSA as if fully set forth verbatim herein. Duties will involve the scope of services outlined in Exhibit A.

Services to be provided include, but are not limited to the scope of services outlined in Exhibit A. Consultant and the Town will mutually determine at time of assignment of individual tasks the Consultant personnel to be assigned, schedule, and deliverables.

SECTION III: SCHEDULE

Consultant shall perform tasks as expeditiously as practical and in conformance with schedules developed at the time of assignment of individual tasks and agreed upon by the Town and Consultant.

SECTION IV: PERIOD OF SERVICE

This SSA shall be for a period of from August 28, 2023 to July 1, 2025.

SECTION V: COMPENSATION

Consultant shall perform the services detailed in the scope described in Section II above on the basis of the hourly rate schedule contained in the MSA or set fee for services and attached hereto.

Billing shall be on a monthly basis in conformance with Section VI of the MSA, and invoices for all compensation owed in accordance with this SSA shall be submitted to the Town with sufficient detail to process the invoice for payment and for a proper pre-audit and post-audit thereof in accordance with Town standards. The total amount billed to the Town under this Supplemental Service Agreement shall not exceed $167,984.74 nor shall the Consultant incur costs above $124,049.74 without the written permission of the Town.

SECTION VI: INSURANCE COVERAGE

Consultant shall provide insurance coverage as provided for in Section VII of the MSA.

SECTION VII: OTHER SPECIAL TERMS

The Town will provide the Consultant all pertinent information and data available to the Town and deemed necessary to perform assigned tasks.

SECTION VIII: PRE-AUDIT, if applicable

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

_____

(Signature of Finance Officer)
Town of Wake Forest
301 S. Brooks Street
Wake Forest, NC 27587

SECTION IX: CONTRACT MONITORING

Staff member responsible for monitoring the contract performance requirements is:

Name and Title: Chris Glass Senior Civil Engineer

Department Head Initials: _____

IN WITNESS WHEREOF, the Town of Wake Forest and the Consultant have caused this contract to be executed under seal by their respective duly authorized agents or officers.

TOWN OF WAKE FOREST:	CONSULTANT:
By: _____	By: _____
_____ Printed	_____ Printed
Witnessed by:	Witnessed by:
_____ Name	_____ Name
_____ Printed	_____ Printed
(SEAL)	(SEAL)

Exhibit A

SR 2049 (Forestville Road) at

Coach Lantern Avenue/Green Drake Drive

Signals/Signal Communications Scope of Services

July 14, 2023

General Description of Work

This project consists of all traffic signal work (warrant analysis, upgrades, and new installations) and intersection modification design work (**if required**) and wireless signal communication plans on the traffic signal project for SR 2049 (Forestville Road) from Coach Lantern Avenue/Green Drake Drive to SR 2051 (Burlington Mills Road).

The Town of Wake Forest (Town) has selected A. Morton Thomas and Associates (AMT) to conduct all design and analysis for this signal project.

Intersection modification design work and traffic signal design work shall be limited to the project intersection of SR 2049 (Forestville Road) and Coach Lantern Avenue/Green Drake Drive. Traffic signal interconnect design work will be limited to the corridor of SR 2049 (Forestville Road) between Coach Lantern Avenue/Green Drake Drive and SR 2045 (Burlington Mills Road). The work shall consist of the following elements:

Analysis including:

- **Task 1** -Conduct a Traffic Signal Warrant Analysis
  - Conduct turning movement counts for weekday (school in session)
  - Conduct turning movement counts for weekend (within school year)
  - Traffic Signal Warrant Analysis for the project intersection
  - Create Traffic Signal Warrant Analysis report for the project intersection
- **Task 2** -Create four alternatives for a Preliminary Pole Placement Analysis
  - Metal Strain Poles with optimal intersection reconfiguration
  - Mast Arms with optimal intersection reconfiguration
  - Wood Poles with optimal intersection reconfiguration
  - Maximum span configuration for future road widening

Plans, Special Provisions and Quantities including:

SIGNAL DESIGN:

- **Task 1** – Field Survey for Signal Plans:
  - Field survey trips to:
    - Check location of existing utilities, stormwater devices, and other roadway features
    - Survey locations for installation of new signal equipment
    - Validate and verify existing right-of-way and easements
    - Provide topography of existing site
- **Task 2** – Final Signal Designs with Electrical and Programming Details & Quantities for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive

- **Task 3** - Pedestrian Features on Final Signal Designs for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive
- **Task 4** – Metal Pole on Final Signal Designs for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive
- **Task 5** – Limited Intersection Modification Designs for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive
- **Task 6** – General Design:
  - Title sheet
  - Summarize quantities
  - Special Provisions
- **Task 7** – Field Work/Meeting:
  - Field review – 1 trip for 2 people
  - Meetings for coordination, assume virtual meetings (when possible)
  - Preliminary Field Inspection (prior to R/W)
  - Final Field Inspection (prior to Let)
- **Task 8** – Miscellaneous Items:
  - Clearance Calculation figures and spreadsheet (part of signal design task 2)
  - Metal pole elevations and clearance calculations (part of signal design task 2)
  - Mast arm design (if required, part of signal design task 2)

SIGNAL COMMUNICATIONS:

- **Task 1** -Scoping:
  - Scoping Document
    - Use **Signal Communications** C**hecklist** below
  - Scoping meetings, discussions and coordination
- **Task 2** – CAD Design:
  - Basemap development
  - Transfer any existing plans to new basemap
- **Task 3** – Field Survey for UMR plans and Radio Signal Analysis:
  - Field Survey trips to:
    - Check location of existing communications and other ITS equipment
    - Survey locations for installation of new communications and ITS equipment
    - Preliminary utility data collection for UMR plans
    - Wireless Site Survey
    - Coordination with NCDOT Division 5 for bucket truck and field personnel for the Wireless Site Survey
- **Task 4** – UMR Plans (*if required)*:
  - First Draft UMR Plans
    - Tree diagrams for poles requiring UMR work
    - Existing heights above driveways and roadways
  - Coordinate with Utility Companies
    - Phone/email communications with Utility Companies
    - Provide preliminary UMR plans
    - Utility Walkthrough with all involved utilities

  - Draft UMR plans for DOT and utility company review
  - Final UMR Plans
-
- **Task 5** – Preliminary Design (Wireless):
  - Develop Preliminary Radio Plans for DOT review
  - Request up to date construction notes, common design practices and typical details
  - Address any comments with proper changes and quality control
- **Task 6** – Preliminary Specifications and Quantities:
  - Develop Preliminary Project Special Provisions for DOT review
    - Submit with preliminary radio plans
  - Develop Preliminary Quantities total for DOT review
    - Submit with final radio plans
- **Task 7** – Final Design – review and address NCDOT Comments
  - Develop Final Plans for NCDOT review
- **Task 8** – Final Submittal
  - Submit final sealed plan package to Town of Wake Forest
    - Include all plans sheets, special provisions and quantities

PUBLIC INVOLVEMENT:

- **Task 1** -Public Notice of Upcoming Signal Addition
  - Provide a public notice for release by the Town prior to submission of 75% design plans
- **Task 2** -Amend 75% Signal Plans based on Public Feedback
  - Provide a revision to 75% signal plans based off any public feedback the Town wishes to incorporate into the design

Design Considerations

The following are major **signal** design considerations for ***this*** project:

- The intersection will include **QFREE MAXTIME** controllers in **standard NCDOT 332** cabinets as listed on the NCDOT QPL.
- Final design will have all new equipment – poles, cabinets, detection, etc.
- Inductive loop detectors will be used for vehicle detection.
- The final intersection phasing will be determined after review of the preliminary pole location alternatives. Alternative phasing will be incorporated into the design if protected/permissive signal phasing is used. Split phasing will be omitted unless unavoidable.
- **MicroStation** will be used for the design of this project, using NCDOT CAD design standards.
- No signal preemption is intended for this signal
- The Town will determine pole material to be used after reviewing the preliminary pole placement alternatives

- Coordination with Division Utility Engineer is required for signal pole locations. Pole/Metal pole locations should be sent to the Division, **as soon as available**, for coordination with utilities.

- Pedestrian signal requirements will be provided for all legs of the intersection.

- High-visibility crosswalks will be used at signalized intersections on this project.

- Stopbar and crosswalk locations will be coordinated with the pavement marking designer. Signal designer is responsible for stopbar and crosswalk locations at signalized locations. Signal designer will provide turning simulations at all locations to validate stopbar and crosswalk locations.

- Roadway designer will be used for pavement markings and curb ramp updates.

- Roadway designer will be used to design modifications to existing nose of median on Coach Lantern Drive, if required.

- Water resources designer will be used for any necessary drainage improvements.
    - This scope only covers any required storm pipe rerouting of any, some, or all of the following existing drainage structures:
        - Approximately 180 LF pipe crossing the Coach Lantern Avenue approach
        - Approximately 90 LF pipe located in the NE quadrant of the intersection
        - Approximately 75 LF pipe crossing the SB Forestville Road approach
        - Approximately 30 LF pipe crossing the WB Green Drake Drive approach
    - Any additional required drainage work is outside the scope of this agreement.

- System detectors will be included in this design and used with the Wake Forest Signal System.

- AMT will directly transmit all submissions simultaneously to NCDOT Division 5 and NCDOT ITS/Signals.

- Town Staff will review all NCDOT submittal comments and provide a unified and consolidated feedback document listing NCDOT and Town comments to AMT between each submittal. Unless directed by NCDOT, AMT will not resubmit any submissions; instead, comments will be incorporated on the subsequent submittal.

- Resubmissions due to preferential design changes are outside the scope of this agreement.

Signal Communications Checklist:

The following are possible Signal Communications design considerations for ***this*** project

- Wireless Communications to tie into the Wake Forest Signal System as constructed under NCDOT TIP # U-6023 at the NCDOT signal # 05-1924 (SR 2049 at SR 2051)

- Interconnect *may* require installation of pole-mounted repeaters and antennas at key locations along Forestville Road.

- Ethernet Communications *may* be required

- Utility Make Ready (UMR) for the relocation of conflicting utilities or the installation of wireless signal interconnect equipment along SR 2049 (Forestville Road) *may* be necessary.

Work Standards

All work will be completed according to the standards established in the MUTCD, the NCDOT *Standard Specifications for Roads & Structures* and *Roadway Standard Drawings* (latest editions), the NCDOT Signals & Geometrics *Signal Design Manual*, and the "*Guidelines for the Preparation of ITS and Signal Plans by Private Engineering Firms*" located at https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals.aspx.

A database configuration file will be provided for the signal at this project location. The file will include all the necessary programming entries to achieve the desired operation of the Signal Design for the location. The file will be compatible with the local controller software that is being used and will be able to be downloaded directly to the controller unit without conversion.

Information and Services to be Provided by the Town (obtained from NCDOT)

1. Copies of all available signal file folder information and electronic (Microstation) for NCDOT Signal No. 05-1924 wherever available.
2. Copies of existing Communications Plans and Splice Diagrams (PDF and/or MicroStation) for NCDOT Signal No. 05-1924 wherever available.
3. Any known revisions to original plans for the existing system in this area.
4. Catalog cuts/existing equipment information for ITS/system equipment if available.

Schedule - Dates are calculated around the Plan Due Date (for NCDOT, this has typically been a week prior to the "Roadway Plans to Cont & Prop" date. For Centrally Managed projects this is typically 15 weeks prior to let. For Municipal or Division Managed projects, use their required date.)

Regular Scheduling		
Item	**Date**	**Weeks Prior to Plan Due Date**
Signal Warrant Analysis to Town	August 1, 2023	N/A
Preliminary Pole Location Sheet to Town	October 2, 2023	24
Town consolidates comments and sends to AMT	October 9, 2023	23
Public Notice to Town	October 16, 2023	22
75% Signal Plans, Communication Plans to NCDOT ITS/Signals (NO electrical details)	October 30, 2023	20
NCDOT ITS/Signals Returns Comments to Town	November 20, 2023	17
Town consolidates comments and sends to AMT	November 27, 2023	16
90% signals, electrical, comm. plans, PSP, and quantities to ITS & Signals	December 22, 2023	12
NCDOT ITS/Signals Returns Comments to Town	January 12, 2024	9
Town consolidates comments and sends to AMT	January 19, 2024	8
100% sealed PS&E submittal due to ITS & Signals	February 16, 2024	4
Plan Due Date to Town	**March 15, 2024**	0

Deliverables

1. Preliminary Pole Location Sheets
2. 75% unsealed signal plans, wireless communication plan
3. 90% unsealed traffic signal plans, electrical details with configuration file, and wireless communication plan
   - One (1) copy of clearance calculations, quantities, project special provisions, wireless communication plan, utility make-ready plans (if any), and autoturn sheets
4. 100% sealed traffic signal plans, electrical details with configuration file, wireless communication plan, utility make-ready plans (if any), and autoturn sheets
   - One (1) copy of clearance calculations, quantities, project special provisions (sealed) and autoturn sheets
5. Electronic project files – Electronically sealed, searchable PDFs. One PDF per plan sheet.
   - For Plan checking

Plans, Special Provisions and Quantities including:

Roadway Design:

A. Morton Thomas and Associates, Inc. (AMT) shall develop final plans and project special provisions in sufficient form and detail for the Town of Wake Forest (Town) to let construction contracts. All final designs for the Project shall conform to the following design specifications:

- NCDOTs *Roadway Design Manual*
- NCDOTs Roadway Standard Drawings
- NCDOTs Standard Specifications for Roads and Structures
- NCDOT's *Municipal / Developer Submittals Guidelines*
- NCDOT's *Guidelines for Drainage Study and Hydraulic Design*
- AASHTO's *A Policy on Geometric Design of Highways and Streets* (latest edition)
- FHWA'S *Manual on Uniform Traffic Control Devices* (latest edition)
- Town of Wake Forest's *Manual of Specifications, Standards & Design*

Plans shall be developed using MicroStation V8i and GEOPAK software. Final design plans shall include roadway and sidewalk design and details, construction traffic control plans, pavement marking plans, erosion control notes and details, and material quantities; and shall identify existing right-of-way, proposed right-of-way, and permanent, utility, and construction easements sufficient to encompass all improvements. The roadway plans will conform to the plan requirements described in NCDOT's *Municipal / Developer Submittal guidelines* so that if an encroachment permit with NCDOT is required, the plans will only require minimal, if any edits to submit to NCDOT.

AMT will coordinate with the Town for roadway plan reviews. A formal scoping meeting with NCDOT is not anticipated and is not included in this scope.

- **Task 1** – Preliminary Design (25% Plans):

Prior to developing preliminary design plans, AMT will develop conceptual level designs and evaluate alternatives regarding the transitions/taper from the existing typical section to the proposed typical section at both project termini points. The conceptual design will be sent to the Town for review. Redesign of the vertical and horizontal geometry, including pavement width, is not anticipated on Green Drake or Forestville Road. Widening and lane reconfigurations may be necessary on Coach Lantern.

All curb ramps and crosswalks within the project area will be upgraded/corrected to meet standards. The Preliminary Plans shall consist of roadway typical sections, plans, profiles and cross sections. The plans at this stage will represent approximately 25% of roadway design.

AMT shall prepare the preliminary roadway plans on plan and profile sheets at a scale of 1"=40' horizontal and 1"=4' vertical. AMT shall prepare preliminary cross sections at a scale of 1"=10' every 50' throughout the project area.

AMT shall prepare an Opinion of Probable Cost to be submitted to the Town along with the preliminary plans. After the Town has reviewed the plans and provided comments, AMT will revise the Preliminary Plans and resubmit.

Task 1 Schedule:
The roadway plans will follow the schedule laid out in the Signals and ITS scope of work. Preliminary Design Plans will be submitted for review on or before the Public Notice deliverable.

Task 1 Deliverables:

- Conceptual layout
- Preliminary Plans and Cross Sections (PDF)
- Opinion of Probable Cost (PDF/Excel)

- **Task 2** – Right of Way Plans (75% Plans):

All existing structures, utilities, proposed signal pole locations, and other items affected by the project shall be shown in addition to the proposed construction. The plans shall include horizontal geometrics, pavements, existing drainage layout, property lines, typical sections, traffic control plans, preliminary signing and pavement marking plans, preliminary signal design plans, erosion control notes and details, utility by other plans, and special details.

AMT shall prepare an Opinion of Probable Cost to be submitted to the Town along with the plans. After the Town has reviewed the plans and provided comments, AMT will revise the Plans and resubmit.

Task 2 Schedule:
The roadway plans will follow the schedule laid out in the Signals and ITS scope of work. Right of Way Plans will be submitted for review with the 90% Signal plans.

Task 2 Deliverables:

- 75% Roadway Plans and Cross Sections (PDF)
- Opinion of Probable Cost (PDF/Excel)

- **Task 3** – Final Roadway Design Plans (100% Plans)

Once the comments on the 75% plans have been addressed, AMT will compile Final Roadway Design Plans, Specifications, and Estimate (PS&E) package. Items include standard drawings, general notes, special provisions, and relevant summary plan sheet summaries. Before sealing, AMT will submit the plans (approximately 90% final construction plans) to the Town for their final review. Once all comments have been addressed the plans will be sealed and submitted with the final PS&E package.

Task 3 Schedule:
The roadway plans will follow the schedule laid out in the Signals and ITS scope of work. 90% Final construction plans will be submitted for review with the 100% Signal plans. If any comments occur, AMT will address them, seal the plans and submit the PS&E package.

Task 3 Deliverables:

- Unsealed plans for final review
- Sealed Roadway Plans and Cross Sections (PDF)
- Final Construction Quantities
- Special Provisions
- Opinion of Probable Cost (PDF/Excel)

Pavement Markings:

- **Task 4** – Initiate Signing & Delineation Design

AMT will develop a delineation design based on the Preliminary Design Plans. Pavement delineations will be in accordance with Manual of Uniform Traffic Control Devices (MUTCD), NCDOT Roadway Standard Drawings, and NCDOT Signing and Delineation Manual. Design plans will include existing signage inventory sheet and an attempt to re-use or modify the existing signage will be evaluated.

Task 4 Schedule:
The Initial Delineation Plans will follow the schedule laid out in the Signals and ITS scope of work and will be submitted with the 75% Signal Plans

Task 4 Deliverables:
- Initial Delineation Plans

- **Task 5** – Complete Delineation Design

After the comments from the preliminary pavement marking and signing plans are addressed, the signing and delineation design plans will be created. These will include quantity estimate for all signing and pavement marking items. Unsealed plans will be submitted for review. After comments from the unsealed plans are addressed, the plans will be sealed and submitted.

Task 5 Schedule:
The Unsealed Delineation Plans will follow the schedule laid out in the Signals and ITS scope of work and will be submitted with the 90% Signal Plans. If any comments occur, AMT will address them and submit the sealed Completed Delineation Plans with the Sealed Signal PS&E.

Task 5 Deliverables:
- Unsealed Delineation Plans
- Sealed Delineation Plans
- Project Special Provisions
- Quantities

Hydraulic Design and Erosion Control Plans:

- **Task 6** – Hydraulic Design

AMT will conduct field reconnaissance of existing and proposed drainage features and patterns associated with the project including storm drain systems, pipe crossings and ditches. It is assumed no Pre-Design meeting is required. S**ignificant redesign of the existing drainage conveyance systems is not anticipated.** Analysis of the existing drainage system will not occur unless impacted by the intersection improvement project.

If any drainage design is required, it will consist of designing proposed ditches and storm drain improvements necessary to accommodate the proposed intersection improvements. Design of structural BMP's such as detention ponds are not anticipated or included in this scope of work. A drainage report is not anticipated as a part of this scope.

Proposed drainage features will be included with all each roadway plan submittal. The Drainage plans, if required, shall include a title sheet, applicable details, notes and planimetric designs.

Task 6 Deliverables:
- Drainage Plan Sheets
- Project Special Provisions
- Quantities

- **Task 7** – Erosion Control

AMT does not anticipate more than 1 acre of disturbance with this scope of work. Should total land disturbance be more than one (1) acre, the Engineer, will submit erosion control plans to NCDEQ for review and approval. The Town will be responsible for signing and notarizing the NCDEQ Financial Responsibility Form and paying the required review fees for the project.

If the project disturbs more than one (1) acre, AMT will develop preliminary erosion control plans for the clearing and grubbing and intermediate/final grade phases to identify large erosion control features that will impact right-of-way and easement acquisitions. These features will be sized accordingly and included with the 75% roadway plan submittal. The design will specify erosion control measures, which minimize erosion and limit off-site sedimentation during construction of the Project.

Once the preliminary plans have been reviewed, AMT will incorporate the comments into the Final Erosion Control Plans. Erosion Control quantities and special provisions will be prepared based on the final plans.

Task 7 Deliverables:

- Erosion Plan Sheets
- Project Special Provisions
- Quantities

Scope of Services

Forestville Rd Intersection with Coach Lantern Ave. and Green Drake Dr. Intersection Improvements
Wake Forest
Wake County, NC

Phase 1 - Topographic Surveying, Mapping and Platting

Task includes the following activities:

- Perform property owner research on approximately 15parcels.
- Property owner notification letters.
- Survey Corridor shall be as shown on attached sketch
- NV5 will perform sufficient field surveys to delineate those existing property lines, rights-of-way and easements within the survey limits. Existing property lines will be mapped based on existing property monumentation in conjunction with recorded deeds and plats.
- Topographic surveys will be performed according to the requirements for a Class C Trigonometric Topographic Survey depicting one foot contour lines. The topographic survey will include existing conditions such as buildings, sidewalks, curb/gutter, paving, roadways, parking areas, drainage features, concrete slabs and fences within the survey limits. Visible utility structures, including fire hydrants, power poles, manholes, vaults, traffic signal cabinets, valves, etc., will be located on the survey. Corresponding top, bottom and invert elevations of storm and sanitary structures will also be recorded. Pipe sizes entering and exiting these structures will also be noted, where accurately attainable. Storm drainage and sanitary systems will be traced and located to one structure beyond the survey limits of the project. Other information that will be shown on the final deliverable includes location of flood plain and perimeter of wooded areas.
- Location and mapping of Level B SUE designation (See Phase 2).
- The survey will be horizontally tied to the North Carolina State Plane Coordinate System under the North American Datum of 1983 (NAD83). Vertically, the project will be tied to the North American Vertical Datum of 1988(NAVD88). The project's units will be the U.S. Survey Foot. Additionally, the survey will be performed based on the Rules of Standard Practice as outlined by the North Carolina Board of Registration for Engineers and Land Surveyors.

Phase 2 – Level B Subsurface Utility Designation

NV5, shall employ geophysical prospecting techniques to determine the existence and horizontal position of underground utilities within the project limits. The utilities will be marked on the ground using a universally recognized system of paint markings at 50 foot intervals along the utility and at all bends in the line. Non-metallic lines cannot be located using standard pipe and cable locating equipment. NV5 will however, attempt to locate these lines

using utility records and indirect methods such as ground penetrating radar (GPR). GPR technology complements standard electromagnetic techniques in the field. Allowing NV5 to detect all material types metallic and non-metallic, including plastics, concrete, ceramics, asphalt composites and more. NV5 cannot guarantee the accuracy of these locates and will not guarantee that all non-metallic lines can be located. Utilities buried in a common trench, or in close proximity to other utilities or metal structures, occasionally cannot be isolated. NV5 will, if possible attempt to isolate all lines. However, such isolation and location may not be possible or practicable and NV5 does not warrant or guarantee the location and/or isolation of the underground utilities designated during the investigation. This service does not include the location of stormwater or sanitary sewer (gravity). NV5 will provide a copy of digital field sketches of the appurtenances as well as utilities that were designated.

Deliverables:

Existing Conditions and Topographic survey in Microstation format.

DTM, DAT and TIN files in Microstation/Geopak format.

PDF copies of Deeds and Plats collected during the property research

Exclusions:

The following items are excluded from the Scope of Services:

- Right of way and Easement acquisition plats, exhibits or legal descriptions.
- Any other platting services not specifically included in the above scope of services.
- Any stakeout services.
- Determination of the presence or absence of hazardous chemicals, threatened and endangered species, or other issues not expressly described in the scope of work.
- Appearance before courts or boards on matters of litigation or hearings related to the project, unless expressly specified in the scope of the project.
- Expenses for overnight delivery services
- Vacuum Excavation

P22–0641 FORESTVILLE AT COACH LANTERN

SUE-160' wide within 200' of intersection on Forestville - 10' outside pavement for rest of survey limits.

60'
400'
200'
80'
80'
200'
80'
550'
60'

200 100 0 200 400

SCALE 1" = 200'

A. MORTON THOMAS AND ASSOCIATES, INC.
6131 FALLS OF NEUSE ROAD, SUITE 101 • RALEIGH, NC 27609
(919) 855-9989 • NC LICENSE NO. F-1049
WWW.AMTENGINEERING.COM

Fee Estimate
Project: Signal Installation at Forrestville/Coach Lantern
Firm: A Morton Thomas and Associates, Inc
Date: 8/8/23

LABOR

Task #	Description	Proposed Fee Type	Consultant Fee	Total Subconsultant Fee	Subconsultant
?	Survey			$66,119.74	NV5
1.0	Traffic Signal Warrant Analysis and Preliminary Pole Analysis		$ 7,335.00		
2.0	Traffic Signal Design		$ 30,990.00		
3.0	Final Roadway Design Plans - see Tasks 7.0 through 13.0 (if required)		$ -		
4.0	Signal Communications Plans		$ 19,605.00		
5.0	UMR Plans (if required)		$ 9,340.00		
6.0	Public Involvement		$ 1,470.00		
7.0	Preliminary Design (25% Plans) (if required)		$ 3,802.50		
8.0	Right of Way Plans (75% Plans) (if required)		$ 7,807.50		
9.0	Final Roadway Design Plans (100 % Plans) (if required)		$ 5,935.00		
10.0	Initiate Signing & Delineation Design (if required)		$ 3,335.00		
11.0	Complete Delineation Design (if required)		$ 1,875.00		
12.0	Hydraulic Design (if required)		$ 3,985.00		
13.0	Erosion Control Plans (if required)		$ 4,385.00		
		Subtotal	$ 99,865.00	$ 66,119.74	

EXPENSES

			Consultant	Subs
	REIMBURSEABLE EXPENSES		$2,000.00	
		Subtotal	$ 2,000.00	$ -

LABOR & EXPENSES TOTAL $ 167,984.74

ADDITIONAL SERVICES

				$ -

TOTAL $ 167,984.74

Contractor/Vendor Name: A. Morton Thomas and Associates

Vendor Number: 5746

Contract type: Consulting

Description / Scope of Work: Planning Signal location based on the CTP and providing construction documents for the signal design

Contract Amount: 167984.74

RFP/RFQ #:

Contractor signature:

E-SIGNED by Samuel Macdonald on 2023-09-07 18:33:42 GMT

Date: September 07, 2023

Finance Department signature:

Date:

Town Manager signature:

Date:

Attested By:

Date:

TOWN OF WAKE FOREST INCORPORATED SEAL FEB. 20, 1909 NORTH CAROLINA

This instrument has been pre-audited in a manner required by the Local Government Budget and Fiscal Control Act.

TOWN OF WAKE FOREST, NORTH CAROLINA
MASTER SERVICE AGREEMENT FOR
ON-CALL PROFESSIONAL GENERAL ENGINEERING SERVICES

THIS AGREEMENT ("Master Service Agreement" or "MSA) is made and entered into as of the 6th day of March, 2023, by the Town of Wake Forest ("Town") and A. Morton Thomas and Associates, Inc ("Consultant"), organized and existing under the laws of the State of North Carolina.

GENERAL ENGINEERING PROFESSIONAL SERVICES

WHEREAS, the Town desires to engage the Consultant to provide On-Call General, Engineering, and Inspection Professional Services related to municipal general engineering, construction, and inspection as set forth in and in accordance with Supplemental Services Agreements ("SSA"); and

WHEREAS, the Town issued a "Request for Qualifications for On-Call General Engineering Services **RFQ # 22-0001** dated 16th day of September 2022; and

WHEREAS, Consultant provides professional consulting services and has experience, staff, and resources to perform such Services;

NOW THEREFORE, Town and Consultant, in consideration of their mutual covenants, herein agree as follows:

SECTION I. BACKGROUND and PURPOSE

The purpose of the Town's on-call process is to secure more than one general engineering professional to provide professional on-call engineering, construction, and inspection services. The purpose of this Agreement is to provide the basic terms and conditions by which Consultant will provide its services to the Town, as the need for Services may arise, and in accordance with the standards and requirements as described herein, and in each SSA.

SECTION II: SERVICES and SCOPE to be PERFORMED

The Consultant shall perform on-call Services as set forth in this MSA and SSA. The SSA is made a part of this Agreement as if fully set forth herein. The Town shall pay Consultant for the performance of Services in the manner set forth herein and in the SSA.

Requests for services made by the Town to Consultant are contingent upon execution of an SSA and the sufficiency of funding. No services shall commence on a particular project until an SSA has been executed by both parties, and the Town has issued a Notice to Proceed to Consultant. Any amendments, corrections, or change orders by either party must be made in writing signed in the same manner as the original. (This form may be used for amendments and change orders.) The Town reserves the right to refuse payment for any work outside that authorized herein or pursuant to a duly approved amendment or change order.

Services to be provided shall be set forth in an SSA and amendments to that agreement. The SSA may also include additional terms and conditions regarding payment and other matters necessary for the

execution of projects. SSAs shall not vary the terms of this Agreement, except where this Agreement authorizes such variance, and shall be interpreted consistently with this Agreement. If there is a conflict between this Agreement and SSAs, this Agreement shall control.

The Town has no obligation to provide Services with any work hereunder and does not guarantee the issuance of any minimum number of SSAs under this Agreement.

Consultant represents and agrees that now and continuing for the term of this Agreement, Consultant:

- is experienced, qualified, skilled, and fully capable of performing Services in a competent and professional manner; and
- shall exercise reasonable care and diligence, and shall act in the best interest of Town; and
- shall act in accordance with generally accepted standards of Consultant's practice applicable to the locality; and shall comply with this Agreement, applicable SSAs, and with all applicable federal, state, and local laws, ordinances, codes, rules, and regulations (collectively "Laws and Regulations"); and
- possesses all necessary qualifications, licenses, and certifications; and
- shall perform in a timely manner and in accordance with schedules required under this Agreement or an applicable SSA, time being of the essence; and
- shall work in good faith with Town to meet requirements imposed by the federal or state government or other funding entity if grants are used to fund any portion of projects; and
- the individual(s) signing Agreement have the right and power to do so and bind Consultant to the obligations set forth herein and such individuals do so personally warrant that they have such authority.

SECTION III: AGREEMENT DURATION

This Agreement shall authorize SSAs to be executed for a three (3) year period from the date of execution of this Agreement. Any SSA executed within period of execution of this Agreement shall be binding for the period set forth therein, and this Agreement and such SSA, and amendments to such Agreements, shall be binding for the time period set forth in the SSA. Any SSA executed within this three-year period may be amended for additional scope, fee, or time. The Agreement may be extended for two (2), one-year periods.

Services shall commence upon execution of SSAs describing the specific project and Services to be performed. A written Notice to Proceed following execution of such SSA(s) will be issued to the Consultant. Consultant will not commence Services until such notice is received.

SECTION IV: COMPLETE WORK without EXTRA COST

Unless otherwise provided, the Consultant shall obtain and provide, without additional cost to the Town, all labor, materials, equipment, transportation, facilities, services, permits, and licenses necessary to perform the Services.

SECTION V: COMPENSATION

The terms of payment for Services provided by Consultant shall be set forth in each SSA. Such agreement may provide for compensation in accordance with an hourly rate schedule, or a set fee for Services, paid one time or in periodic payments, or a combination of these methods of compensation.

Unless otherwise provided in the SSA, Consultant shall obtain, and provide, without additional cost to the Town, all labor, materials, equipment, transportation, facilities, services, permits, and licenses necessary to perform Services under this Agreement. In addition to hourly rates or the set fee payment set forth in the SSA, Town shall pay Consultant for expenses and costs only when reimbursement for such items is specifically provided for in an SSA. The Town shall not be obligated to pay any expenses and costs not specifically identified in an SSA.

SECTION VI: CONSULTANT'S BILLINGS to TOWN

The Consultant shall submit an invoice once Service is completed or at designated times during the course of completing a Service. Once the invoice is submitted and approved by the appropriate department the terms will be Net 30 days. The terms may only be changed by written consent of the Finance Director.

SECTION VII: INSURANCE

Consultant shall maintain insurance policies at all times with minimum limits as follows:

Coverage	Minimum Limits
Workers' Compensation	Statutory Limits
Employers' Liability	$ 1,000,000
General Liability	$1,000,000
Automobile Liability	$500,000
Professional Liability (E & O)	$1,000,000 (If Required)

Contractor shall provide the Town with a Certificate of Insurance for review prior to the issuance of any contract or Purchase Order. All Certificates of Insurance will require thirty (30) days written notice by the insurer or contractor's agent in the event of cancellation, reduction or other modifications of coverage. In addition to the notice requirement above, Contractor shall provide the Town with immediate written notice of cancellation, reduction, or other modification of coverage of insurance. Upon failure of the Contractor to provide such notice, Contractor assumes sole responsibility for all loses incurred by the Town for which insurance would have provided coverage. The insurance certificate shall be for the initial contract period of one (1) year and shall be renewed by the contractor for each subsequent renewal period of the contract. The Town shall be listed as certificate holder and named as an additional insured under General Liability. It is required that coverage be placed with "A" rated insurance companies acceptable to the Town. Failure to maintain the required insurance in force may be cause for contract termination. In the event that the contractor fails to maintain and keep in force the insurance herein required, the Town has the right to cancel and terminate the contract without notice. Contractor shall provide proof that a Drug-Free Workplace Program is in place and that drivers meet DOT/CDL licensing requirements, if requested.

SECTION VIII: PERFORMANCE of WORK by TOWN

If the Consultant fails to perform the Services in accordance to Section II above, the Town may, in its discretion, in order to bring the project closer to schedule, perform or cause to be performed some or all of the Services, and doing so shall not waive any of the Town's rights and remedies. Before doing so, the Town shall give the Consultant reasonable notice of its intention. The Consultant shall reimburse the Town for all costs incurred by the Town in exercising its right to perform or cause to be performed some or all of the Services pursuant to this section.

SECTION IX: ATTACHMENTS

The following attachments are made a part of this Agreement and incorporated herein by reference:

Attachment A: Scope of Work
Attachment B: Hourly Rate
Attachment C: Title VI Appendment
Attachment D: ARPA Contract Addendum

SECTION X: NOTICE

All notices and other communications required or permitted by this contract shall be in writing and shall be given either by personal delivery, email, or certified United States mail, return receipt requested, addressed as follows:

To the Town:
Town of Wake Forest
Attn: Joe Guckavan, Jr., PE
Director of Engineering
Engineering Department
301 S Brooks Street
Wake Forest, NC 27587
(919) 435-9439
jguckavan@wakeforestnc.gov

To the Consultant:
A. Morton Thomas and Associates, Inc
Attn: Sam MacDonald, P.E.
Project Manager
6131 Falls of Neuse Rd., Suite 101
Raleigh, NC 27609
(919) 855-9989
smacdonald@amtengineering.com

Change of Address, Date Notice Deemed Given:
A change of address, fax number, or person to receive notice may be made by either party by notice given to the other party. Any notice or other communication under this contract shall be deemed given at the time of actual delivery, if it is personally delivered or sent by fax. If the notice or other communication is sent by US Mail, it shall be deemed given upon the third calendar day following the day on which such notice or other communication is deposited with the US Postal Service or upon actual delivery, whichever occurs first.

SECTION XI: INDEMNIFCATION

To the extent permitted under N.C. Gen. Stat § 22B-1, the Consultant agrees to indemnify, and hold-harmless the Town of Wake Forest, its elected and appointed officials, employees, agents, and volunteers against any and all damages, expenses, or losses, which may be asserted, claimed, or recovered against or from the Town of Wake Forest, its elected or appointed officials, employees, agents, and volunteers by reason of personal injury, including bodily injury or death and/or property damage, including loss of use thereof that are proximately caused by the negligence of the Consultant.

SECTION XII: ADDITIONAL PROVISIONS

(a) Choice of Law and Forum. This contract shall be deemed made in Wake County, North Carolina. This contract shall be governed by and construed in accordance with the law of North Carolina. The exclusive forum and venue for all actions arising out of this contract shall be the appropriate division of the North Carolina General Court of Justice, in Wake County. Such actions shall neither be

commenced in nor removed to federal court. This section shall not apply to subsequent actions to enforce a judgment entered in actions heard pursuant to this section.

(b) Waiver. No action or failure to act by the Town shall constitute a waiver of any of its rights or remedies that arise out this contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

(c) Performance of Government Functions: Nothing contained in this contract shall be deemed or construed so as to in any way estop, limit, or impair the Town from exercising or performing any regulatory, policing, legislative, governmental, or other powers or functions.

(d) Severability. If any provision of this contract shall be unenforceable, the remainder of this contract shall be enforceable to the extent permitted by law.

(e) Assignment, Successors and Assigns. Without the Town's written consent, the Consultant shall not assign (which includes to delegate) any of its rights (including the right to payment) or duties that arise out this contract. Unless the Town otherwise agrees in writing, the Consultant and all assigns shall be subject to all of the Town's defenses and shall be liable for all of the Consultant's duties that arise out of this contract and all of the Town's claims that arise out of this contract. Without granting the Consultant the right to assign, it is agreed that the duties of the Consultant that arise out of this contract shall be binding upon it and its heirs, personal representatives, successors, and assigns.

(f) Compliance with Law. In performing all of the Work, the Consultant shall comply with all applicable law.

(g) Town Policy. THE TOWN OPPOSES DISCRIMINATION ON THE BASIS OF RACE AND SEX AND URGES ALL OF ITS CONSULTANTS TO PROVIDE A FAIR OPPORTUNITY FOR MINORITIES AND WOMEN TO PARTICIPATE IN THEIR WORK FORCE AND AS SUBCONSULTANTS AND VENDORS UNDER CITY CONTRACTS.

(h) EEO Provisions. During the performance of this Contract the Consultant agrees as follows: (1)The Consultant shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, political affiliation or belief, age, or handicap. The Consultant shall take affirmative action to ensure that applicants are employed and that employees are treated equally during employment, without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or handicap. The Consultant shall post in conspicuous places available to employees and applicants for employment, notices setting forth these EEO provisions. (2) The Consultant in all solicitations or advertisements for employees placed by or on behalf of the Consultant, state all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or handicap.

(i) No Third Party Right Created. This contract is intended for the benefit of the Town and the Consultant and not any other person.

(j) Principles of Interpretation. In this contract, unless the context requires otherwise: (1) The singular includes the plural and the plural the singular. The pronouns "it" and "its" include the masculine and feminine. Reference to statutes or regulations include all statutory or regulatory provisions consolidating, amending, or replacing the statute or regulation. References to contracts and agreements shall be deemed to include all amendments to them. The word "person" includes natural persons, firms, companies, associations, partnerships, trusts, corporations, governmental agencies and units, and any other legal entities.

(k) Modifications, Entire Agreement. A modification of this contract is not valid unless signed by both parties and otherwise in accordance with requirements of law. Further, a modification is not enforceable against the Town unless the Town Manager or other duly authorized official signs it for the Town. This contract contains the entire agreement between the parties pertaining to the subject matter of this contract. With respect to that subject matter, there are no promises, agreements, conditions, inducements, warranties, or understandings, written or oral, expressed or implied, between the parties, other than as set forth or referenced in this contract.

(l) E-Verify. Consultant shall comply with the requirements of Article 2 of Chapter 64 of the NC General Statutes. Further, if Consultant utilizes a subconsultant, Consultant shall require the Subconsultant to comply with the requirements of Article 2 of Chapter 64 of the NC General Statutes.

(m) Iran Divestment Act. Consultant certifies that; (i) it is not identified on the Final Divestment List or any other list of prohibited investments created by the NC State Treasurer pursuant to N.C.G.S. 143-6A-4; (ii) it will not take any action causing it to appear on any such list during the term of this Contract, and (iii) it will not utilize any subcontractor to provide goods or services hereunder that is identified on any list.

(n) Divestment from Companies that Boycott Israel. Consultant represents, covenants, and certifies that it is not listed on the list of restricted companies developed and published by the North Carolina State Treasurer as required by N.C.G.S. 147-86.81.

(o) Quality and Workmanship. All work performed and/or services rendered shall be performed to the reasonable satisfaction of the Town of Wake Forest in accordance with the accepted industry standard of care for design professionals. The work performed and/or services rendered shall not be considered complete, nor applicable payments rendered, until the Town is satisfied with the work performed and/or services rendered

(p) Standard Terms and Conditions. The Town of Wake Forest's Standard Terms and Conditions listed at https://www.wakeforestnc.gov/sites/default/files/uploads/residents/finance/8-26-22_towf_standard_terms_and_conditions.pdf https://www.wakeforestnc.gov/sites/default/files/uploads/towf_standard_terms_and_conditions.pdf will govern all matters related to the goods and/or services provided by you or your company (the "Vendor") to the Town of Wake Forest (the "Town"). Additional Terms and Conditions stated on the face of a Town purchase order shall take precedence over any conflicting Standard Terms and Conditions stated. Any Terms and Conditions not stated, but incorporated by reference therein, shall be binding only if provided or signed by the Town and attached hereto. In the event that a binding written contract signed by both the Vendor and the Town exists, the Terms and Conditions of that contract shall supersede any conflicting Standard Terms and Conditions.

(q) Non-appropriation clause. Contractor acknowledges that the Town of Wake Forest is a governmental entity, and the contract validity is based upon the availability of public funding under the authority of its statutory mandate. In the event that public funds are unavailable and not appropriated for the performance of the Town of Wake Forest's obligations under this contract, then this contract shall automatically expire without penalty to the Town of Wake Forest thirty (30) days after written notice to Contractor of the unavailability and non-appropriation of public funds. It is expressly agreed that the Town of Wake Forest shall not activate this non-appropriation provision for its convenience or to circumvent the requirements of this contract, but only as an emergency fiscal measure during a substantial fiscal crisis, which affects generally its governmental operations. In the event of a change in the Town of Wake Forest's statutory

authority, mandate and mandated functions, by state and federal legislative or regulatory action, which adversely affects the Town of Wake Forest's authority to continue its obligations under this contract, then this contract shall automatically terminate without penalty to the Town of Wake Forest upon written notice to Contractor of such limitation or change in the Town of Wake Forest's legal authority.

(r) No pledge of taxing authority. The taxing power of the Town of Wake Forest is not pledged directly or indirectly to secure any monies due under this contract.

(s) No waiver of governmental immunity; Violation of law. Except for waiver of governmental immunity resulting from the execution of a valid contract, the Town of Wake Forest makes no other waiver of governmental immunity. If any provision of the Contract or Agreement is in violation of any legal, statutory or state constitutional prohibition, then such provision(s) shall be unenforceable against the Town of Wake Forest.

(t) Conflict of Interest. If this is a contract for design, engineering, contract administration or similar services, the Contractor will not enter into contracts or agreements with third parties that may present a potential for conflict of interest between the Town of Wake Forest and the third parties regarding the subject matter of this Contract or Agreement.

(u) Public Record. This Contract or Agreement is subject to disclosure under the public records laws of the State of North Carolina.

SECTION XIII: TERMINATION

Either party may terminate this Agreement upon sixty (60) day written notice; provided, however, no such termination shall discharge Consultant's obligations to complete and furnish services as previously agreed to by the parties pursuant to this Agreement or any Supplemental Service Agreement, nor shall termination discharge the Town's obligations to pay for such services as provided for in this Agreement or any Supplemental Service Agreement.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Town of Wake Forest and the Consultant have caused this contract to be executed under seal by their respective duly authorized agents or officers.

TOWN OF WAKE FOREST:

By: _____

Kip Padgett
Printed

Witnessed by:

_____
Name

Ella F Dowtin
Printed

TOWN OF WAKE FOREST INCORPORATED (SEAL) FEB. 20, 1909 NORTH CAROLINA

CONSULTANT:

By: _____

Jeff McKay, P.E., Associate in Charge
Printed

Witnessed by:

_____
Name

Richard Higdon, Contracts Manager
Printed

(SEAL)

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-258-
Submitted by: Ruben Wall
Submitting Department: Parks & Recreation
Meeting Date: October 3, 2023

SUBJECT
Presentation on PRCR Master Plan Feedback

Recommendation:
Provide Feedback to Consultant/Staff

Item Summary:

ATTACHMENTS
- Summary Sheet - PRCR Master Plan Presentation - Feedback.pdf
- Wake Forest BOC Listening Session Oct. 3, 2023.pdf

Presentation on PRCR Master Plan - Feedback

Summary

Item: Presentation on PRCR Master Plan - Feedback

Summary:

McAdams was the chosen consultant firm to lead the process of revising and updating the PRCR Master Plan. The process started in July with a series of meetings with staff and the Recreation Advisory Board in August. The presentation at the work session will provide an overview of the process and gather some feedback from the board. There will be future meetings with the BOC to include a summary of findings and draft recommendations.



TOWN OF WAKE FOREST

PRCR MASTER PLAN

Play It Forward
WAKE FOREST

Parks, Recreation & Cultural Resources
TOWN of WAKE FOREST
A Nationally Accredited Agency

McADAMS

BOARD OF COMMISIONERS LISTENING SESSION

2023-10-05

McAdams

KEY TEAM MEMBERS



SHWETA NANEKAR



RUBEN WALL



MONICA LILETON



JEN BEEDLE



EDWARD AUSTIN



RANDY HOYLE

McAdams Team

Town Team

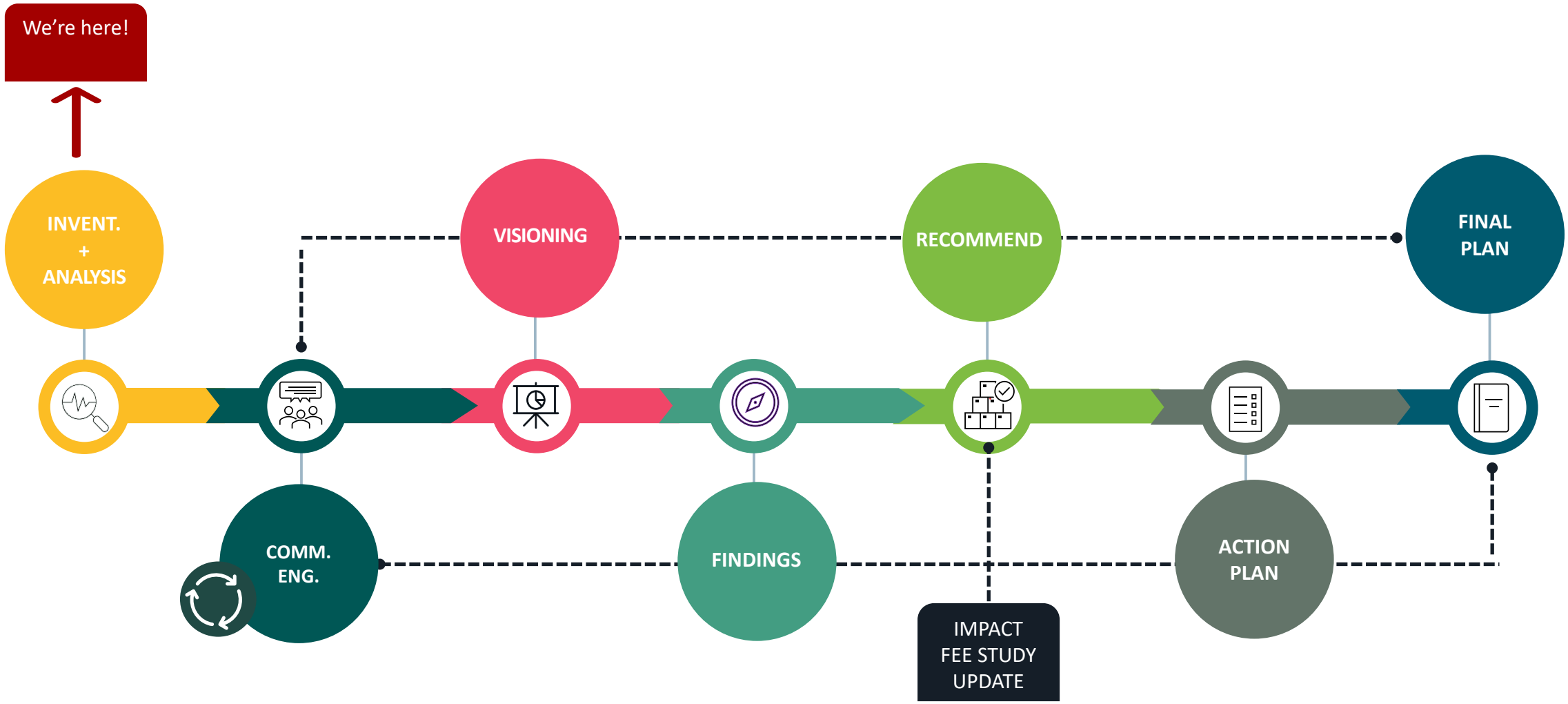


Image Credit: Town of Wake Forest

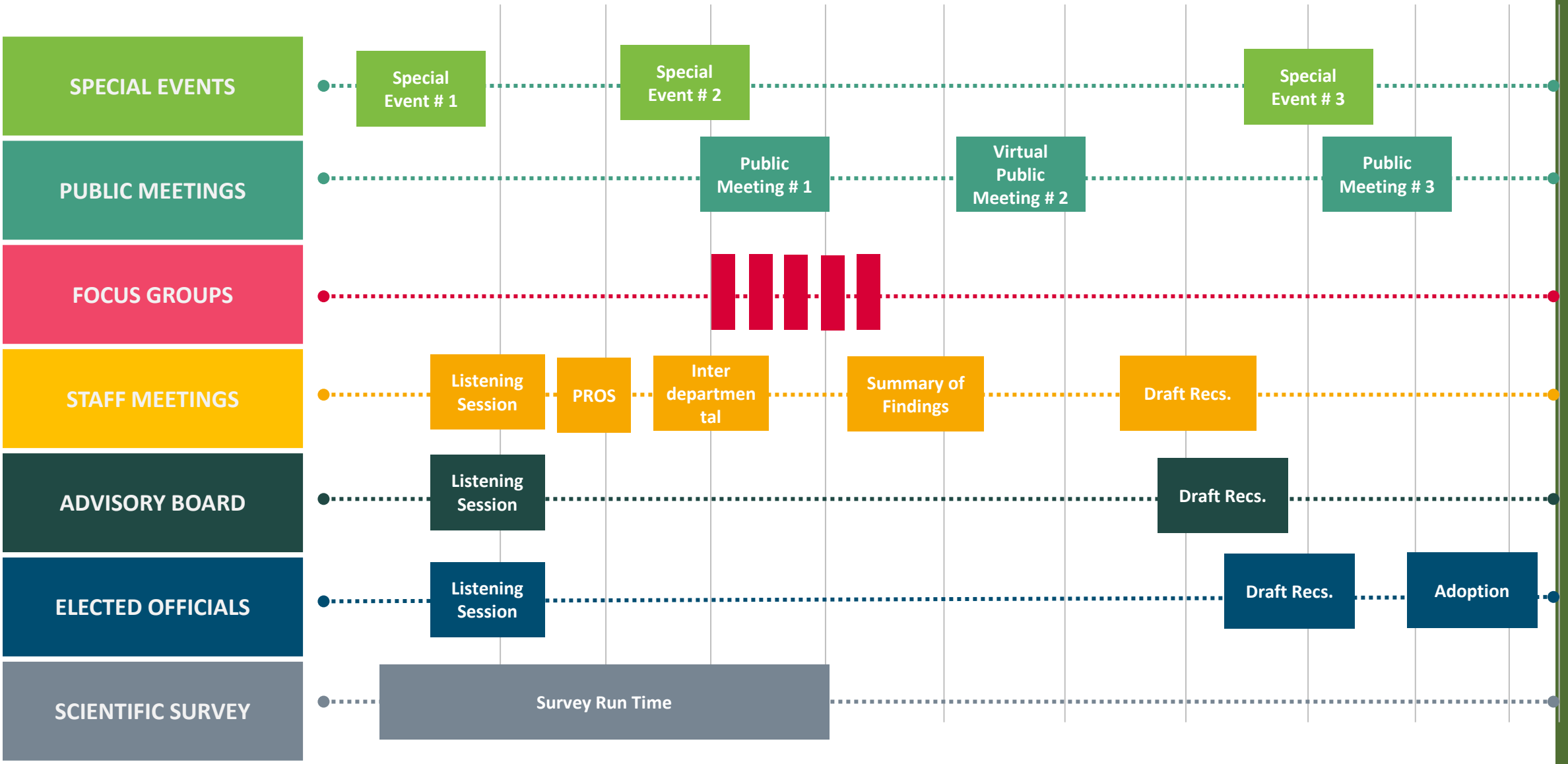
BENEFITS OF COMPREHENSIVE PLANNING

- prioritize goals and objectives for a 5-year planning horizon
- identify and resolve gaps and deficiencies
- catalog community needs and wants
- create a 5-year work plan for department staff
- engage community, staff, stakeholders and decision makers
- Compliance with CAPRA standards
- NRPA Benchmarking standards to inform department decisions
- generate population-based goals for new parkland, trails and more
- qualify for State and Federal grant funding opportunities

PROJECT PROCESS



COMMUNITY ENGAGEMENT



PLAN CONTENT



PARKLAND + FACILITIES

- Outdoor + Indoor Amenity + Facility Assessment, Level of Service, Youth / Young + Active Adult Amenity Study



RECREATIONAL DEMAND

- Program + Activity Enhancements, Innovation, Measures of Success, Focus on Teens, Adults, + Active Older Adults



STAFFING + OPERATIONS + FINANCE

- SWOT Analysis, Priorities + Demand Assessment, Staffing Needs



FUNDING STRATEGIES

- Fees and charges options and recommendations, Opportunities for Supporting Operational and Capital Costs, etc.

ROLE OF TOWN COMMISSIONERS

- Represent constituents' parks and recreational needs
- Provide guidance based on community priorities
- Advocate for parks and recreation within the broader community and among partners
- Make important decisions about parks and recreation projects and policies



Image Credit: Town of Wake Forest

CONSERVATION LAND

- LWCF
- Conservation Easements
- Trust for Public Land
- Triangle Land Conservancy
- Conservation Fund
- Wake County Parks and Open Space



Image Credit: Wake County Open Space + Greenways

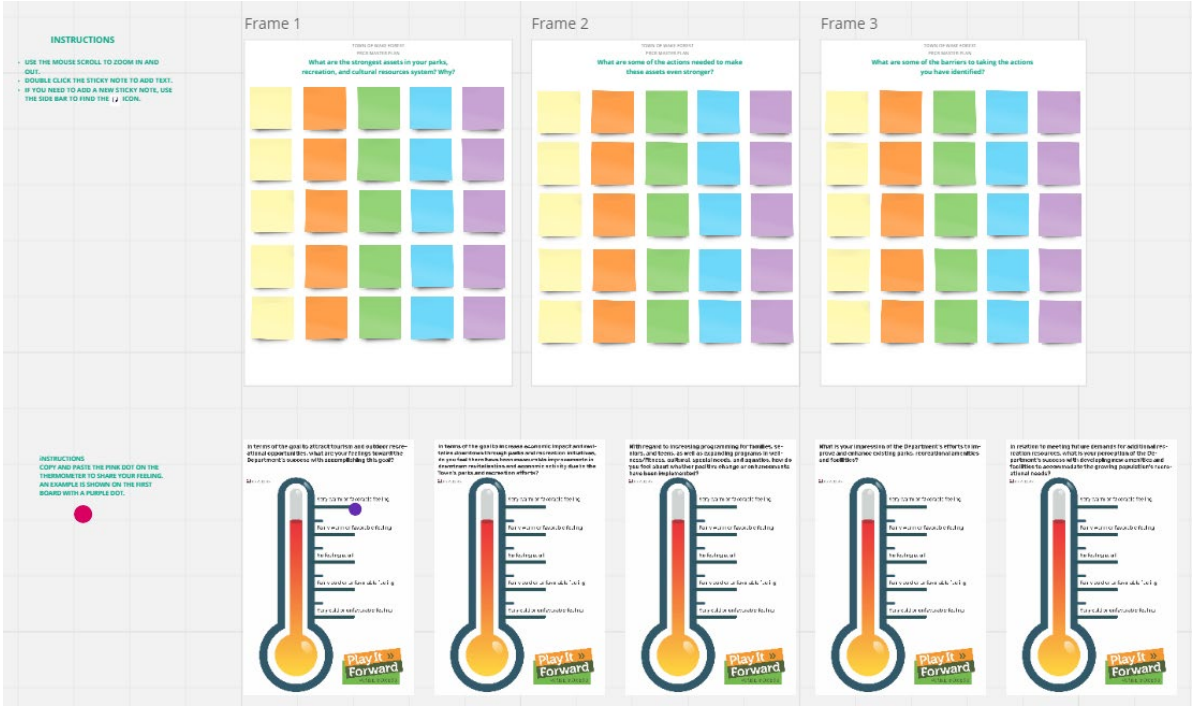
WHAT IS ASSET MAPPING?

- Process to identify key strengths of the community based on existing resources
- Uncover gaps, needs, and solutions to strengthen the resources further



INTERACTIVE VIRTUAL ACTIVITY/MIRO BOARD

1. Scan the QR code or click on the link to the Miro board.
   https://miro.com/WAKE FOREST



THANK YOU!

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-257-
Submitted by: Elisabeth Palermo
Submitting Department: Engineering
Meeting Date: October 3, 2023

SUBJECT
PRESENTATION OF MUNICIPAL INFRASTRUCTURE IMPROVEMENTS AT THE U-TURNS ON HWY 98 NEAR THE SOUTH FRANKLIN INTERSECTION.

Recommendation:
Consideration of Resolution authorizing the Town Manager to execute on behalf of the Town of Wake Forest a contract with to HR Northlake, LLC for the construction and installation of traffic control devices and related municipal infrastructure at the intersection of Calvin Jones Hwy 98 (State Road R-2809B) and S. Franklin St.

Item Summary:

ATTACHMENTS

- Attachment_A_summary_Signalized_Uturns_98.docx
- Attachment_B_Resolution Uturns 98.docx
- Attachment_C_Reimbursement Agreement - Holding Village (Traffic Control Improvements).pdf
- Attachment D_Exhibit A_Construction Plans.pdf
- Attachment_E_Exhibit_B_Reimbursement Estimate.pdf
- Attachment_F_Exhibit C - NCDOT Traffic Agreement.pdf
- Attachment_G_Traffic Signals for U-Turns on Hwy 98.pptx

Agenda Item: Presentation of Resolution authorizing the Town Manager to execute on behalf of the Town of Wake Forest a contract with HR Northlake, LLC for the construction and installation of traffic control devices and related municipal infrastructure at the intersection of Calvin Jones Hwy 98 (State Road R-2809B) and S. Franklin St.

Summary: At the request of the Town, NCDOT performed a signal warrant analysis for signals to be located at the U-turns associated with the intersection of Dr. Calvin Jones Hwy 98 and S. Franklin St. and determined additional signals are warranted.

The Town has determined that it is most cost effective to enter into agreement with the Developer to reimburse 50% of the cost for the installation of signals and pursuant to N.C.G.S. § 160A-309, the Town of Wake Forest, North Carolina (the "Town") may contract with a developer or property owner, or with a private party who is under contract with the developer or property owner, for public intersection or roadway improvements that are adjacent or ancillary to a private land development project."

The project is estimated to cost $399,300. The Town's estimated portion is $199,650. The agreement caps the Town's obligation for the project to $250,000.

Attachment: Attachment_A_summary_Signalized Uturns 98
Attachment_B_Resolution_Uturns 98
Attachment_C_Reimbursement Agreement - Holding Village (Traffic Control Improvements)
Attachment_D_Exhibit_A_Construction Plans
Attachment_E_Exhibit_B_Reimbursement Estimate
Attachment_F_Exhibit_C_NCDOT Traffic Agreement
Attachment_G_Traffic Signals for U-Turns on Hwy 98

RESOULTION 2023-XX

RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE TOWN OF WAKE FOREST TO CONTRACT WITH AND APPROPRIATE MONEY TO HR NORTHLAKE, LLC FOR MUNICIPAL INFRASTRUCTURE IMPROVEMENTS

WHEREAS, pursuant to N.C.G.S. § 160A-309, the Town of Wake Forest, North Carolina (the "Town") may contract with a developer or property owner, or with a private party who is under contract with the developer or property owner, for public intersection or roadway improvements that are adjacent or ancillary to a private land development project."

WHEREAS, the Developer is the developer of a development in the Town known as Holding Village (the "Development"), and is the owner of certain real property located within the Development;

WHEREAS, in connection with the Development, the Developer desires to have constructed and installed certain traffic control devices and related municipal infrastructure at the intersection of NC Hwy. 98 and South Franklin Street in the Town (collectively, the "Improvements");

WHEREAS, in connection with the Development, at the request of the Town, the Developer performed a signal warrant study and determined that the Improvements are warranted;

WHEREAS, the North Carolina Department of Transportation ("NCDOT") has provided approved construction documents for the installation of the Improvements (the "Construction Plans"), which Construction Plans are attached hereto as Exhibit A and incorporated herein by reference; and

WHEREAS, the Town also desires for the Improvements to be constructed and installed, and has agreed to reimburse the Developer for fifty percent also desires for the Improvements (50%) of the costs of constructing and installing the Improvements,

all as provided in this Agreement and pursuant to the reimbursement estimate set forth on Exhibit B attached hereto and incorporated herein by reference (the "Reimbursement Estimate").

WHEREAS, in the event of unforeseen circumstances beyond the Developer's control that materially increase the Project Budget, as further defined in the Reimbursement Agreement, the Town's obligation to reimburse Developer for Reimbursement Costs shall be capped at $250,000.

BE IT RESOLVED by the Board of Commissioners of the Town of Wake Forest, North Carolina, that the terms of the Reimbursement Agreement, including without limitation the Project Budget and the Reimbursement Cap are hereby approved.

Duly adopted this 17th day of October 2023.

_____

Vivian A. Jones
Mayor

(ATTEST)

_____

Terry Savary

Town Clerk

STATE OF NORTH CAROLINA
COUNTY OF WAKE

REIMBURSEMENT AGREEMENT
(South Franklin Street Signal U-Turn Improvements)

THIS REIMBURSEMENT AGREEMENT (this "**Agreement**") is entered into as of _____, 2023 (the "**Effective Date**") by and between the **Town of Wake Forest**, a North Carolina municipal corporation (the "**Town**") and **HR Northlake, LLC**, a North Carolina limited liability company (the "**Developer**"). The Town and Developer are sometimes referred to collectively herein as the "**Parties**" and individually as a "**Party**".

RECITALS

WHEREAS, N.C.G.S. § 160A-309 states a city may contract with a developer or property owner, or with a private party who is under contract with the developer or property owner, for public intersection or roadway improvements that are adjacent or ancillary to a private land development project;

WHEREAS, the Developer is the developer of a development in the Town known as Holding Village (the "**Development**"), and is the owner of certain real property located within the Development;

WHEREAS, in connection with the Development, the Developer desires to have constructed and installed certain traffic control devices and related municipal infrastructure at the intersection of NC Hwy. 98 and South Franklin Street in the Town (collectively, the "**Improvements**");

WHEREAS, in connection with the Development, at the request of the Town, the Developer performed a signal warrant study and determined that the Improvements are warranted;

WHEREAS, the North Carolina Department of Transportation ("**NCDOT**") has provided approved construction documents for the installation of the Improvements (the "**Construction Plans**"), which Construction Plans are attached hereto as **Exhibit A** and incorporated herein by reference; and

WHEREAS, the Town also desires for the Improvements to be constructed and installed, and has agreed to reimburse the Developer for fifty percent (50%) of the costs of constructing and installing the Improvements, all as provided in this Agreement and pursuant to the reimbursement estimate set forth on **Exhibit B** attached hereto and incorporated herein by reference (the "**Reimbursement Estimate**").

THE AGREEMENT

NOW, THEREFORE in consideration of the mutual promises and covenants contained herein, the Town and Developer agree as follows:

1. **Recitals**. The recitals set forth above are hereby incorporated into this Agreement by reference.

2. **Construction of Improvements**.

a. Construction. The Developer shall design and cause to be constructed the Improvements in a good and workmanlike manner, in accordance with NCDOT's Signal Agreement process; the terms of the Town's Unified Development Ordinance adopted July 16, 2013 (as amended, the "**UDO**"); the Town's approved construction process; the Town's Manual of Specifications, Standards and Design; and the Construction Plans (collectively, the "**Approved Construction Process**"). NCDOT has

advised that they will allow the Improvements to be completed in accordance with Developer's existing Signal Agreement dated August 25, 2020, a copy of which is attached hereto as **Exhibit C** (the "**Signal Agreement**").

b. Project Manager. The Developer shall engage Reader & Partners, LLC (the "**Project Manager**") to manage and oversee the construction and installation of the Improvements, and to otherwise carryout any or all of the Developer's obligations set forth herein. The Developer and the Project Manager are sometimes referred to herein collectively as the "**Developer Parties**".

c. Engineer's Certificate. Following Substantial Completion (as defined hereafter) of the Improvements, the Project Manager shall cause NCDOT to complete and issue a final engineering certification or acceptance for the Improvements (the "**Engineer's Certificate**"). The Engineer's Certificate shall be certified to the Town and any other parties the Town reasonably requests, including NCDOT. "**Substantial Completion**" of the Improvements shall occur when all turning movements as a result of the Improvements are functional.

3. **Town's Acceptance**.

a. Maintenance and Inspection. The Developer shall be responsible for maintenance of the Improvements until Substantial Completion. Subject to Section 3.b., upon Substantial Completion the Town shall use commercially reasonable efforts to cause the NCDOT (or other applicable governmental entity) to be responsible for the maintenance of the Improvements. The Town or NCDOT may inspect the Improvements prior to Substantial Completion as either deems appropriate. In performing any maintenance to the Improvements, the Developer Parties shall adhere to the Town's and the NCDOT's rules and regulations, including without limitation the Town's and NCDOT's safety policies and road or lane closure policies.

b. Final Acceptance. Following Substantial Completion, the Project Manager shall provide notice to the Town and NCDOT of Substantial Completion and request that the Town and NCDOT promptly perform each's final inspection of the Improvements. Following the Town's and NCDOT's final inspection of the Improvements, the Town and NCDOT shall collectively issue to the Project Manager a single punch list for any remaining outstanding items required by the Construction Plans, if any (the "**Punch List**"). Once the Project Manager has completed each item set forth on the Punch List, Project Manager shall notify the Town and NCDOT of such completion and thereafter the Town and NCDOT shall promptly inspect the Punch List items. If the Punch List items are completed to the Town's and NCDOT's reasonable satisfaction, the Town and NCDOT shall formally notify the Project Manager in writing of such fact, and following the such written notifications and certifications that the Improvements are complete, the Improvements shall be deemed accepted by NCDOT (or other applicable governmental entity) ("**Final Acceptance**"). If neither the Town nor NCDOT issues a Punch List as set forth in this subsection, Final Acceptance shall be deemed to have occurred. Notwithstanding the foregoing, Final Acceptance shall be in accordance with NCDOT policy.

c. Cooperation. Notwithstanding anything to the contrary contained herein, the Town covenants and agrees to use good faith commercially reasonable efforts to cause NCDOT (or other applicable governmental entity) to comply with the provisions of this Agreement pertaining to the Approved Construction Process, Substantial Completion, and Final Acceptance.

4. **Reimbursement**.

a. Establishing Reimbursement Costs. The Town and Developer have agreed that the Reimbursement Estimate constitutes a commercially reasonable estimate of the entirety of the costs for

the design, engineering and construction of the Improvements (the "**Reimbursement Costs**"). Notwithstanding the foregoing or anything herein to the contrary, the Reimbursement Costs shall only include those costs actually and reasonably incurred by the Developer for the design, engineering and construction of the Improvements, but exclusive of legal fees and administrative costs (including, but not limited to, profit and overhead) of the Developer. Furthermore, and notwithstanding the foregoing or anything herein to the contrary, the Town's obligation to reimburse Developer for Reimbursement Costs shall be capped at $250,000.00 (the "**Reimbursement Costs Cap**").

b. Reimbursement Procedure. As Developer incurs Reimbursement Costs, each month the Developer shall provide to the Town for the work completed for that month: (i) payment application from Developer's contractor(s) with a description of the work sufficient to allow field verification, (ii) an interim (or in the case of final payment, final) lien waiver signed by Developer's contractor, (iii) certification from Developer that the expenses being requested for reimbursement are actual costs that qualify as Reimbursement Costs under this Agreement, and (iv) any other information reasonably requested by the Town (each a "**Developer Expense Submission**" and collectively "**Developer Expense Submissions**"). The Developer shall submit monthly Developer Expense Submissions to the Town at least fourteen (14) business days prior to the date on which the Developer requests the Town's payment of the Reimbursement Costs. The Town shall review the Developer Expense Submission and within fourteen (14) business days following its receipt of the Developer Expense Submission in good-faith either approve or disapprove the Developer Expense Submission as Reimbursement Costs in writing to Developer. Following the Town's approval or deemed approval of the Developer Expense Submission, the Town shall promptly document the Reimbursement Costs on the ledger of Reimbursement Costs accrued but unreimbursed (the "**Ledger**"), which Ledger is attached hereto as **Exhibit D** and incorporated herein by reference. The Town shall pay the approved Reimbursement Costs to Developer within fourteen (14) business days of its receipt of the Developer Expense Submission. If the Town disapproves the Developer Expense Submission, its written disapproval pursuant to this Section must be accompanied by a detailed explanation of the reason for the disapproval. The Town will not be required to approve a Developer Expense Submission in full if the result would bring the Reimbursement Costs beyond the Reimbursement Costs Cap. If the Town and Developer are unable to reach an agreement that an expense constitutes Reimbursements Costs within thirty (30) days of the Town's written disapproval of the Developer Expense Submission, the Town and Developer shall engage in the dispute resolution process set forth in Section 4.c. of this Agreement prior to pursuing any legal remedies.

c. Procedure for Disputed Developer Expense Submissions. If the Developer believes the Town is in default under this Agreement for failing to approve a Developer Expense Submission for Reimbursement Costs, the Developer and the Town shall make a good faith effort to negotiate and informally resolve the dispute as provided in Section 4.b. prior to terminating or modifying this Agreement or pursuing any available legal remedies. If the Town and the Developer cannot resolve the dispute through negotiation within thirty (30) days of the Town's written disapproval of the Developer Expense Submission as provided in Section 4.b., Developer will submit the applicable Developer Expense Submission, and the Town will submit a written rejection or partial approval of the Developer Expense Submission (the "**Town Developer Expense Submission**"), to Kimley Horn (the "**Third Party Project Engineer**"). The Third Party Project Engineer will then select either the Developer Expense Submission or the Town Expense Submission as being the most accurate, in his/her/its professional opinion (the "**Approved Expense Submission**"), which Approved Expense Submission will then be binding on the Parties. The Town shall add the amount of the Approved Expense Submission to the Ledger. The Third Party Project Engineer's costs and fees incurred in connection with this Section shall be paid in equal shares by the Town and Developer.

5. **Changes to the Reimbursement Estimate**. If, at any point during the design, engineering and construction of the Improvements, there is a material increase in the Reimbursement Estimate, then the

Developer shall promptly submit to the Town's Chief Financial Officer (or another party identified by the Town) a written request to amend the Reimbursement Estimate (a "**Change Request**"). A Change Request shall include sufficient detail (i.e., quotes, invoices, receipts, and/or such other documentation as may reasonably be requested by the Town) to allow the Town to determine whether the proposed increase in the Reimbursement Estimate is commercially reasonable and justified. The Town shall make a final determination, in writing, regarding the reasonableness of a Change Request within fifteen (15) days' receipt of such initial request (a "**Change Request Response**"). Failure to submit a Change Request as required herein shall constitute an acknowledgement by the Developer that such cost increase is commercially unreasonable and unjustified; in which case, the amount of such cost increase shall not constitute a portion of the Reimbursement Costs. For the purposes of this Section, a cost increase shall be considered material when it results in an increase of over five thousand dollars ($5,000.00) above and beyond the Reimbursement Estimate. Notwithstanding anything herein to the contrary, the terms and amount of the Reimbursement Costs, as set forth herein, may only be changed by the prior written consent of the Town's Chief Financial Officer.

6. **Bidding**. This Agreement is not subject to Article 8 of Chapter 143 of the General Statutes if the public cost will not exceed two hundred fifty thousand dollars ($250,000) and the city or its designated agency determines that: (i) the public cost will not exceed the estimated cost of providing for those public intersection or roadway improvements through either eligible force account qualified labor or through a public contract let pursuant to Article 8 of Chapter 143 of the General Statutes; or (ii) the coordination of separately constructed public intersection or roadway improvements, and the adjacent or ancillary private land development improvements would be impracticable.

7. **Default**. Subject to Sections 4.b. and 4.c. herein, if either Party defaults and fails to cure said default within thirty (30) days (or if such default cannot be cured within thirty (30) days using commercially reasonable diligence, then a commercially reasonable period of time) after receipt of written notice of such default from the non-defaulting Party, the non-defaulting Party may pursue any remedy available to it at law or in equity. The failure of either Party to enforce any provision of this Agreement will not be deemed a waiver or consent to a subsequent default or breach by the other Party.

8. **Notices**. All notices and other communications required or permitted by this Agreement shall be in writing and shall be given by either personal delivery, certified United States mail, return receipt requested, or overnight delivery by a nationally reputable overnight delivery service (e.g., UPS, FedEx) addressed as follows:

To the Town:
Town of Wake Forest
301 S. Brooks Street
Wake Forest, NC 27587
Attn: Town Manager

with copy to:

Town of Wake Forest
301 S. Brooks Street
Wake Forest, NC 27587
Attn: Town Attorney

To the Developer:
HR Northlake, LLC
5850 T.G. Lee Blvd., Suite 200
Orlando, FL 32822
Attn: Dean Barberree

with copy to:

Reader & Partners, LLC
8480 Honeycutt Road, Suite 200
Raleigh, NC 27651
Attn: Scott Lay

and with additional copy to:

Maynard Nexsen PC
4141 Parklake Ave., Suite 200
Raleigh, NC 27612
Attn: Keith Burns and Alex Serkes

A change of address or person to receive notice may be made by either Party by notice given to the other Party. Any notice or other communication under this Agreement shall be deemed given at the time of actual delivery, if it is personally delivered. If the notice or other communication is sent by US Mail, it shall be deemed given upon the third calendar day following the day on which such notice or other communication is deposited with the US Postal Service or upon actual delivery, whichever occurs first. If the notice or other communication is sent by overnight delivery, it shall be deemed given upon documented delivery to the overnight delivery service.

9. **Indemnification**. To the maximum extent allowed by law, the Developer shall indemnify and save harmless the Town, its agents, officers, and employees, from and against all charges that arise in any manner from, in connection with, or out of this Agreement proximately caused by the negligent acts or omissions of the Developer Parties, their agents, officers, or employees or anyone for whose acts any of them may be liable except for damage or injury caused solely by the negligence or intentional misconduct of the Town, its agents, officers, or employees. As used in this subsection, "charges" means claims, judgments, costs, damages, losses, demands, liabilities, duties, obligations, fines, penalties, royalties, settlements, expenses, interest, reasonable attorney's fees, and amounts for alleged violations of sedimentation pollution, erosion control, pollution, or other environmental laws, regulations, ordinances, rules, or orders. Nothing in this section shall affect any warranties in favor of the Town that are otherwise provided in or arise out of this Agreement. This Section is in addition to and shall be construed separately from any other indemnification provisions or remedies that may be in this Agreement. This Section shall remain in force despite termination of this Agreement (whether by expiration of the term or otherwise) and termination of the services of any supplemental agreement entered into under this Agreement.

10. **Choice of Law and Forum**. This Agreement shall be deemed made in Wake County, North Carolina. This Agreement shall be governed by and construed in accordance with the law of North Carolina. The exclusive forum and venue for all actions arising out of this Agreement shall be the appropriate division of the North Carolina General Court of Justice in Wake County. Such actions shall neither be commenced in nor removed to federal court. This section shall not apply to subsequent actions to enforce a judgment entered in actions heard pursuant to this section.

11. **Waiver**. No action or failure to act by the Town shall constitute a waiver of any of its rights or remedies that arise out of this Agreement, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

12. **Performance of Government Functions**. Nothing contained in this Agreement shall be deemed or construed in any way to stop, limit, or impair the Town from exercising or performing any regulatory, policing, legislative, governmental, or other powers or functions.

13. **Severability**. If any provision of this Agreement shall be unenforceable, the remainder of this Agreement shall be enforceable to the extent permitted by law.

14. **Assignment, Successors and Assigns**. Without the Town's written consent, the Developer shall not assign (which includes to delegate) any of its rights (including the right to payment) or duties that arise out this Agreement. Unless the Town otherwise agrees in writing, the Developer and all assigns shall be subject to all of the Town's defenses and shall be liable for all of the Developer's duties that arise out of this Agreement and all of the Town's claims that arise out of this Agreement. Without granting the Developer the right to assign, it is agreed that the duties of the Developer that arise out of this Agreement shall be binding upon it and its heirs, personal representatives, successors, and assigns.

15. **Compliance with Law**. In performing all of its obligations hereunder, the Developer shall comply with all applicable law.

16. **Town Policy**. THE TOWN OPPOSES DISCRIMINATION ON THE BASIS OF RACE AND SEX AND URGES ALL OF ITS DEVELOPERS TO PROVIDE A FAIR OPPORTUNITY FOR MINORITIES AND WOMEN TO PARTICIPATE IN THEIR WORK FORCE AND AS SUBCONTRACTORS AND VENDORS UNDER CITY CONTRACTS.

17. **EEO Provisions**. During the performance of this Agreement the Developer agrees as follows:

a. The Developer shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, political affiliation or belief, age, or handicap. The Developer shall take affirmative action to ensure that applicants are employed and that employees are treated equally during employment, without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or handicap. The Developer shall post in conspicuous places available to employees and applicants for employment, notices setting forth these EEO provisions.

b. The Developer in all solicitations or advertisements for employees placed by or on behalf of the Developer, state all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or handicap.

18. **No Third Party Right Created**. This Agreement is intended for the benefit of the Town and the Developer and not any other person.

19. **Principles of Interpretation**. In this Agreement, unless the context requires otherwise, the singular includes the plural and the plural the singular. The pronouns "it" and "its" include the masculine and feminine. Reference to statutes or regulations include all statutory or regulatory provisions consolidating, amending, or replacing the statute or regulation. References to contracts and agreements shall be deemed to include all amendments to them. The word "person" includes natural persons, firms, companies, associations, partnerships, trusts, corporations, governmental agencies and units, and any other legal entities.

20. **Modifications, Entire Agreement**. A modification of this Agreement is not valid unless signed by both parties and otherwise in accordance with requirements of law. Further, a modification is not enforceable against the Town unless the Town Manager or other duly authorized official signs it for the Town. This Agreement contains the entire agreement between the parties pertaining to the subject matter of this Agreement. With respect to that subject matter, there are no promises, agreements, conditions, inducements, warranties, or understandings, written or oral, expressed or implied, between the parties, other than as set forth or referenced in this Agreement.

21. **E-Verify**. Developer shall comply with the requirements of Article 2 of Chapter 64 of the NC General Statutes. Further, if Developer utilizes a subcontractor, Developer shall require the

subcontractor to comply with the requirements of Article 2 of Chapter 64 of the NC General Statutes.

22. **Iran Divestment Act**. Developer certifies that; (i) it is not identified on the Final Divestment List or any other list of prohibited investments created by the NC State Treasurer pursuant to N.C.G.S. 147-86.58; (ii) it will not take any action causing it to appear on any such list during the term of this Agreement, and (iii) it will not utilize any subcontractor to provide goods or services hereunder that is identified on any list.

23. **Divestment from Companies that Boycott Israel**. Developer represents, covenants, and certifies that it is not listed on the list of restricted companies developed and published by the North Carolina State Treasurer as required by N.C.G.S. 147-86.81.

24. **Quality and Workmanship**. All work performed and/or services rendered shall be performed to the satisfaction of the Town. The work performed and/or services rendered shall not be considered complete, nor applicable payments rendered, until the Town is satisfied with the work performed and/or services rendered.

25. **Title VI**. During the performance of this Agreement, the Developer, for itself, its assignees and successors in interest agrees as follows:

a. Compliance with Regulations. The Developer shall comply with the Regulation relative to nondiscrimination in Federally-assisted programs of the Town Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the "**Regulations**"), which are herein incorporated by reference and made a part of this Agreement.

b. Nondiscrimination. The Developer, with regard to the work performed by it during the Agreement, shall not discriminate on the grounds of race, color, national origin, sex, religion, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Developer shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the Agreement covers a program set forth in Appendix B of the Regulations.

c. Solicitations for Subcontractors, Including Procurements of Materials and Equipment. In all solicitations either by competitive bidding or negotiation made by the Developer for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Developer of the Developer's obligations under this Agreement and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

d. Information and Reports. The Developer shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Town to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a Developer is in the exclusive possession of another who fails or refuses to furnish this information the Developer shall so certify to the Town as appropriate and shall set forth what efforts it has made to obtain the information.

e. Sanctions for Noncompliance. In the event of the Developer's noncompliance with the nondiscrimination provisions of this Agreement, the Town shall impose such contract sanctions as it or the Town may determine to be appropriate, including, but not limited to:

a. withholding of payments to the Developer under the Agreement until the Developer complies, and/or

b. cancellation, termination, or suspension of the Agreement, in whole or in part.

f. Incorporation of Provisions. The Developer shall include the provisions of subparagraphs (a) through (f) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Developer shall take such action with respect to any subcontract or procurement as the Town may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event a Developer becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Developer may request the Town to enter into such litigation to protect the interests of the Town, and, in addition, the Developer may request the United States to enter into such litigation to protect the interests of the United States.

26. **Pre-Audit**. This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

27. **Non-appropriation clause**. Developer acknowledges that the Town is a governmental entity, and the Agreement validity is based upon the availability of public funding under the authority of its statutory mandate. In the event that public funds are unavailable and not appropriated for the performance of the Town's obligations under this Agreement, then this Agreement shall automatically expire without penalty to the Town thirty (30) days after written notice to Developer of the unavailability and non-appropriation of public funds. It is expressly agreed that the Town shall not activate this non-appropriation provision for its convenience or to circumvent the requirements of this Agreement, but only as an emergency fiscal measure during a substantial fiscal crisis, which affects generally its governmental operations. In the event of a change in the Town's statutory authority, mandate and mandated functions, by state and federal legislative or regulatory action, which adversely affects the Town's authority to continue its obligations under this Agreement, then this Agreement shall automatically terminate without penalty to the Town upon written notice to Developer of such limitation or change in the Town's legal authority.

28. **No pledge of taxing authority**. The taxing power of the Town is not pledged directly or indirectly to secure any monies due under this Agreement.

29. **No waiver of governmental immunity; Violation of law**. Except for waiver of governmental immunity resulting from the execution of a valid contract, the Town makes no other waiver of governmental immunity. If any provision of the Agreement or Agreement is in violation of any legal, statutory or state constitutional prohibition, then such provision(s) shall be unenforceable against the Town.

30. **Conflict of Interest**. If this is an Agreement for design, engineering, contract administration or similar services, the Developer will not enter into contracts or agreements with third parties that may present a potential for conflict of interest between the Town and the third parties regarding the subject matter of this Agreement.

31. **Public Record**. This Agreement is subject to disclosure under the public records laws of the State of North Carolina.

32. **Miscellaneous Provision**. In the event of any inconsistency, conflict, or ambiguity between these miscellaneous terms and conditions and other associated contract documents, the parties

agree that the terms and conditions of this Agreement shall prevail.

[SIGNATURE PAGE FOLLOWS. REMAINDER OF PAGE INTENTIONALLY BLANK.]

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the Effective Date.

ATTEST:

_____
Terry Savary, Town Clerk

THE TOWN:

TOWN OF WAKE FOREST,
a North Carolina municipal corporation

By: _____
Kip Padgett, Town Manager

THE DEVELOPER:

HR NORTHLAKE, LLC
a North Carolina limited liability company

By: HR Southeast, LLC, its sole Member

By: Reader & Partners, LLC, its Managing Member

By: _____
Name: Dean Barberree
Title: President

ACKNOWLEDGED AND AGREED TO BY THE PROJECT MANAGER:

READER & PARTNERS, LLC
a Florida limited liability company

By: _____
Name: Dean Barberree
Title: President

PREAUDIT CERTIFICATION

This instrument has been pre-audited in a manner required by applicable law.

_____
Aileen Staples, Chief Financial Officer

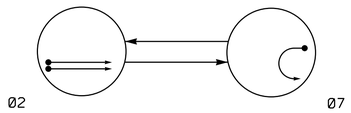
EXHIBIT A

The Construction Plans

See attached.

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 3.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

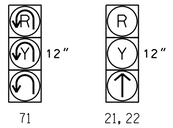
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 02	PHASE 07	FLASH
21, 22	↑	R	Y
71	↑R	↑	↑R

SIGNAL FACE I.D.

All Heads L.E.D.



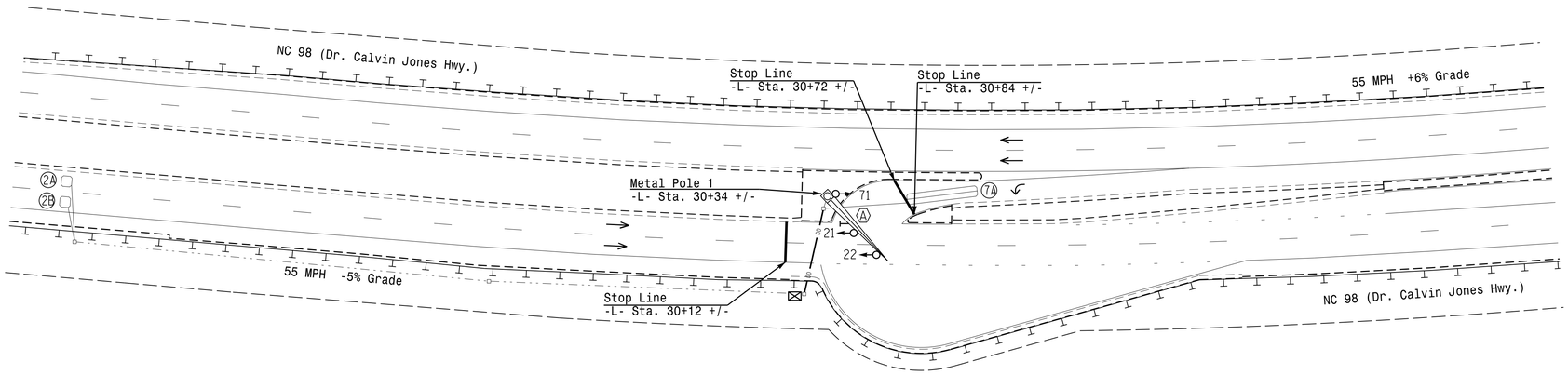
DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	420	6	X	2	Yes	-	-	X	N	-	X
2B	6X6	420	6	X	2	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	X	7	Yes	-	-	-	N	-	X

2 Phase
Fully Actuated
(Wake Forest Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
DD	Directional Drill	N/A
	Metal Pole with Mastarm	
A	No Left Turn Sign (R3-2)	A

TIMING CHART

FEATURE	PHASE 2	PHASE 7
Min Green *	14	7
Delayed Green *	-	-
Walk *	-	-
Ped Clear	-	-
Veh. Extension *	6.0	2.0
Max 1 *	90	30
Yellow	5.8	3.0
Red Clear	1.0	2.3
Red Revert	2.0	2.0
Actuations B4 Add *	-	-
Seconds /Actuation *	1.5	-
Max Initial *	46	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.4	-
Locking Detector	X	-
Recall Position	VEH. RECALL	-
Dual Entry	-	-
Simultaneous Gap	X	X

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 2 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

This plan supersedes the plan signed and sealed on 6/13/22.

New Installation

Prepared In the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 98 EB (Dr. Calvin Jones Hwy.)
at
U-Turn West of
South Franklin Street

Division 5 Wake County Wake Forest

PLAN DATE:	June 2022	REVIEWED BY:	
PREPARED BY:	J.A. Lohr	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: 06/22/2022
DATE

SIG. INVENTORY NO. 05-2073

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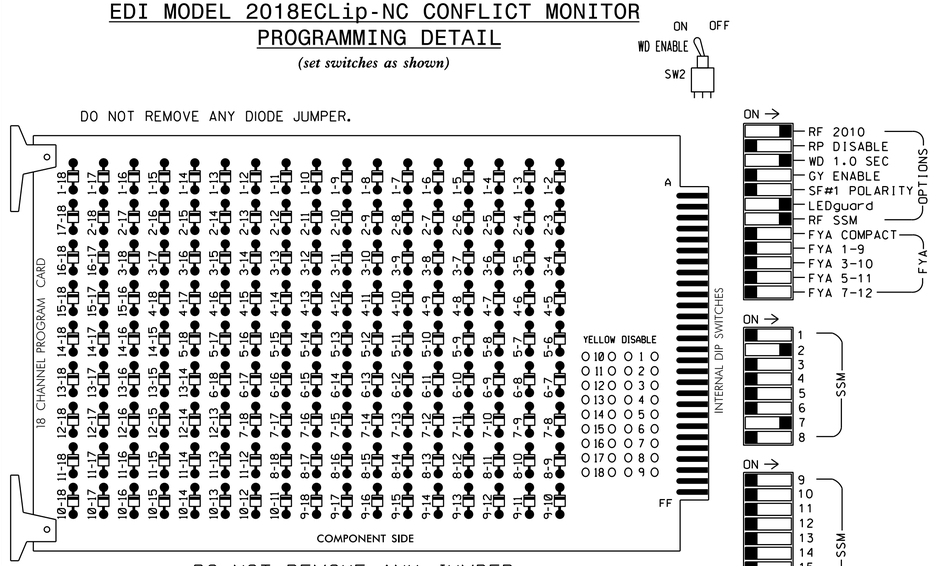
PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 3.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



DO NOT REMOVE ANY JUMPER

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Integrate monitor with Ethernet network in cabinet.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Green.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the Wake Forest Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S10
PHASES USED.....2,7
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71	NU	NU	NU	NU	NU	NU	NU	NU
RED		128																
YELLOW		129																
GREEN																		
RED ARROW										122								
YELLOW ARROW										123								
GREEN ARROW		130								124								

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		ø2 2B												ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L					NOT USED									

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
7A	TB5-5,6	J5U	57	7	7	YES				N

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

This Plan Supersedes Electrical Detail Sealed on 6/15/2022

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2073
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 EB (Dr. Calvin Jones Hwy.)
at
U-Turn West of
South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: June 2022 | REVIEWED BY:

PREPARED BY: Zarrar Zafar | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
NCDOT Transportation Mobility and Safety Division
Traffic Engineering Branch
Traffic Signals & Signals Management Section
750 N.Greenfield Pkwy.,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
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SIG. INVENTORY NO. 05-2073

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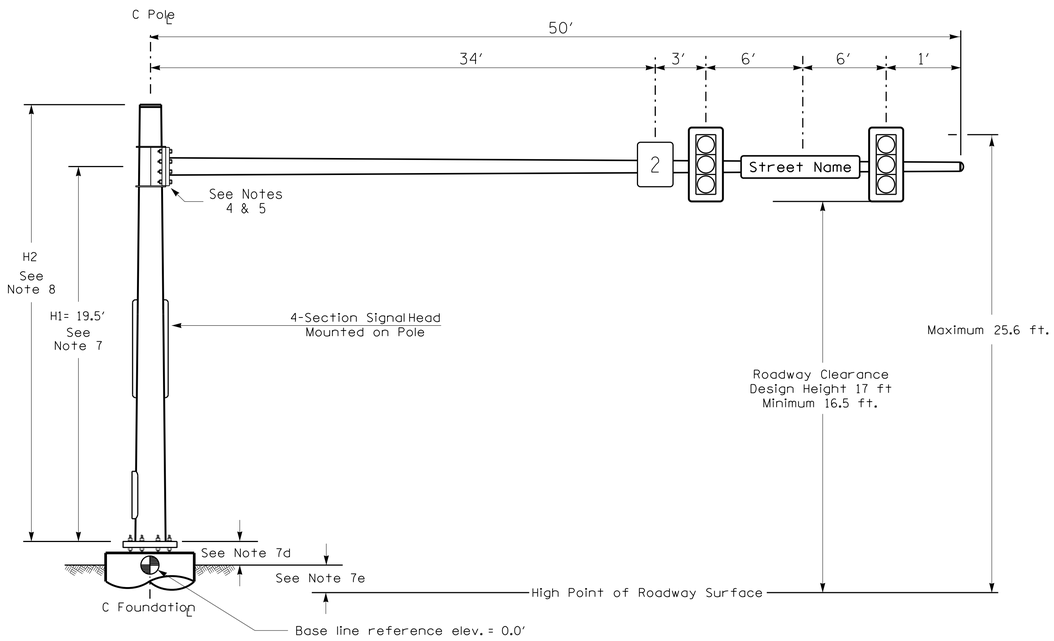
zzafar

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 3.2

Design Loading for METAL POLE NO. 1



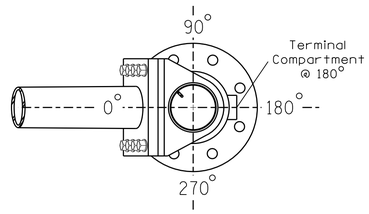
Elevation View

SPECIAL NOTE

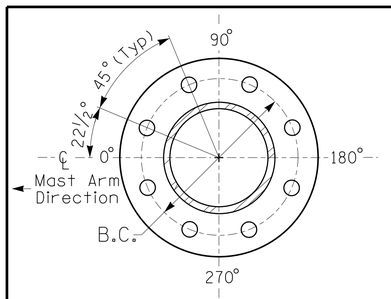
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+0.6 ft.	
Elevation difference at Edge of travelway or face of curb	-0.2 ft.	

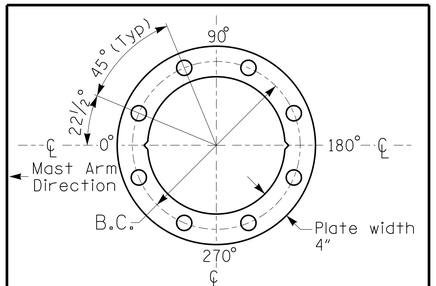


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

This plan supersedes the plan signed and sealed on 6/16/22.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 98 EB (Dr. Calvin Jones Hwy.)
at
U-Turn West of
South Franklin Street

Division 5 Wake County Wake Forest

PLAN DATE: June 2022 REVIEWED BY:

PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: 06/23/2022
DATE

SIG. INVENTORY NO. 05-2073

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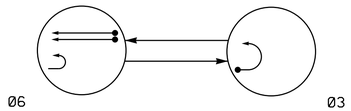
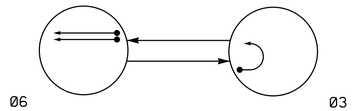
PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 4.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE 06	PHASE 03	FLASH
31	Y		Y
32	Y		Y
61, 62		R	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE 06	PHASE 03	FLASH
31	R		Y
32	R		Y
61, 62		R	Y

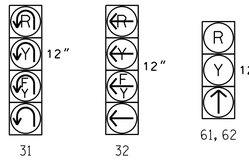
2 Phase
Fully Actuated
(Wake Forest Signal System)

PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

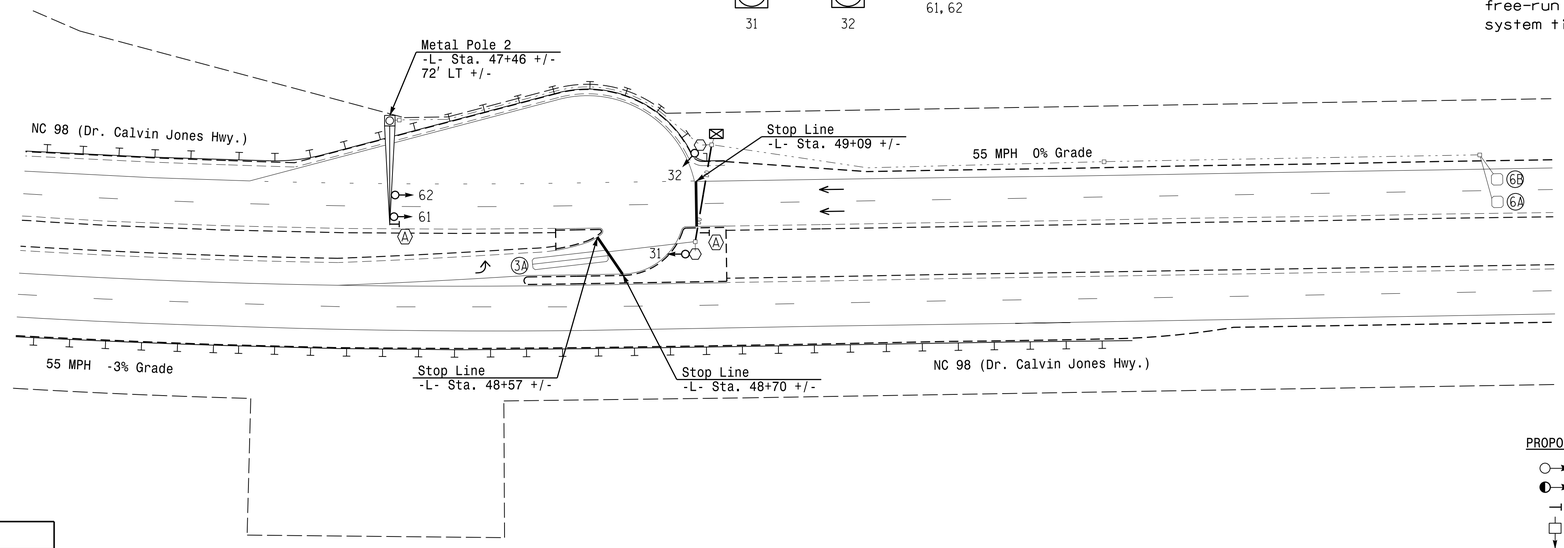
SIGNAL FACE I.D.

All Heads L.E.D.



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



TIMING CHART

FEATURE	PHASE 3	PHASE 6
Min Green *	7	14
Delayed Green *	-	-
Walk *	-	-
Ped Clear	-	-
Veh. Extension *	2.0	6.0
Max 1 *	30	90
Yellow	3.0	5.2
Red Clear	2.4	1.0
Red Revert	2.0	2.0
Actuations B4 Add *	-	-
Seconds /Actuation *	-	1.5
Max Initial *	-	46
Time Before Reduction *	-	15
Time To Reduce *	-	30
Minimum Gap	-	3.4
Locking Detector	-	X
Recall Position	-	VEH. RECALL
Dual Entry	-	-
Simultaneous Gap	X	X

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
3A	6X40	0	2-4-2	X	3	Yes	-	15 *	-	N	-	X
6A	6X6	420	6	X	6	Yes	-	-	X	N	-	X
6B	6X6	420	6	X	6	Yes	-	-	X	N	-	X

* Disable Delay during Alternate Phasing Operation.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	Directional Drill	N/A
	Metal Pole with Mastarm	
	Type II Signal Pedestal	
A	No Left Turn Sign (R3-2)	A

This plan supersedes the plan signed and sealed on 6/13/22.

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared In the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-Turn East of
South Franklin Street

Division 5 Wake County Wake Forest

PLAN DATE: June 2022 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: 06/22/2022
SIGNATURE DATE

SIG. INVENTORY NO. 05-2074

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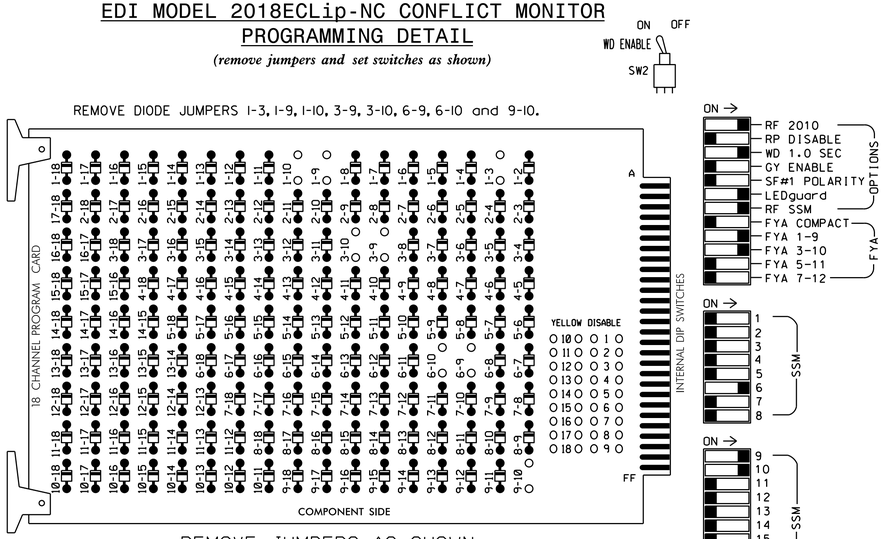
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Integrate monitor with Ethernet network in cabinet.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 6 Green.
3. Program phase 2 for Red Flash.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the Wake Forest Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S4,S8,AUX S1,AUX S2
PHASES USED.....3,6
OVERLAP "A".....NOT USED
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....NOT USED
OVERLAP "G".....3
OVERLAP "H".....3

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 4.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	OLH	2	2 PED	OLG	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	32 ★	NU	NU	31 ★	NU	NU	NU	61,62	NU	NU	NU	NU	32 ★	31 ★	NU	NU	NU	NU
RED								134										
YELLOW	*			*				135										
GREEN																		
RED ARROW													A121	A124				
YELLOW ARROW													A122	A125				
FLASHING YELLOW ARROW													A123	A126				
GREEN ARROW	127			118				136										

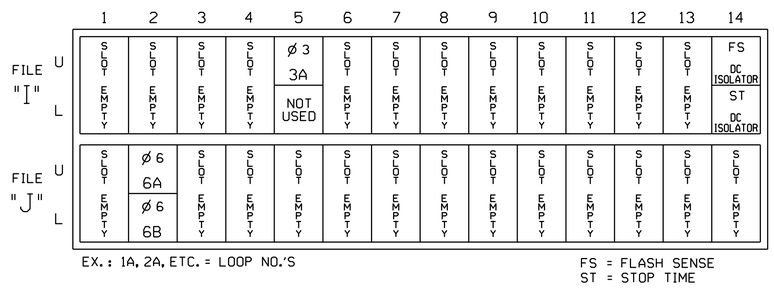
NU = Not Used

* Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

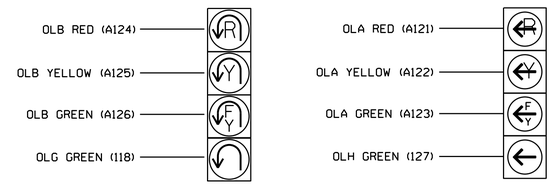
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
3A	TB4-5,6	I5U	58	3 ★	3	YES		15		N
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

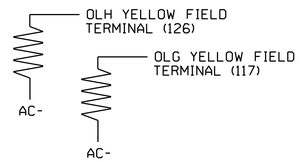
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



This Plan Supersedes Electrical Detail Sealed on 6/15/2022

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2074
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 WB (Dr. Calvin Jones Hwy.) at U-turn East of South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: June 2022 | REVIEWED BY:

PREPARED BY: Zarrar Zafar | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Traffic Engineering, Mobility and Safety Division
NCDEPARTMENT OF TRANSPORTATION
Traffic Engineering & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
A90CADFDBD4241D... DATE

SIG. INVENTORY NO. 05-2074

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PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 4.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle Until Overlap 'G'

OVERLAP G

Select TMG VEH OVLP [G] and 'NORMAL'

```
TMG VEH OVLP...[G] TYPE: .......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . X . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP H

Select TMG VEH OVLP [H] and 'NORMAL'

```
TMG VEH OVLP...[H] TYPE: .......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . X . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Until Overlap 'A'

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....    OVERLAP  H
OPPOSING THROUGH.......    PHASE    6

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 3
```

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....    OVERLAP  G
OPPOSING THROUGH.......    PHASE    6

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 3
```

← NOTICE ACTION PLAN SF BIT "3"

END PROGRAMMING

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 3A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
        FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
        THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

   - Place cursor in VEH DETECTOR [ ] position and enter "3".
   - Set delay time to "0".

```
VEH DETECTOR [ 3]    VEH DET PLAN [ 2]
TYPE: N-NTCIP
TS2 DETECTOR..... X ECPI LOG.......    NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 3  3    . . . . . . . . . . . . . . . .
CALL OPTION.... YES DELAY TIME...     0.0
EXT OPTION. PASSAGE EXTENSION TIME.   0.0
USE ADDED INITIAL . CROSS SWITCH PH..   0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

END PROGRAMMING

This Plan Supersedes Electrical Detail Sealed on 6/15/2022

ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

NOTICE OVERLAP H ASSIGNED TO LD SWITCH 1 →

NOTICE OVERLAP G ASSIGNED TO LD SWITCH 3 →

```
LD SWITCH ASSIGN
     PHASE       DIMMING ---FLASH---
     /OVLP TYPE R Y G D PWR AUT TGR
 1    8    O    . . . + A    R    X
 2    2    V    . . . + A    R    .
 3    7    O    . . . + A    R    X
 4    4    V    . . . + A    R    .
 5    5    V    . . . - A    R    .
 6    6    V    . . . - A    Y    X
 7    7    V    . . . - A    R    .
 8    8    V    . . . - A    R    X
 9    1    O    . . . + A    R    X
10    2    O    . . . + A    R    X
11    3    O    . . . - A    R    .
12    4    O    . . . - A    R    .
13    2    P    . . . + A    .    .
14    4    P    . . . - A    .    .
15    6    P    . . . + A    .    .
16    8    P    . . . - A    .    .
```

← Ensure LD Switch 2 AUT set to 'R'

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2074
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-turn East of
South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: June 2022 | REVIEWED BY:

PREPARED BY: Zarrar Zafar | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Transportation Mobility and Safety Division
NCDEPARTMENT OF TRANSPORTATION
Traffic Engineering Branch
Signal Management Section

750 N.Greenfield Pkwy.,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
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SIG. INVENTORY NO. 05-2074

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PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 4.3

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 3.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 3.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	3

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BIT 3 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 3: Modifies overlap parent phases for heads 31 and 32 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A to 0 seconds.

This Plan Supersedes Electrical Detail Sealed on 6/15/2022

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[ *]
PATTERN.....AUTO   SYS OVERRIDE.... NO
TIMING PLAN..... 0   SEQUENCE.....  0
VEH DETECTOR PLAN.. 2   DET LOG.......NONE
FLASH.....   --   RED REST..... NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
```

PHASE	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
PED RCL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
WALK 2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
VEX 2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
VEH RCL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MAX RCL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MAX 2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

PHASE	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
MAX 3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CS INH	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
OMIT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SPC FCT	.	.	X	.	.	.	.	.	(1-8)							
AUX FCT	.	.	.	(1-3)												

	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
LP 1-15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 16-30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 31-45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 46-60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 61-75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 76-90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 91-100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

* The Action Plan number(s) are to be determined by the Division and/or City Traffic Engineer.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2074
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-turn East of
South Franklin Street

Division 5 | Wake County | Wake Forest

Prepared in the Offices of:
Transportation Mobility and Safety Division
NCDEPARTMENT OF TRANSPORTATION
Traffic Engineering Branch
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

PLAN DATE: June 2022	REVIEWED BY:
PREPARED BY: Zarrar Zafar	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
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SIG. INVENTORY NO. 05-2074

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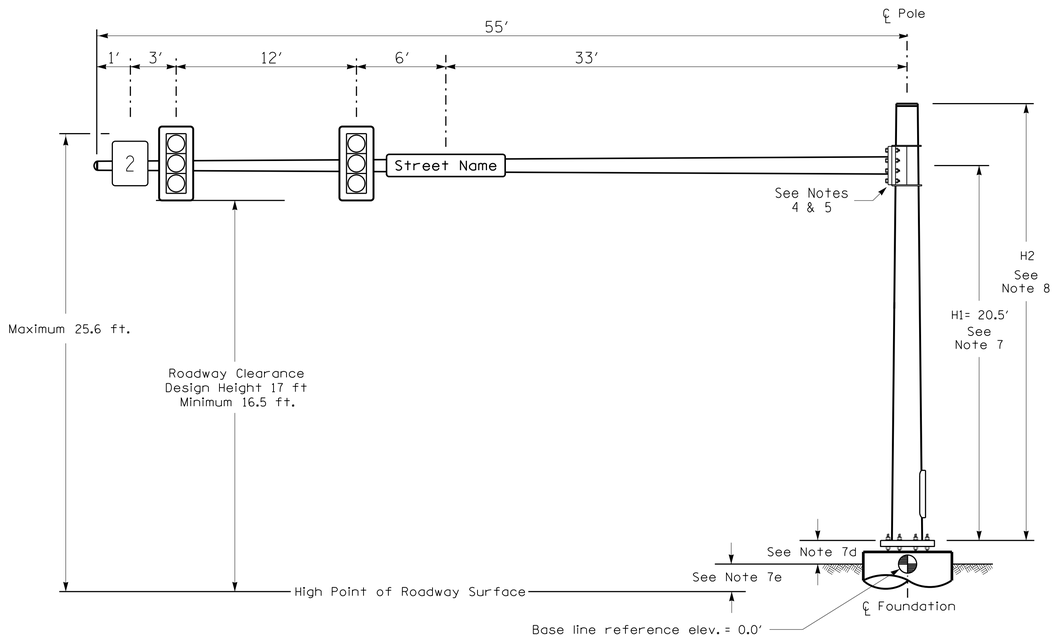
METAL POLE No. 2

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 4.4

Design Loading for METAL POLE NO. 2



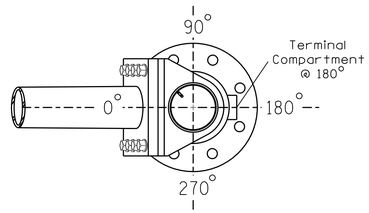
Elevation View

SPECIAL NOTE

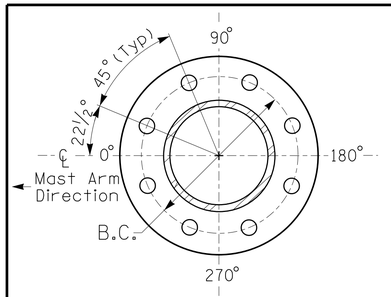
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 2	
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+2.0 ft.	
Elevation difference at Edge of travelway or face of curb	+1.0 ft.	

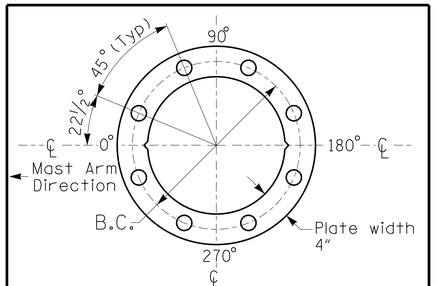


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-Turn East of
South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: May 2022 | REVIEWED BY:
PREPARED BY: J.A. Lohr | REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA
DocuSigned by: 06/16/2022
DATE
SIG. INVENTORY NO. 05-2074

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jlohr

EXHIBIT B

The Reimbursement Estimate

See attached.

EXHIBIT B

The Reimbursement Estimate

ITEM	AMOUNT	NOTES
Signal Warrants, Engineering & Staking	$ 40,000	Kimley Horn & McAdams
Two Signal Poles, Mastarms & Appurtenances	$ 273,000	Signal Contractor Scope Complete
Traffic Control	$ 20,000	Allowance
Power Extension	$ 30,000	Allowance - Wake Forest Power
Subtotal	**$ 363,000**	
Contingency (10%)	**$ 36,300**	
Total	**$ 399,300**	

Developer (50%)	**$ 199,650**
Town of Wake Forest (50%)	**$ 199,650**

EXHIBIT C

The Signal Agreement

See attached.

DocuSign Envelope ID: 959125D7-CDAA-43E5-A5BA-515B0CFB1AFC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

June 29, 2020

Readers & Partners, LLC
c/o Scott Lay
8480 Honeycutt Road, Suite 200
Raleigh, NC 27615

Subject: Traffic Agreement between the North Carolina Department of Transportation and Readers & Partners, LLC – signal upgrades on NC 98 at Franklin Street and NC 98 at US 1A/US 1 in Wake Forest
Project 36249.4123, Wake County

Attached is a copy of a Traffic Agreement covering the above project. You have 45 days from the date of receipt to sign and return two originals of the agreement to our office.

Please have two originals properly executed and return both originals to this office for further handling. As stipulated in the agreement, please include a check for $14,000. The agreements cannot have handwritten revisions or crossed out words. If there are revisions to request, please email changes to eehoneycutt@ncdot.gov as soon as you can so we can update the agreement.

After execution of the agreements by the Department, one of the original agreements will be returned to your office for your records.

If you have any questions or additional information is needed, please contact Elizabeth Honeycutt at (919) 220-4623.

Sincerely,

DocuSigned by:
Jeremy Warren
40A076BA50CC46F...

Jeremy L. Warren, PE
Division Traffic Engineer

Enclosures

JLW:eeh

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
DIVISION 5 OFFICE
2612 NORTH DUKE STREET
DURHAM, NC 27704

Telephone: (919) 220-4600
Fax: (919) 560-3371
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
2612 NORTH DUKE STREET
DURHAM, NC 27704

NORTH CAROLINA
WAKE COUNTY

TRAFFIC – REVIEW AND INSPECTION AGREEMENT

DATE: 6/29/2020

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

AND

WBS Elements: 36249.4123

READER & PARTNERS, LLC

THIS AGREEMENT is made and entered into on the last date executed below, by and between the North Carolina Department of Transportation, an agency of the State of North Carolina, hereinafter referred to as the "Department" and the Reader & Partners, LLC, hereinafter referred to as the "Developer".

W I T N E S S E T H:

WHEREAS, the Department and the Developer propose to make certain traffic control improvements under said project in Wake County; and,

WHEREAS, the Developer has agreed to participate in the cost of the project as hereinafter set out.

NOW, THEREFORE, the parties hereto, each in consideration of the promises and undertakings of the other as herein provided, do hereby covenant and agree, each with the other, as follows:

SCOPE OF PROJECT

1. The Project consists of upgrading the traffic signal on NC 98 at Franklin Street and NC 98 at US 1A/US 1. The design will include metal poles. The Department will review the traffic signal plans and inspect the traffic signal installation.

DESIGN AND EQUIPMENT PROCUREMENT

2. Project plans and traffic signal designs shall be prepared by the Developer, including electrical and programming details, (if applicable) metal poles with mast arm shop drawings, foundation designs, utility make-ready plans, communications cable routing plans, traffic signal coordination timing plans and Project Special Provisions (including, but not limited to: providing Synchro/Tru-Traffic files and programming data sheets; coordination timing plans, graphics package, downloading coordination timing plans onto system cabinets and/or onto central computer). All work shall be performed in accordance with Departmental standards and specifications. Said

plans and design shall be submitted to the Department for review and approval prior to any work being performed by the Developer. All work shall be done at no expense to the Department.

3. The Developer, at no expense to the Department, shall purchase or furnish from stock all traffic signal equipment necessary for the traffic signal revision. Said equipment shall be in reasonably close conformity with the standards and specifications of equipment and materials used by the Department. The Department reserves the right to reject the use of any equipment and materials it deems functionally inferior.

UTILITIES AND RIGHT OF WAY

4. The Developer, shall accomplish the relocation or adjustment of any and all utilities in conflict with the construction of the project. Said work shall be accomplished in a manner satisfactory to the Department, and without cost to the Department.

5. It is understood by the parties hereto that all work shall be contained within existing right of way. However, should it become necessary, the Developer, shall provide any required right of way and/or construction easements at no cost or liability whatsoever to the Department. Acquisition of right of way shall be accomplished in accordance with State procedures. The Developer, shall indemnify and save the Department harmless from any and all claims for damages that might arise on account of damage to public or private property and right of way acquisition, drainage, and construction easements for the construction of the project.

CONSTRUCTION

6. The Developer, at no expense to the Department, shall enter into and administer the contract for the installation of all equipment and perform such other work as required on the project in accordance with the approved project plans, the NCDOT "Standard Specifications for Roads and Structures", January 2018, "Roadway Standard Drawings", January 2018 and any addendum, all local codes and ordinances, and the procedures set out herein below shall be followed:

   A. No work shall be performed by the Developer prior to approval of the traffic signal design by the Department.

   B. Installation shall be done by a licensed electrical contractor familiar with traffic signal construction.

   C. All preliminary and construction engineering, supervision, and labor pertaining to the signal installation will be furnished by the Developer.

D. The Department's Division Engineer shall have the right to inspect, sample or test, and approve or reject any materials or construction methods used during the construction of the project.

E. Upon completion of the project, and prior to final acceptance by the Department, the Developer, will furnish to the Department's Division Engineer one (1) signal inventory control sheet and one (1) set of "Plan of Record" plans.

F. Prior to final acceptance by the Department, the Division Engineer shall have the right to make a final inspection of the completed work.

G. Failure on the part of the Developer, to comply with any of these provisions will be grounds for the Department to terminate the project.

H. The Developer, agrees to pursue the completion of the work covered by this Agreement as expeditiously as feasible and to complete all work within 180 Days of notice to proceed.

7. During installation of the signal equipment, the Department shall inspect the work being performed by the Developer to ensure compliance with the project plans, the current NCDOT traffic signal specifications, and the terms of this Agreement.

8. The Developer shall install thermoplastic pavement markings where pavement markings are required on the project.

FUNDING

9. The Developer shall reimburse the Department one hundred percent (100%) of the actual cost of all work performed by the Department, including administrative costs. Based on the estimated costs, the Developer shall submit a check for **$14,000** to the Department's Division Engineer upon **partial execution** of this Agreement by the Developer. Upon completion of the project, if actual costs exceed the amount of payment, the Developer shall reimburse the Department any underpayment within sixty (60) days of invoicing by the Department. If the actual cost of the work is less than $14,000, the Department shall reimburse the Developer any overpayment. The Department shall charge a late payment penalty and interest on any unpaid balance due in accordance with G.S. 147-86.23.

MAINTENANCE

10. Upon completion of the project, the Department shall own the traffic signal. Control and maintenance of the traffic signal will be accomplished in the same manner as maintenance of other state system signalized intersections.

11. In the event of damage to the metal poles, the Department shall install "in-kind" metal poles if funding is available from the damage claim or the Developer. However, if said funding is not available, the Department reserves the right to install wooden poles in lieu of metal poles (if applicable).

ADDITIONAL PROVISIONS

12. The other party to this Agreement shall comply with Title VI of the Civil Rights Act of 1964 (Title 49 CFR, Subtitle A, Part 21) and related nondiscrimination authorities. Title VI and related authorities prohibit discrimination on the basis of race, color, national origin, disability, gender, and age in all programs or activities of any recipient of Federal assistance.

13. A copy or facsimile copy of the signature of any party shall be deemed an original with each fully executed copy of the Agreement as binding as an original, and the parties agree that this Agreement can be executed in counterparts, as duplicate originals, with facsimile signatures sufficient to evidence an agreement to be bound by the terms of the Agreement.

14. By Executive Order 24, issued by Governor Perdue, and N.C. G.S.§ 133-32, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e., Administration, Commerce, Environmental Quality, Health and Human Services, Information Technology, Military and Veterans Affairs, Natural and Cultural Resources, Public Safety, Revenue, Transportation, and the Office of the Governor).

IT IS UNDERSTOOD AND AGREED that the approval of the project by the Department and the Developer is subject to the conditions of this Agreement.

IN WITNESS WHEREOF, this Agreement has been executed, in duplicate, the day and year heretofore set out, on the part of the Department and the Developer by authority duly given.

ATTEST:

BY: _____

TITLE: _____

READER & PARTNERS, LLC

BY: _____

TITLE: SVP

DATE: 7/1/20

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

(SEAL)

Federal Tax Identification Number

84-3277121

Remittance Address:

Reader & Partners, LLC

8480 HONEYCUTT ROAD, SUITE 200

RALEIGH, NC 27615

DEPARTMENT OF TRANSPORTATION

BY: _____
(CHIEF ENGINEER)

DATE: _____

PRESENTED TO BOARD OF TRANSPORTATION ITEM O: _____

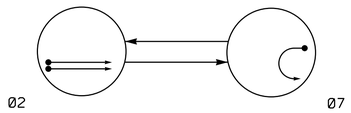
EXHIBIT D

Form of Ledger

Date	Unreimbursed Reimbursement Costs	Amount Reimbursed	Balance of Town Reimbursement Costs Responsibility

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 3.0

PHASING DIAGRAM



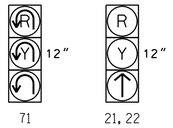
PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION			
SIGNAL FACE	PHASE 02	PHASE 07	PHASE FLASH
21, 22	↑	R	Y
71	↰R	↱	↰R

SIGNAL FACE I.D.

All Heads L.E.D.

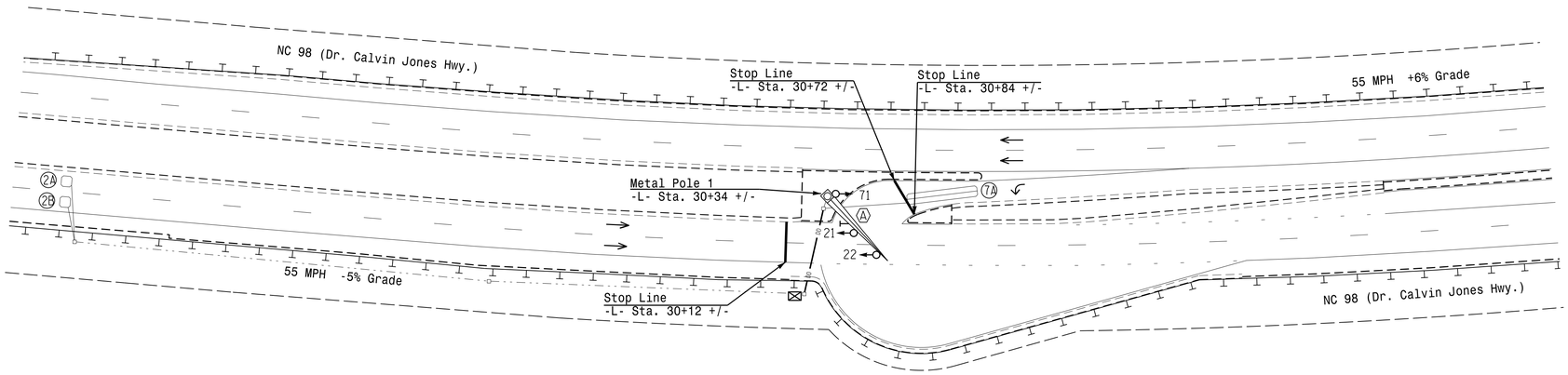


DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	420	6	X	2	Yes	-	-	X	N	-	X
2B	6X6	420	6	X	2	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	X	7	Yes	-	-	-	N	-	X

2 Phase
Fully Actuated
(Wake Forest Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
DD	Directional Drill	N/A
	Metal Pole with Mastarm	
A	No Left Turn Sign (R3-2)	A

TIMING CHART

FEATURE	PHASE 2	PHASE 7
Min Green *	14	7
Delayed Green *	-	-
Walk *	-	-
Ped Clear	-	-
Veh. Extension *	6.0	2.0
Max 1 *	90	30
Yellow	5.8	3.0
Red Clear	1.0	2.3
Red Revert	2.0	2.0
Actuations B4 Add *	-	-
Seconds /Actuation *	1.5	-
Max Initial *	46	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.4	-
Locking Detector	X	-
Recall Position	VEH. RECALL	-
Dual Entry	-	-
Simultaneous Gap	X	X

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 2 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

This plan supersedes the plan signed and sealed on 6/13/22.

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared In the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 98 EB (Dr. Calvin Jones Hwy.)
at
U-Turn West of
South Franklin Street

Division 5 Wake County Wake Forest

PLAN DATE:	June 2022	REVIEWED BY:	
PREPARED BY:	J.A. Lohr	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: 06/22/2022
DATE

SIG. INVENTORY NO. 05-2073

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rziemba

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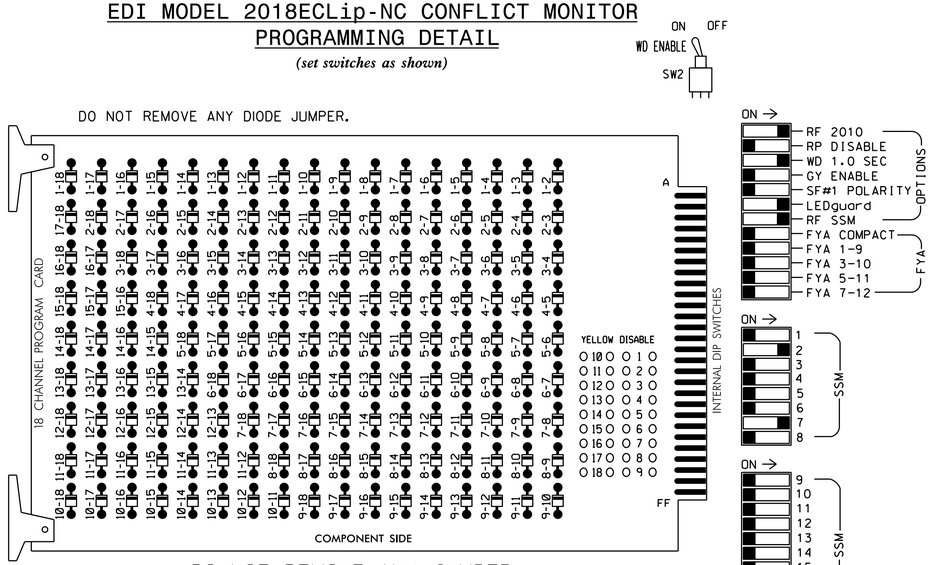
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



DO NOT REMOVE ANY JUMPER

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Integrate monitor with Ethernet network in cabinet.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Green.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the Wake Forest Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S10
PHASES USED.....2,7
OVERLAPS.....NONE

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 3.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71	NU	NU	NU	NU	NU	NU	NU	NU
RED		128																
YELLOW		129																
GREEN																		
RED ARROW										122								
YELLOW ARROW										123								
GREEN ARROW		130								124								

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		ø2 2B												ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L					NOT USED									

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
7A	TB5-5,6	J5U	57	7	7	YES				N

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

This Plan Supersedes Electrical Detail Sealed on 6/15/2022

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2073
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 EB (Dr. Calvin Jones Hwy.)
at
U-Turn West of
South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: June 2022 | REVIEWED BY:

PREPARED BY: Zarrar Zafar | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
NC Department of Transportation Mobility and Safety Division Traffic Engineering Branch Signals & Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
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SIG. INVENTORY NO. 05-2073

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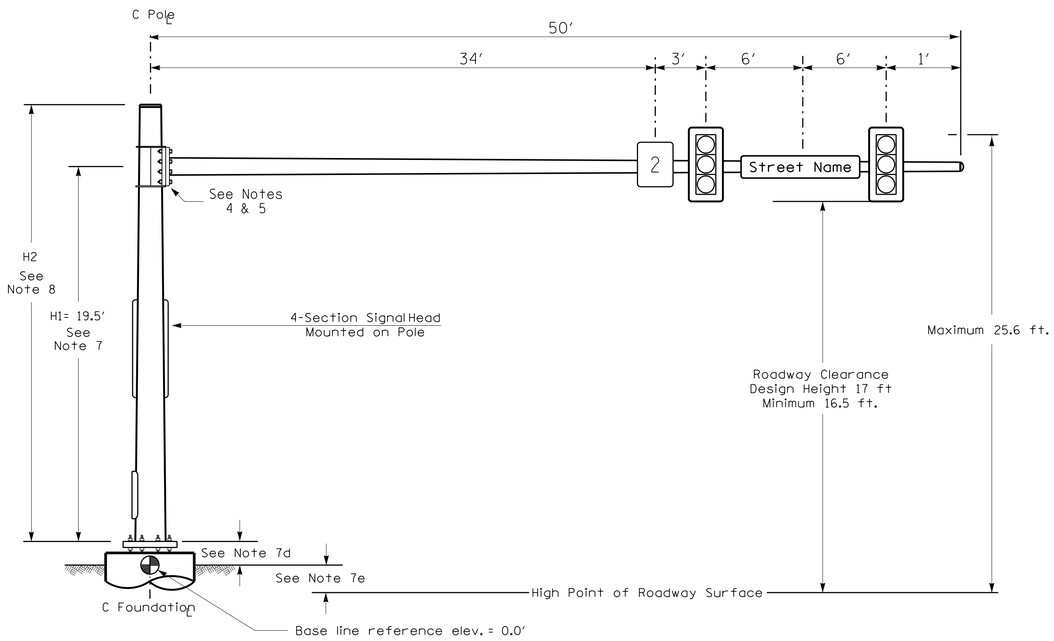
METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 3.2

Design Loading for METAL POLE NO. 1



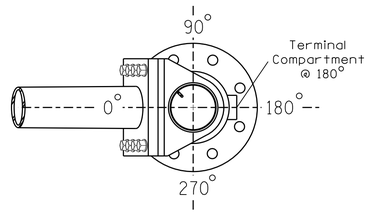
Elevation View

SPECIAL NOTE

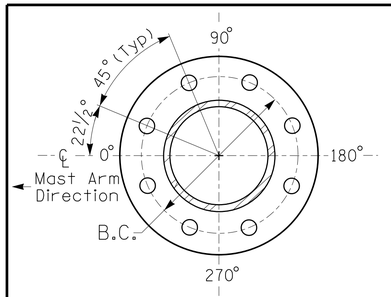
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+0.6 ft.	
Elevation difference at Edge of travelway or face of curb	-0.2 ft.	

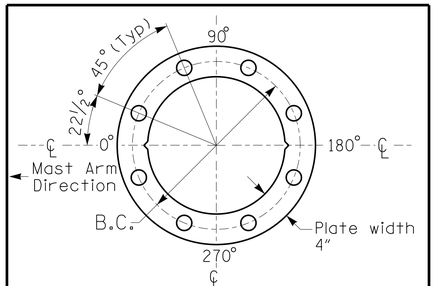


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

This plan supersedes the plan signed and sealed on 6/16/22.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 98 EB (Dr. Calvin Jones Hwy.)
at
U-Turn West of
South Franklin Street

Division 5 Wake County Wake Forest

PLAN DATE: June 2022 REVIEWED BY:

PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: 06/23/2022
DATE

SIG. INVENTORY NO. 05-2073

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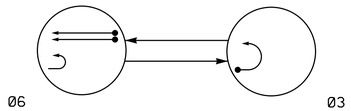
PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 4.0

DEFAULT PHASING DIAGRAM

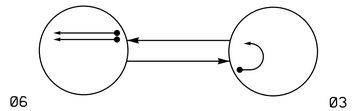


PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

DEFAULT PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE 06	PHASE 03	FLASH
31	Y		Y
32	Y		Y
61, 62		R	Y

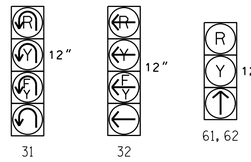
ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE 06	PHASE 03	FLASH
31	R		Y
32	R		Y
61, 62		R	Y

SIGNAL FACE I.D.

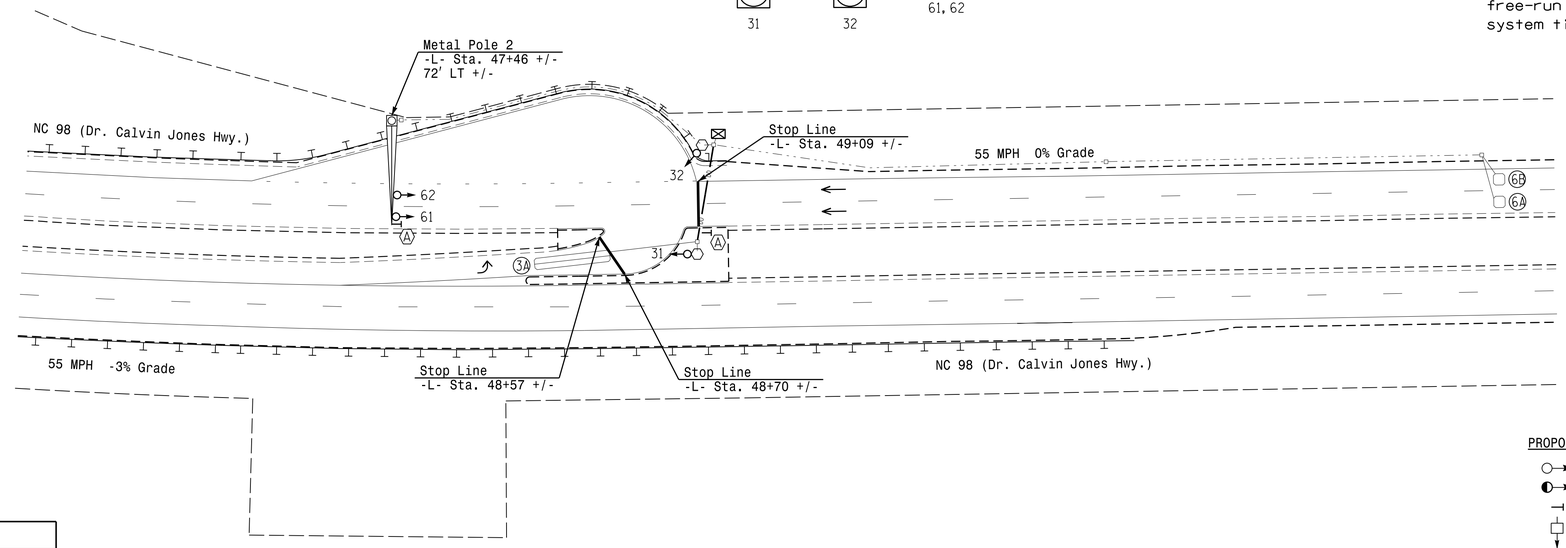
All Heads L.E.D.



2 Phase
Fully Actuated
(Wake Forest Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



TIMING CHART

FEATURE	PHASE 3	PHASE 6
Min Green *	7	14
Delayed Green *	-	-
Walk *	-	-
Ped Clear	-	-
Veh. Extension *	2.0	6.0
Max 1 *	30	90
Yellow	3.0	5.2
Red Clear	2.4	1.0
Red Revert	2.0	2.0
Actuations B4 Add *	-	-
Seconds /Actuation *	-	1.5
Max Initial *	-	46
Time Before Reduction *	-	15
Time To Reduce *	-	30
Minimum Gap	-	3.4
Locking Detector	-	X
Recall Position	-	VEH. RECALL
Dual Entry	-	-
Simultaneous Gap	X	X

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
3A	6X40	0	2-4-2	X	3	Yes	-	15 *	-	N	-	X
6A	6X6	420	6	X	6	Yes	-	-	X	N	-	X
6B	6X6	420	6	X	6	Yes	-	-	X	N	-	X

* Disable Delay during Alternate Phasing Operation.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	Directional Drill	N/A
	Metal Pole with Mastarm	
	Type II Signal Pedestal	
A	No Left Turn Sign (R3-2)	A

This plan supersedes the plan signed and sealed on 6/13/22.

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared In the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-Turn East of
South Franklin Street

Division 5 Wake County Wake Forest

PLAN DATE: June 2022 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: 06/22/2022
DATE

SIG. INVENTORY NO. 05-2074

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rziemba

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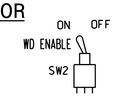
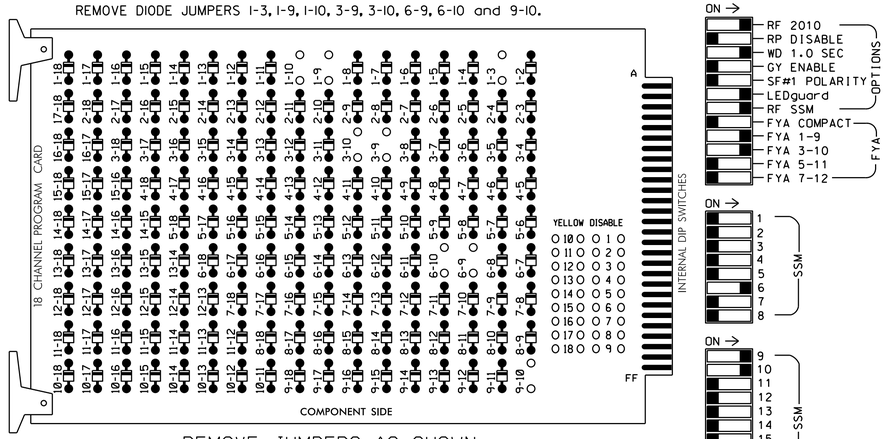
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-3, 1-9, 1-10, 3-9, 3-10, 6-9, 6-10 and 9-10.



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Integrate monitor with Ethernet network in cabinet.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 6 Green.
3. Program phase 2 for Red Flash.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the Wake Forest Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S4,S8,AUX S1,AUX S2
PHASES USED.....3,6
OVERLAP "A".....NOT USED
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....NOT USED
OVERLAP "G".....3
OVERLAP "H".....3

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 4.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	OLH	2	2 PED	OLG	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	32 ★	NU	NU	31 ★	NU	NU	NU	61,62	NU	NU	NU	NU	32 ★	31 ★	NU	NU	NU	NU
RED								134										
YELLOW	*			*				135										
GREEN																		
RED ARROW													A121	A124				
YELLOW ARROW													A122	A125				
FLASHING YELLOW ARROW													A123	A126				
GREEN ARROW	127			118				136										

NU = Not Used

* Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø 3 3A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
FILE "I" L					NOT USED									ST DC ISOLATOR
FILE "J" U	SLOT EMPTY	ø 6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "J" L		ø 6 6B												

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

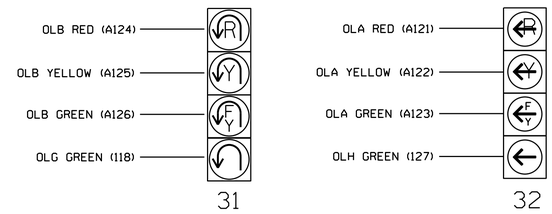
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
3A	TB4-5,6	I5U	58	3 ★	3	YES		15		N
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

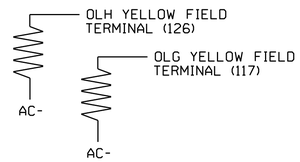
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



This Plan Supersedes Electrical Detail Sealed on 6/15/2022

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2074
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 WB (Dr. Calvin Jones Hwy.) at U-turn East of South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: June 2022 | REVIEWED BY:

PREPARED BY: Zarrar Zafar | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Traffic Engineering, Mobility and Safety Division
NCDEPARTMENT OF TRANSPORTATION
Traffic Engineering & Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
A90CADFDBD4241D... DATE

SIG. INVENTORY NO. 05-2074

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PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 4.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle Until Overlap 'G'

OVERLAP G

Select TMG VEH OVLP [G] and 'NORMAL'

```
TMG VEH OVLP...[G] TYPE: ......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . X . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP H

Select TMG VEH OVLP [H] and 'NORMAL'

```
TMG VEH OVLP...[H] TYPE: ......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . X . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Until Overlap 'A'

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....    OVERLAP  H
OPPOSING THROUGH.......    PHASE    6

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 3
```

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....    OVERLAP  G
OPPOSING THROUGH.......    PHASE    6

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 3
```

← NOTICE ACTION PLAN SF BIT "3"

END PROGRAMMING

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 3A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
        FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
        THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

   - Place cursor in VEH DETECTOR [ ] position and enter "3".
   - Set delay time to "0".

```
VEH DETECTOR [ 3]    VEH DET PLAN [ 2]
TYPE: N-NTCIP
TS2 DETECTOR..... X ECPI LOG.......    NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 3  3    . . . . . . . . . . . . . . . .
CALL OPTION.... YES DELAY TIME...     0.0
EXT OPTION. PASSAGE EXTENSION TIME.   0.0
USE ADDED INITIAL . CROSS SWITCH PH..   0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

END PROGRAMMING

This Plan Supersedes Electrical Detail Sealed on 6/15/2022

ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

NOTICE OVERLAP H ASSIGNED TO LD SWITCH 1 →

NOTICE OVERLAP G ASSIGNED TO LD SWITCH 3 →

```
LD SWITCH ASSIGN
     PHASE       DIMMING ---FLASH---
     /OVLP TYPE R Y G D PWR AUT TGR
 1    8    O    . . . + A    R    X
 2    2    V    . . . + A    R    .
 3    7    O    . . . + A    R    X
 4    4    V    . . . + A    R    .
 5    5    V    . . . - A    R    .
 6    6    V    . . . - A    Y    X
 7    7    V    . . . - A    R    .
 8    8    V    . . . - A    R    X
 9    1    O    . . . + A    R    X
10    2    O    . . . + A    R    X
11    3    O    . . . - A    R    .
12    4    O    . . . - A    R    .
13    2    P    . . . + A    .    .
14    4    P    . . . - A    .    .
15    6    P    . . . + A    .    .
16    8    P    . . . - A    .    .
```

← Ensure LD Switch 2 AUT set to 'R'

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2074
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-turn East of
South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: June 2022 | REVIEWED BY:

PREPARED BY: Zarrar Zafar | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Traffic Engineering Branch, Transportation Mobility and Safety Division
NCDOT Department of Transportation
Traffic Engineering & Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
A0CCAEDB0D4410... DATE

SIG. INVENTORY NO. 05-2074

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PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig. 4.3

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 3.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 3.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	3

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BIT 3 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 3: Modifies overlap parent phases for heads 31 and 32 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A to 0 seconds.

This Plan Supersedes Electrical Detail Sealed on 6/15/2022

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[ *]
PATTERN.....AUTO   SYS OVERRIDE.... NO
TIMING PLAN..... 0   SEQUENCE.....  0
VEH DETECTOR PLAN.. 2   DET LOG.......NONE
FLASH.....   --   RED REST..... NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   .  .  X  .  .  .  .  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

* The Action Plan number(s) are to be determined by the Division and/or City Traffic Engineer.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2074
DESIGNED: June 2022
SEALED: 6/22/2022
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-turn East of
South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: June 2022 | REVIEWED BY:
PREPARED BY: Zarrar Zafar | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Traffic Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 06/23/2022
A90CADFDB0D4241D... DATE

SIG. INVENTORY NO. 05-2074

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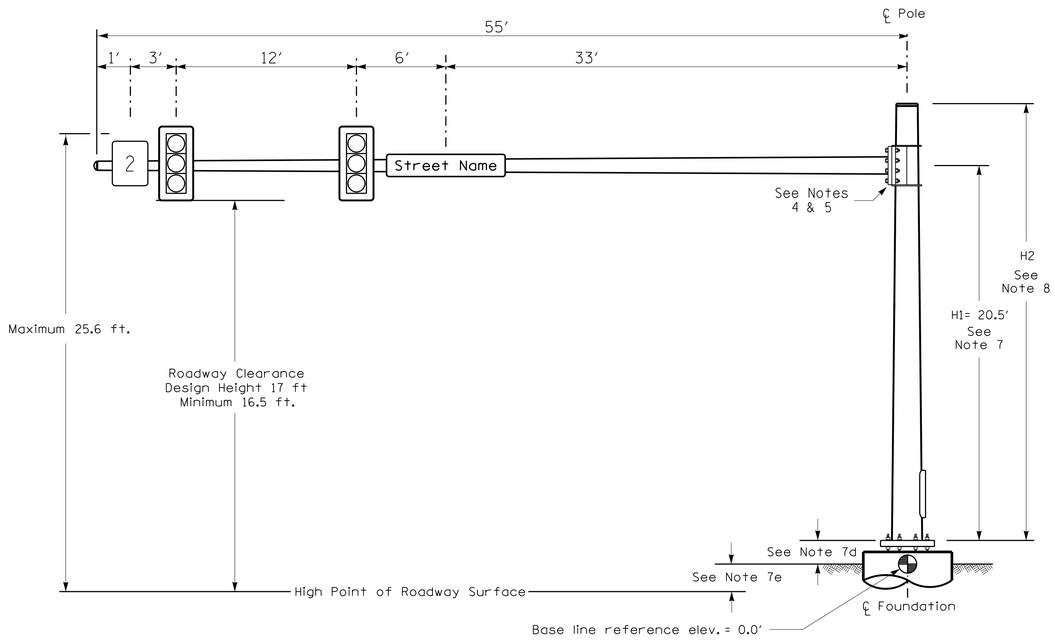
METAL POLE No. 2

PROJECT REFERENCE NO.	SHEET NO.
Holdings Village	Sig 4.4

Design Loading for METAL POLE NO. 2



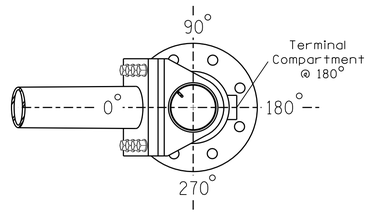
Elevation View

SPECIAL NOTE

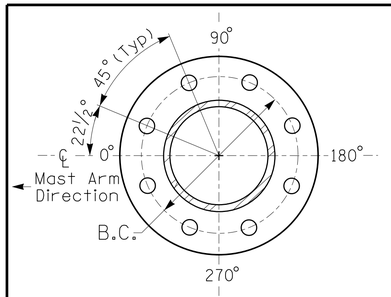
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 2	
Baseline reference point at ⊕ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+2.0 ft.	
Elevation difference at Edge of travelway or face of curb	+1.0 ft.	

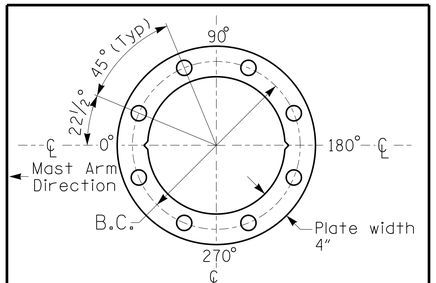


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 98 WB (Dr. Calvin Jones Hwy.)
at
U-Turn East of
South Franklin Street

Division 5 | Wake County | Wake Forest

PLAN DATE: May 2022 | REVIEWED BY:
PREPARED BY: J.A. Lohr | REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA
DocuSigned by: 06/16/2022
DATE
SIG. INVENTORY NO. 05-2074

13-JUN-2022 09:53
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jlohr

EXHIBIT B

The Reimbursement Estimate

ITEM	AMOUNT	NOTES
Signal Warrants, Engineering & Staking	$ 40,000	Kimley Horn & McAdams
Two Signal Poles, Mastarms & Appurtenances	$ 273,000	Signal Contractor Scope Complete
Traffic Control	$ 20,000	Allowance
Power Extension	$ 30,000	Allowance - Wake Forest Power
Subtotal	**$ 363,000**	
Contingency (10%)	**$ 36,300**	
Total	**$ 399,300**	

Developer (50%)	**$ 199,650**
Town of Wake Forest (50%)	**$ 199,650**

DocuSign Envelope ID: 959125D7-CDAA-43E5-A5BA-515B0CFB1AFC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

June 29, 2020

Readers & Partners, LLC
c/o Scott Lay
8480 Honeycutt Road, Suite 200
Raleigh, NC 27615

Subject: Traffic Agreement between the North Carolina Department of Transportation and Readers & Partners, LLC – signal upgrades on NC 98 at Franklin Street and NC 98 at US 1A/US 1 in Wake Forest
Project 36249.4123, Wake County

Attached is a copy of a Traffic Agreement covering the above project. You have 45 days from the date of receipt to sign and return two originals of the agreement to our office.

Please have two originals properly executed and return both originals to this office for further handling. As stipulated in the agreement, please include a check for $14,000. The agreements cannot have handwritten revisions or crossed out words. If there are revisions to request, please email changes to eehoneycutt@ncdot.gov as soon as you can so we can update the agreement.

After execution of the agreements by the Department, one of the original agreements will be returned to your office for your records.

If you have any questions or additional information is needed, please contact Elizabeth Honeycutt at (919) 220-4623.

Sincerely,

DocuSigned by:
Jeremy Warren
40A076BA50CC46F...

Jeremy L. Warren, PE
Division Traffic Engineer

Enclosures

JLW:eeh

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
DIVISION 5 OFFICE
2612 NORTH DUKE STREET
DURHAM, NC 27704

Telephone: (919) 220-4600
Fax: (919) 560-3371
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
2612 NORTH DUKE STREET
DURHAM, NC 27704

NORTH CAROLINA
WAKE COUNTY

TRAFFIC – REVIEW AND INSPECTION AGREEMENT

DATE: 6/29/2020

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

AND

WBS Elements: 36249.4123

READER & PARTNERS, LLC

THIS AGREEMENT is made and entered into on the last date executed below, by and between the North Carolina Department of Transportation, an agency of the State of North Carolina, hereinafter referred to as the "Department" and the Reader & Partners, LLC, hereinafter referred to as the "Developer".

W I T N E S S E T H:

WHEREAS, the Department and the Developer propose to make certain traffic control improvements under said project in Wake County; and,

WHEREAS, the Developer has agreed to participate in the cost of the project as hereinafter set out.

NOW, THEREFORE, the parties hereto, each in consideration of the promises and undertakings of the other as herein provided, do hereby covenant and agree, each with the other, as follows:

SCOPE OF PROJECT

1. The Project consists of upgrading the traffic signal on NC 98 at Franklin Street and NC 98 at US 1A/US 1. The design will include metal poles. The Department will review the traffic signal plans and inspect the traffic signal installation.

DESIGN AND EQUIPMENT PROCUREMENT

2. Project plans and traffic signal designs shall be prepared by the Developer, including electrical and programming details, (if applicable) metal poles with mast arm shop drawings, foundation designs, utility make-ready plans, communications cable routing plans, traffic signal coordination timing plans and Project Special Provisions (including, but not limited to: providing Synchro/Tru-Traffic files and programming data sheets; coordination timing plans, graphics package, downloading coordination timing plans onto system cabinets and/or onto central computer). All work shall be performed in accordance with Departmental standards and specifications. Said

plans and design shall be submitted to the Department for review and approval prior to any work being performed by the Developer. All work shall be done at no expense to the Department.

3. The Developer, at no expense to the Department, shall purchase or furnish from stock all traffic signal equipment necessary for the traffic signal revision. Said equipment shall be in reasonably close conformity with the standards and specifications of equipment and materials used by the Department. The Department reserves the right to reject the use of any equipment and materials it deems functionally inferior.

UTILITIES AND RIGHT OF WAY

4. The Developer, shall accomplish the relocation or adjustment of any and all utilities in conflict with the construction of the project. Said work shall be accomplished in a manner satisfactory to the Department, and without cost to the Department.

5. It is understood by the parties hereto that all work shall be contained within existing right of way. However, should it become necessary, the Developer, shall provide any required right of way and/or construction easements at no cost or liability whatsoever to the Department. Acquisition of right of way shall be accomplished in accordance with State procedures. The Developer, shall indemnify and save the Department harmless from any and all claims for damages that might arise on account of damage to public or private property and right of way acquisition, drainage, and construction easements for the construction of the project.

CONSTRUCTION

6. The Developer, at no expense to the Department, shall enter into and administer the contract for the installation of all equipment and perform such other work as required on the project in accordance with the approved project plans, the NCDOT "Standard Specifications for Roads and Structures", January 2018, "Roadway Standard Drawings", January 2018 and any addendum, all local codes and ordinances, and the procedures set out herein below shall be followed:

   A. No work shall be performed by the Developer prior to approval of the traffic signal design by the Department.

   B. Installation shall be done by a licensed electrical contractor familiar with traffic signal construction.

   C. All preliminary and construction engineering, supervision, and labor pertaining to the signal installation will be furnished by the Developer.

D. The Department's Division Engineer shall have the right to inspect, sample or test, and approve or reject any materials or construction methods used during the construction of the project.

E. Upon completion of the project, and prior to final acceptance by the Department, the Developer, will furnish to the Department's Division Engineer one (1) signal inventory control sheet and one (1) set of "Plan of Record" plans.

F. Prior to final acceptance by the Department, the Division Engineer shall have the right to make a final inspection of the completed work.

G. Failure on the part of the Developer, to comply with any of these provisions will be grounds for the Department to terminate the project.

H. The Developer, agrees to pursue the completion of the work covered by this Agreement as expeditiously as feasible and to complete all work within 180 Days of notice to proceed.

7. During installation of the signal equipment, the Department shall inspect the work being performed by the Developer to ensure compliance with the project plans, the current NCDOT traffic signal specifications, and the terms of this Agreement.

8. The Developer shall install thermoplastic pavement markings where pavement markings are required on the project.

FUNDING

9. The Developer shall reimburse the Department one hundred percent (100%) of the actual cost of all work performed by the Department, including administrative costs. Based on the estimated costs, the Developer shall submit a check for **$14,000** to the Department's Division Engineer upon **partial execution** of this Agreement by the Developer. Upon completion of the project, if actual costs exceed the amount of payment, the Developer shall reimburse the Department any underpayment within sixty (60) days of invoicing by the Department. If the actual cost of the work is less than $14,000, the Department shall reimburse the Developer any overpayment. The Department shall charge a late payment penalty and interest on any unpaid balance due in accordance with G.S. 147-86.23.

MAINTENANCE

10. Upon completion of the project, the Department shall own the traffic signal. Control and maintenance of the traffic signal will be accomplished in the same manner as maintenance of other state system signalized intersections.

11. In the event of damage to the metal poles, the Department shall install "in-kind" metal poles if funding is available from the damage claim or the Developer. However, if said funding is not available, the Department reserves the right to install wooden poles in lieu of metal poles (if applicable).

ADDITIONAL PROVISIONS

12. The other party to this Agreement shall comply with Title VI of the Civil Rights Act of 1964 (Title 49 CFR, Subtitle A, Part 21) and related nondiscrimination authorities. Title VI and related authorities prohibit discrimination on the basis of race, color, national origin, disability, gender, and age in all programs or activities of any recipient of Federal assistance.

13. A copy or facsimile copy of the signature of any party shall be deemed an original with each fully executed copy of the Agreement as binding as an original, and the parties agree that this Agreement can be executed in counterparts, as duplicate originals, with facsimile signatures sufficient to evidence an agreement to be bound by the terms of the Agreement.

14. By Executive Order 24, issued by Governor Perdue, and N.C. G.S.§ 133-32, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e., Administration, Commerce, Environmental Quality, Health and Human Services, Information Technology, Military and Veterans Affairs, Natural and Cultural Resources, Public Safety, Revenue, Transportation, and the Office of the Governor).

IT IS UNDERSTOOD AND AGREED that the approval of the project by the Department and the Developer is subject to the conditions of this Agreement.

IN WITNESS WHEREOF, this Agreement has been executed, in duplicate, the day and year heretofore set out, on the part of the Department and the Developer by authority duly given.

ATTEST:

BY: _____

TITLE: _____

READER & PARTNERS, LLC

BY: _____

TITLE: SVP

DATE: 7/1/20

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

(SEAL)

Federal Tax Identification Number

84-3277121

Remittance Address:

Reader & Partners, LLC

8480 HONEYCUTT ROAD, SUITE 200

RALEIGH, NC 27615

DEPARTMENT OF TRANSPORTATION

BY: _____
(CHIEF ENGINEER)

DATE: _____

PRESENTED TO BOARD OF TRANSPORTATION ITEM O: _____

Traffic Signals for U-Turns on NC Hwy 98 at S. Franklin St.

PRESENTED BY

Joe Guckavan , PE

Director of Engineering

TOWN of WAKE FOREST

U-Turn West of S. Franklin on Hwy 98



TOWN *of*
WAKE FOREST

U-Turn West of S. Franklin on Hwy 98



U-Turn East of S. Franklin on Hwy 98



TOWN *of*
WAKE FOREST

Estimate

EXHIBIT B

The Reimbursement Estimate

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Town of Wake Forest (50%)	**$ 199,650**





TOWN *of*
WAKE FOREST

Questions?

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-244-
Submitted by: Elisabeth Palermo
Submitting Department: Engineering
Meeting Date: October 3, 2023

SUBJECT
PRESENTATION FOR MUNICIPAL INFRASTRUCTURE IMPROVEMENTS

Recommendation:

Item Summary:

ATTACHMENTS

- Summary_S._Franklin_Exp.docx
- Attachment_A_Resolution Franklin Exp.docx
- Attachment_B_DA S. Franklin Exp.pdf
- Attachment_C_CIP Franklin Exp.pdf
- Attachment_D_S. Franklin Expansion.pptx

Agenda Item: Presentation of the S. Franklin Widening Reimbursement Agreement and authorizing the Town Manager to enter into a contract with RP HV Lakeside, LLC for S. Franklin Infrastructure improvements.

Summary: The Town may contract with a developer or property owner for public intersection or roadway improvements that are adjacent or ancillary to a private land development project. Additionally, the 2023-2028 Capital Improvements Program (CIP) includes the widening of S. Franklin St. as a high priority project that will help relieve traffic congestion and accommodate new development in the area.

The Town has determined that the cost to the Town in reimbursing the Developer for the design and construction of the portion of the project that the town is responsible for would cost less than if the Town were to design and construct the widening through a contract pursuant to N.C.G.S. § 143-128.

The developer has provided an initial cost estimate for the project of $5,414,319. The actual cost will be determined at the time of bidding. The estimate for the Town's portion of the project $3,464,309 which is 56.24% of the initial estimate.

Attachment: Attachment_A_Resolution Franklin Exp
Attachment_B_DA S. Franklin Exp
Attachment_C_CIP Franklin Expansion
Attachment_D_S. Franklin Expansion

RESOULTION 2023-XX

RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE TOWN OF WAKE FOREST TO CONTRACT WITH AND APPROPRIATE MONEY TO RPHV LAKESIDE, LLC FOR MUNICIPAL INFRASTRUCTURE IMPROVEMENTS

WHEREAS, pursuant to N.C.G.S. § 160A-309 a city may contract with a developer or property owner for public intersection or roadway improvements that are adjacent or ancillary to a private land development project;

WHEREAS, the Developer is the developer of a development in the Town known as Holding Village (the "Development"), and is the owner of certain real property located within the Development;

WHEREAS, in connection with the Development, the Developer is required to design, widen and construct a portion of S. Franklin Street adjacent to the Development, which is presently a 2-lane rural road (the "Road"), into a 5-lane section of the Road limited to the Development's frontage of the Road;

WHEREAS, the Developer is responsible for the design, widening and construction of the portion of the Road west of the center line and fronting the Development only (the "Developer Improvements");

WHEREAS, the Town is responsible for the design, widening and construction of the portion of the Road east of the center line on the opposite side of the Development only and terminating at the existing curb-cut entry to Wake County PIN 1840514169 on the Road, consistent with the Town Comprehensive Transportation Plan (the "Town Improvements");

WHEREAS, the Town Improvements and the Developer Improvements (collectively, the "Improvements") collectively shall create a full 5-lane section of the Road extending to the existing curb-cut entry to Wake County PIN 1840514169 on the Road;

WHEREAS, the Parties have agreed to jointly design, construct and fund the Improvements in accordance with the terms of this Agreement;

WHEREAS, the construction plans for the Improvements are more precisely delineated on the constructions drawings entitled "Town of Wake Forest South Franklin Street Improvements Wake Forest Project Number: SP-22-09" prepared by The John R.

McAdams Company, Inc. (the "Project Engineer"), the cover sheet of which is attached hereto as Exhibit A and incorporated herein by reference (the "Construction Plans");

WHEREAS, to allow for a more defined scope and allocation of the Improvements the Developer has engaged and funded certain contractors that have commenced with the design, engineering, and permitting of the Improvements (the "Engineering and Permitting"), which Engineering and Permitting costs will be allocated and reimbursed by the Parties as set forth in this Agreement; and

WHEREAS, the Town is responsible for the design, widening and construction of the portion of the Road east of the center line on the opposite side of the Development only and terminating at the existing curb-cut entry to Wake County PIN 1840514169 on the Road, consistent with the Town Comprehensive Transportation Plan (the "Town Improvements")

WHEREAS, N.C.G.S. § 160A-20.1 enables the Town to contract with and appropriate money to any person, association, or corporation, in order to carry out any public purpose that the Town is authorized to engage in.

BE IT RESOLVED by the Board of Commissioners of the Town of Wake Forest, North Carolina, hereby authorizes the Town Manager to execute the developers agreement with RPHV Lakeside, LLC for the expansion of South Franklin Street.

Duly adopted this 17th day of October 2023.

_____

Vivian A. Jones
Mayor

(ATTEST)

_____

Terry Savary

Town Clerk

STATE OF NORTH CAROLINA
COUNTY OF WAKE

JOINT DEVELOPMENT AGREEMENT
(South Franklin St. Road Improvements)

THIS JOINT DEVELOPMENT AGREEMENT (this "**Agreement**") is entered into as of _____, 2023 (the "**Effective Date**") by and between the **Town of Wake Forest**, a North Carolina municipal corporation (the "**Town**") and **RP HV Lakeside, LLC**, a Florida limited liability company (the "**Developer**"). The Town and Developer are sometimes referred to collectively herein as the "**Parties**" and individually as a "**Party**".

RECITALS

WHEREAS, pursuant to N.C.G.S. § 160A-309 a city may contract with a developer or property owner for public intersection or roadway improvements that are adjacent or ancillary to a private land development project;

WHEREAS, the Developer is the developer of a development in the Town known as Holding Village (the "**Development**"), and is the owner of certain real property located within the Development;

WHEREAS, in connection with the Development, the Developer is required to design, widen and construct a portion of S. Franklin Street adjacent to the Development, which is presently a 2-lane rural road (the "**Road**"), into a 5-lane section of the Road limited to the Development's frontage of the Road;

WHEREAS, the Developer is responsible for the design, widening and construction of the portion of the Road west of the center line and fronting the Development only (the "**Developer Improvements**");

WHEREAS, the Town is responsible for the design, widening and construction of the portion of the Road east of the center line on the opposite side of the Development only and terminating at the existing curb-cut entry to Wake County PIN 1840514169 on the Road, consistent with the Town Comprehensive Transportation Plan (the "**Town Improvements**");

WHEREAS, the Town Improvements and the Developer Improvements (collectively, the "**Improvements**") collectively shall create a full 5-lane section of the Road extending to the existing curb-cut entry to Wake County PIN 1840514169 on the Road;

WHEREAS, the Parties have agreed to jointly design, construct and fund the Improvements in accordance with the terms of this Agreement;

WHEREAS, the construction plans for the Improvements are more precisely delineated on the constructions drawings entitled "Town of Wake Forest South Franklin Street Improvements Wake Forest Project Number: SP-22-09" prepared by The John R. McAdams Company, Inc. (the "**Project Engineer**"), the cover sheet of which is attached hereto as **Exhibit A** and incorporated herein by reference (the "**Construction Plans**");

WHEREAS, to allow for a more defined scope and allocation of the Improvements the Developer has engaged and funded certain contractors that have commenced with the design, engineering, and permitting of the Improvements (the "**Engineering and Permitting**"), which Engineering and Permitting costs will be allocated and reimbursed by the Parties as set forth in this Agreement; and

WHEREAS, N.C.G.S. § 160A-20.1 enables the Town to contract with and appropriate money to

any person, association, or corporation, in order to carry out any public purpose that the Town is authorized to engage in.

THE AGREEMENT

NOW, THEREFORE in consideration of the mutual promises and covenants contained herein, the Town and Developer agree as follows:

1. **Recitals**. The recitals set forth above are hereby incorporated into this Agreement by reference.

2. **Construction of Improvements**.

a. Construction. The Developer shall cause for the hiring of the Project Manager (as defined herein) to complete or cause to be completed the Engineering and Permitting and the construction of the Improvements. These efforts shall be carried out in a good and workmanlike manner, in accordance with the terms of the Town's Unified Development Ordinance adopted July 16, 2013 (as amended, the "**UDO**"); the Town's Approved Construction Process; the Town's Manual of Specifications, Standards and Design; and the Construction Plans approved by the Town for the construction of the Improvements (collectively, the "**Approved Construction Process**").

b. Project Manager. The Developer shall engage Reader & Partners, LLC (the "**Project Manager**") to manage and oversee the construction and installation of the Improvements, and to otherwise carryout any or all of the Developer's obligations set forth herein. The Developer and the Project Manager are sometimes referred to herein collectively as the "**Developer Parties**". The Town shall pay the Project Manager a Management Fee as detailed on the Cost Estimate (defined herein).

c. Engineer's Certificate. Following Substantial Completion (as defined hereafter) of the Improvements, the Project Manager shall cause the Project Engineer to complete and issue a final engineering certification for the Improvements (the "**Engineer's Certificate**"). The Engineer's Certificate shall be certified to the Town and any other parties the Town reasonably requests. "**Substantial Completion**" of the Improvements is defined as when all 5 through lanes of the Road may be opened to through traffic.

3. **Town's Acceptance**.

a. Maintenance and Inspection. Following the beginning of construction of the Improvements, but prior to Substantial Completion, the Developer shall be responsible for maintenance of the Developer Improvements, and the Town shall be responsible for maintenance of the Town Improvements, all in accordance with the Construction Plans. Subject to Section 4.d., upon Substantial Completion the Town shall be responsible for the maintenance of the Improvements, the Developer's Bond (defined in Section 4.d.) shall be released, and the Town shall be solely responsible for any warranty periods for the Improvements. The Town may inspect the Improvements prior to Substantial Completion. In performing any maintenance to the Improvements prior to Substantial Completion, the Developer Parties shall adhere to the Town's standards, rules and regulations, including without limitation the Town's safety policies and road or lane closure policies. Notwithstanding anything to the contrary contained herein, the Town shall continue to be solely responsible for the payment of streetlight usage fees applicable to the Road, if any.

b. Final Acceptance. Following Substantial Completion, the Project Manager shall provide notice to the Town of Substantial Completion and request that the Town promptly perform its final

inspection of the Improvements. Following the Town's final inspection of the Improvements, the Town shall issue to the Project Manager a punch list for any remaining outstanding items required by the Construction Plans, if any (the "**Punch List**"). Once the Project Manager has completed each item set forth on the Punch List, Project Manager shall notify the Town of such completion and thereafter the Town shall promptly inspect the Punch List items. If the Punch List items are completed to the Town's reasonable satisfaction, the Town shall formally notify the Project Manager in writing of such fact, and following the Town's written notification and certification that the Improvements are complete, the Improvements shall be deemed accepted by the Town ("**Final Acceptance**"). Notwithstanding the foregoing, if the Town does not issue a Punch List as set forth in this subsection, Final Acceptance shall be deemed to have occurred. Furthermore, and notwithstanding the foregoing, but subject to Section 3.a. and Section 4.d. herein, Final Acceptance shall be in accordance with Town policy.

4. **Funding**.

a. Establishing Allocation and Funding of Costs.

i. Prior Engineering and Permitting Costs. The Town confirms that the Developer has funded the Engineering and Permitting costs prior to the effective date of this Agreement. The Town shall reimburse Developer for its respective share of the Engineering and Permitting costs as provided in Section 4.a.iii. herein.

ii. Future Design and Construction Funding. The Parties shall fund all future costs and expenses related to the design, engineering and construction of its portions of the Improvements as shown on the Construction Plans (e.g. the Developer Improvements on the portion of the Road west of the center line along the Development frontage, and the Town Improvements on the portion of the Road east of the center line and its extension past the Development to Rodgers Road), pursuant to this Section 4. The estimated costs shown in **Exhibit B-1** attached hereto and incorporated herein by this reference (the "**Costs Estimate**") constitute a commercially reasonable estimate of the entirety of the costs for the design, engineering and construction of the Improvements (the "**Improvements Work Costs**"). Notwithstanding the foregoing or anything herein to the contrary, the Improvements Work Costs shall only include those costs actually and reasonably incurred by the Parties for the design, engineering, project management, and construction of the Improvements, but exclusive of legal fees and administrative costs (including, but not limited to, profit and overhead) of the Parties.

iii. Prior Design Funding. The Town acknowledges that the Developer has previously funded certain costs for the Engineering and Permitting (collectively, the "**Prior Design Costs**"). An accounting of the Prior Design Costs is set forth on **Exhibit B-2** attached hereto and incorporated herein by this reference. The Town and Developer further agree that the Town shall reimburse the Developer pursuant to this subsection on the first Draw Request (defined herein) for the Engineering and Permitting based on the following formula:

A. The Town shall be responsible for 56.24% of the Prior Design Costs, based on an allocation to the Town of 3,380 linear feet of the total 6,010 linear feet of the Improvements as shown on the Construction Plans.

B. The Developer shall be responsible for 43.76% of the Prior Design Costs, based on an allocation to the Developer of 2,630 linear feet of the total 6,010 linear feet of the Improvements as shown on the Construction Plans.

b. Funding Procedure. The Project Manager shall plan and carry out the construction of the Improvements pursuant to this Agreement. In connection with the Project Manager's duties hereunder, the Project Manager shall submit monthly Draw Requests (defined below) to the Town at least fourteen (14) business days prior to the date on which the Project Manager requests the Town's payment of the Draw Request in order to fund the portions of the Improvements Work Costs applicable to the Town Improvements. For purposes clarity, the Town's share of the Improvements Work Costs shall be based on the percentage set forth in Section 4.a.iii.A. above, and the Developer's share of the Improvement Work Costs shall be based on the percentage set forth in Section 4.a.iii.B. above. A "**Draw Request**" or "**Draw Requests**" means a written request setting forth the costs incurred or to be incurred by the Project Manager in completing the Improvements that constitute Improvements Work Costs and specifying each line item for which the disbursement is requested, consistent with the line items in the Costs Estimate. Together with the Draw Request, the Project Manager shall submit to the Town: (i) a certificate executed by the Project Manager and the Project Engineer stating the costs of the work to be funded by the applicable Draw Request are Improvements Work Costs that have been paid, or will be immediately paid, upon receipt of the disbursement pursuant to the Draw Request; (ii) an interim (or in the case of final payment, final) lien waiver signed by the applicable contractor(s); and (iii) any other information reasonably requested by the Town. The Town shall review the Draw Request and within fourteen (14) business days following its receipt of the Draw Request in good-faith either approve and pay or disapprove the Draw request in writing to the Project Manager. Following the Town's approval of the Draw Request, the Town shall promptly process the Draw Request's payment to the Project Manager.

c. Procedure for Disputed Draw Requests. If the Developer believes the Town is in default under this Agreement for failing to approve a Draw Request, the Developer and the Town shall make a good faith effort to negotiate and informally resolve the dispute prior to pursuing any available legal remedies. If the Town and the Developer cannot resolve the dispute through negotiation within thirty (30) days of the Town's written disapproval of the Draw Request as provided in Section 4.b., Developer will submit the applicable Draw Request (the "**Developer Draw Request Submission**"), and the Town will submit a written rejection or partial approval of the Draw Request or other mark-up of the Draw Request (the "**Town Draw Request Submission**"), to the Project Engineer. The Project Engineer will then select either the Developer Draw Request Submission or the Town Draw Request Submission as being the most accurate in its professional opinion (the "**Approved Expense Submission**"), which Approved Expense Submission will then be binding on the Parties. Thereafter, the Town shall promptly provide funding for the amount of the Approved Expense Submission. The Project Engineer's costs and fees incurred in connection with this Section shall be paid by the Parties in equal shares.

d. Bonding and Performance Guarantees. The Developer has currently posted Completion Bond No. 800132213 in the amount of $1,513,110.00 for the Developer Improvements, with the Town named as beneficiary (the "**Developer's Bond**"). The Developer's Bond shall continue to serve as the Developer's security for the Developer Improvements. Upon incremental completion of the Developer Improvements in Developer's discretion, and upon notice to the Town, the Developer may apply to partially reduce Developer's Bond to cover only 110% of the remaining work for the Developer Improvements at a given time, which remaining work and the amount thereof shall be certified in writing to the Town by the Project Engineer. The Developer's Bond shall be released in full upon Substantial Completion of the Developer Improvements. The Project Manager's contractors performing the work for the Improvements shall pay for and post performance and payment bonds for the Town Improvements only and naming the Town as beneficiary. The Developer's Bond is the only bond required from the Developer Parties in connection with the Improvements, and the Developer Parties shall not be required to post any additional bonds with respect to the Improvements.

5. **Changes to the Costs Estimate**. If, at any point during the design, engineering and construction of the Improvements, there is a material increase in the Costs Estimate as it relates to the Town

Improvements, then the Project Manager shall promptly submit to the Town's Chief Financial Officer (or another party identified by the Town) a written request to amend the Costs Estimate (a "**Change Request**"). A Change Request shall include sufficient detail (i.e., quotes, invoices, receipts, and/or such other documentation as may reasonably be requested by the Town) to allow the Town to determine whether the proposed increase in the Costs Estimate is commercially reasonable and justified. The Town shall make a final determination, in writing, regarding the reasonableness of a Change Request within fifteen (15) days' receipt of such initial request (a "**Change Request Response**"). Failure to submit a Change Request as required herein shall constitute an acknowledgement by the Project Manager that such cost increase is commercially unreasonable and unjustified; in which case, the amount of such cost increase shall not constitute a portion of the Improvements Work Costs. For the purposes of this Section, a cost increase shall be considered material when it results in either an increase to the Town Improvements of over Five Thousand Dollars ($5,000) after contingency is deployed as set forth on **Exhibit B-1**. Notwithstanding anything herein to the contrary, the terms and amount of the Improvements Work Costs, as set forth herein, may only be changed by the prior written consent of the Town's Chief Financial Officer.

6. **Bidding**. This Agreement is not subject to Article 8 of Chapter 143 of the North Carolina General Statutes, except that the Project Manager shall solicit bids in accordance with Article 8 of Chapter 143 of the General Statutes when awarding contracts for the Town Improvements that would have required competitive bidding if the contract had been awarded by the Town.

7. **Default**. Subject to Sections 4.b. and 4.c. herein, if either Party defaults and fails to cure said default within thirty (30) days (or if such default cannot be cured within thirty (30) days using commercially reasonable diligence, then a commercially reasonable period of time) after receipt of written notice of such default from the non-defaulting Party, the non-defaulting Party may pursue any remedy available to it at law or in equity. The failure of either Party to enforce any provision of this Agreement will not be deemed a waiver or consent to a subsequent default or breach by the other Party.

8. **Notices**. All notices and other communications required or permitted by this Agreement shall be in writing and shall be given by either personal delivery, certified United States mail, return receipt requested, or overnight delivery by a nationally reputable overnight delivery service (e.g., UPS, FedEx) addressed as follows:

To the Town:
Town of Wake Forest
301 S. Brooks Street
Wake Forest, NC 27587
Attn: Town Manager

with copy to:

Town of Wake Forest

301 S. Brooks Street
Wake Forest, NC 27587
Attn: Town Attorney

To the Developer:
RP HV Lakeside, LLC
5850 T.G. Lee Blvd., Suite 200
Orlando, FL 32822
Attn: Dean Barberree

with copy to:

To Project Manager:
Reader & Partners, LLC
8480 Honeycutt Road, Suite 200
Raleigh, NC 27651
Attn: Scott Lay

and with additional copy to:

Maynard Nexsen PC
4141 Parklake Ave., Suite 200
Raleigh, NC 27612
Attn: Keith Burns and Alex Serkes

A change of address or person to receive notice may be made by either Party by notice given to the other Party. Any notice or other communication under this Agreement shall be deemed given at the time of actual delivery, if it is personally delivered. If the notice or other communication is sent by US Mail, it shall be deemed given upon the third calendar day following the day on which such notice or other communication is deposited with the US Postal Service or upon actual delivery, whichever occurs first. If the notice or other communication is sent by overnight delivery, it shall be deemed given upon documented delivery to the overnight delivery service.

9. **Indemnification**. To the maximum extent allowed by law, the Project Manager shall indemnify and save harmless the Town, its agents, officers, and employees, from and against all charges that arise in any manner from, in connection with, or out of this Agreement proximately caused by the negligent acts or omissions of the Project Manager, their agents, officers, or employees or anyone for whose acts any of them may be liable except for damage or injury caused solely by the negligence or intentional misconduct of the Town, its agents, officers, or employees. As used in this subsection, "charges" means claims, judgments, costs, damages, losses, demands, liabilities, duties, obligations, fines, penalties, royalties, settlements, expenses, interest, reasonable attorney's fees, and amounts for alleged violations of sedimentation pollution, erosion control, pollution, or other environmental laws, regulations, ordinances, rules, or orders. Nothing in this section shall affect any warranties in favor of the Town that are otherwise provided in or arise out of this Agreement. This Section is in addition to and shall be construed separately from any other indemnification provisions or remedies that may be in this Agreement. This Section shall remain in force despite termination of this Agreement (whether by expiration of the term or otherwise) and termination of the services of any supplemental agreement entered into under this Agreement.

10. **Choice of Law and Forum**. This Agreement shall be deemed made in Wake County, North Carolina. This Agreement shall be governed by and construed in accordance with the law of North Carolina. The exclusive forum and venue for all actions arising out of this Agreement shall be the appropriate division of the North Carolina General Court of Justice in Wake County. Such actions shall neither be commenced in nor removed to federal court. This section shall not apply to subsequent actions to enforce a judgment entered in actions heard pursuant to this section.

11. **Waiver**. No action or failure to act by the Town shall constitute a waiver of any of its rights or remedies that arise out of this Agreement, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

12. **Performance of Government Functions**. Nothing contained in this Agreement shall be deemed or construed in any way to stop, limit, or impair the Town from exercising or performing any regulatory, policing, legislative, governmental, or other powers or functions.

13. **Severability**. If any provision of this Agreement shall be unenforceable, the remainder of this Agreement shall be enforceable to the extent permitted by law.

14. **Assignment, Successors and Assigns**. Without the Town's written consent, the Developer shall not assign (which includes to delegate) any of its rights (including the right to payment) or duties that arise out this Agreement. Unless the Town otherwise agrees in writing, the Developer and all assigns shall be subject to all of the Town's defenses and shall be liable for all of the Developer's duties

that arise out of this Agreement and all of the Town's claims that arise out of this Agreement. Without granting the Developer the right to assign, it is agreed that the duties of the Developer that arise out of this Agreement shall be binding upon it and its heirs, personal representatives, successors, and assigns.

15. **Compliance with Law**. In performing all of its obligations hereunder, the Developer shall comply with all applicable law.

16. **Town Policy**. THE TOWN OPPOSES DISCRIMINATION ON THE BASIS OF RACE AND SEX AND URGES ALL OF ITS DEVELOPERS TO PROVIDE A FAIR OPPORTUNITY FOR MINORITIES AND WOMEN TO PARTICIPATE IN THEIR WORK FORCE AND AS SUBCONTRACTORS AND VENDORS UNDER CITY CONTRACTS.

17. **EEO Provisions**. During the performance of this Agreement the Developer agrees as follows:

a. The Developer shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, political affiliation or belief, age, or handicap. The Developer shall take affirmative action to ensure that applicants are employed and that employees are treated equally during employment, without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or handicap. The Developer shall post in conspicuous places available to employees and applicants for employment, notices setting forth these EEO provisions.

b. The Developer in all solicitations or advertisements for employees placed by or on behalf of the Developer, state all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or handicap.

18. **No Third Party Right Created**. This Agreement is intended for the benefit of the Town and the Developer and not any other person.

19. **Principles of Interpretation**. In this Agreement, unless the context requires otherwise, the singular includes the plural and the plural the singular. The pronouns "it" and "its" include the masculine and feminine. Reference to statutes or regulations include all statutory or regulatory provisions consolidating, amending, or replacing the statute or regulation. References to contracts and agreements shall be deemed to include all amendments to them. The word "person" includes natural persons, firms, companies, associations, partnerships, trusts, corporations, governmental agencies and units, and any other legal entities.

20. **Modifications, Entire Agreement**. A modification of this Agreement is not valid unless signed by both parties and otherwise in accordance with requirements of law. Further, a modification is not enforceable against the Town unless the Town Manager or other duly authorized official signs it for the Town. This Agreement contains the entire agreement between the parties pertaining to the subject matter of this Agreement. With respect to that subject matter, there are no promises, agreements, conditions, inducements, warranties, or understandings, written or oral, expressed or implied, between the parties, other than as set forth or referenced in this Agreement.

21. **E-Verify**. Developer shall comply with the requirements of Article 2 of Chapter 64 of the NC General Statutes. Further, if Developer utilizes a subcontractor, Developer shall require the subcontractor to comply with the requirements of Article 2 of Chapter 64 of the NC General Statutes.

22. **Iran Divestment Act**. Developer certifies that; (i) it is not identified on the Final Divestment List or any other list of prohibited investments created by the NC State Treasurer pursuant to

N.C.G.S. 147-86.58; (ii) it will not take any action causing it to appear on any such list during the term of this Agreement, and (iii) it will not utilize any subcontractor to provide goods or services hereunder that is identified on any list.

23. **Divestment from Companies that Boycott Israel**. Developer represents, covenants, and certifies that it is not listed on the list of restricted companies developed and published by the North Carolina State Treasurer as required by N.C.G.S. 147-86.81.

24. **Quality and Workmanship**. All work performed and/or services rendered shall be performed to the satisfaction of the Town. The work performed and/or services rendered shall not be considered complete, nor applicable payments rendered, until the Town is satisfied with the work performed and/or services rendered.

25. **Title VI**. During the performance of this Agreement, the Developer, for itself, its assignees and successors in interest agrees as follows:

a. Compliance with Regulations. The Developer shall comply with the Regulation relative to nondiscrimination in Federally-assisted programs of the Town Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the "**Regulations**"), which are herein incorporated by reference and made a part of this Agreement.

b. Nondiscrimination. The Developer, with regard to the work performed by it during the Agreement, shall not discriminate on the grounds of race, color, national origin, sex, religion, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Developer shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the Agreement covers a program set forth in Appendix B of the Regulations.

c. Solicitations for Subcontractors, Including Procurements of Materials and Equipment. In all solicitations either by competitive bidding or negotiation made by the Developer for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Developer of the Developer's obligations under this Agreement and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

d. Information and Reports. The Developer shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Town to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a Developer is in the exclusive possession of another who fails or refuses to furnish this information the Developer shall so certify to the Town as appropriate and shall set forth what efforts it has made to obtain the information.

e. Sanctions for Noncompliance. In the event of the Developer's noncompliance with the nondiscrimination provisions of this Agreement, the Town shall impose such contract sanctions as it or the Town may determine to be appropriate, including, but not limited to:

a. withholding of payments to the Developer under the Agreement until the Developer complies, and/or

b. cancellation, termination, or suspension of the Agreement, in whole or in

part.

f. Incorporation of Provisions. The Developer shall include the provisions of subparagraphs (a) through (f) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Developer shall take such action with respect to any subcontract or procurement as the Town may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event a Developer becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Developer may request the Town to enter into such litigation to protect the interests of the Town, and, in addition, the Developer may request the United States to enter into such litigation to protect the interests of the United States.

26. **Pre-Audit**. This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

27. **Non-appropriation clause**. Developer acknowledges that the Town is a governmental entity, and the Agreement validity is based upon the availability of public funding under the authority of its statutory mandate. In the event that public funds are unavailable and not appropriated for the performance of the Town's obligations under this Agreement, then this Agreement shall automatically expire without penalty to the Town thirty (30) days after written notice to Developer of the unavailability and non-appropriation of public funds. It is expressly agreed that the Town shall not activate this non-appropriation provision for its convenience or to circumvent the requirements of this Agreement, but only as an emergency fiscal measure during a substantial fiscal crisis, which affects generally its governmental operations. In the event of a change in the Town's statutory authority, mandate and mandated functions, by state and federal legislative or regulatory action, which adversely affects the Town's authority to continue its obligations under this Agreement, then this Agreement shall automatically terminate without penalty to the Town upon written notice to Developer of such limitation or change in the Town's legal authority.

28. **No pledge of taxing authority**. The taxing power of the Town is not pledged directly or indirectly to secure any monies due under this Agreement.

29. **No waiver of governmental immunity; Violation of law**. Except for waiver of governmental immunity resulting from the execution of a valid contract, the Town makes no other waiver of governmental immunity. If any provision of the Agreement or Agreement is in violation of any legal, statutory or state constitutional prohibition, then such provision(s) shall be unenforceable against the Town.

30. **Conflict of Interest**. If this is an Agreement for design, engineering, contract administration or similar services, the Developer will not enter into contracts or agreements with third parties that may present a potential for conflict of interest between the Town and the third parties regarding the subject matter of this Agreement.

31. **Public Record**. This Agreement is subject to disclosure under the public records laws of the State of North Carolina.

32. **Miscellaneous Provision**. In the event of any inconsistency, conflict, or ambiguity between these miscellaneous terms and conditions and other associated contract documents, the parties agree that the terms and conditions of this Agreement shall prevail.

[SIGNATURE PAGE FOLLOWS. REMAINDER OF PAGE INTENTIONALLY BLANK.]

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the Effective Date.

ATTEST:

_____
Terry Savary, Town Clerk

THE TOWN:

TOWN OF WAKE FOREST,
a North Carolina municipal corporation

By: _____
Kip Padgett, Town Manager

THE DEVELOPER:

RP HV LAKESIDE, LLC
a Florida limited liability company

By: Reader & Partners, LLC, its Manager

By: _____
Name: Dean Barberree
Title: President

ACKNOWLEDGED AND AGREED TO BY THE PROJECT MANAGER:

READER & PARTNERS, LLC
a Florida limited liability company

By: _____
Name: Dean Barberree
Title: President

PREAUDIT CERTIFICATION

This instrument has been pre-audited in a manner required by applicable law.

_____
Aileen Staples, Chief Financial Officer

EXHIBIT A

The Construction Plans

See attached.

TOWN OF WAKE FOREST SOUTH FRANKLIN STREET IMPROVEMENTS

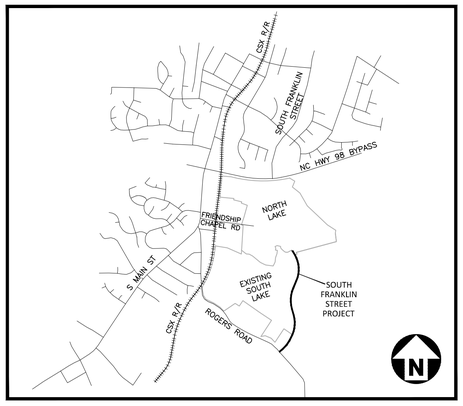
0 SOUTH FRANKLIN STREET
WAKE FOREST, NORTH CAROLINA

CONSTRUCTION DRAWINGS

PROJECT NUMBER: RAP-19000
WAKE FOREST PROJECT NUMBER: SP-22-08
DATE: MARCH 24, 2023

SHEET INDEX

C0.10	TYPICAL SECTIONS	
C1.00	EXISTING CONDITONS	STA. 15+00 THRU STA. 26+00
C1.01	EXISTING CONDITIONS	STA. 26+00 THRU STA. 46+00
C2.00	ROAD WIDENING PLAN	STA. 15+00 THRU STA. 26+00
C2.01	ROAD WIDENING PLAN	STA. 26+00 THRU STA. 46+00
C2.10	PAVEMENT MARKING PLAN	STA. 10+00 THRU STA. 26+00
C2.11	PAVEMENT MARKING PLAN	STA. 26+00 THRU STA. 46+00
C3.00	GRADING AND STORM DRAINAGE PLAN	STA. 10+00 THRU STA. 26+00
C3.01	GRADING AND STORM DRAINAGE PLAN	STA. 26+00 THRU STA. 46+00
C4.00	DEMOLITION AND UTILITY CONFLICT PLAN	STA. 10+00 THRU STA. 26+00
C4.01	DEMOLITION AND UTILITY CONFLICT PLAN	STA. 26+00 THRU STA. 46+00
C7.00	CROSS SECTIONS	STA. 14+00 THRU STA. 15+50
C7.01	CROSS SECTIONS	STA. 15+64.11 THRU STA. 16+00
C7.02	CROSS SECTIONS	STA. 16+50 THRU STA. 17+50
C7.03	CROSS SECTIONS	STA. 18+00 THRU STA. 19+50
C7.04	CROSS SECTIONS	STA. 20+00 THRU STA. 21+50
C7.05	CROSS SECTIONS	STA. 22+00 THRU STA. 23+50
C7.06	CROSS SECTIONS	STA. 24+00 THRU STA. 25+00
C7.07	CROSS SECTIONS	STA. 25+50 THRU STA. 26+50
C7.08	CROSS SECTIONS	STA. 27+00 THRU STA. 28+50
C7.09	CROSS SECTIONS	STA. 28+85.95 THRU STA. 29+50
C7.10	CROSS SECTIONS	STA. 30+00 THRU STA. 30+50
C7.11	CROSS SECTIONS	STA. 31+00
C7.12	CROSS SECTIONS	STA. 31+50
C7.13	CROSS SECTIONS	STA. 32+00
C7.14	CROSS SECTIONS	STA 32+29.91
C7.15	CROSS SECTIONS	STA. 32+50
C7.16	CROSS SECTIONS	STA. 33+00 THRU STA. 33+50
C7.17	CROSS SECTIONS	STA. 34+00 THRU STA. 35+00
C7.18	CROSS SECTIONS	STA. 35+50 THRU STA. 37+00
C7.19	CROSS SECTIONS	STA. 37+50 THRU STA. 39+00
C7.20	CROSS SECTIONS	STA. 39+50 THRU STA. 40+50
C7.21	CROSS SECTIONS	STA. 41+00 THRU STA. 42+50
C7.22	CROSS SECTIONS	STA. 43+00 THRU STA. 44+00
C8.00	SITE DETAILS	
C8.01	SITE DETAILS	
C8.02	PAVEMENT MARKING DETAILS	
C8.03	STORM DRAINAGE DETAILS	
C8.04	STORM DRAINAGE DETAILS	
C8.05	EROSION CONTROL DETAILS	
C8.06	SEEDING SCHEDULE	
L5.00	CODE LANDSCAPE PLAN	
L5.01	CODE LANDSCAPE PLAN	
L5.10	LANDSCAPE DETAILS	
C10.00	TRANSPORTATION OPERATIONS PLAN: (MANAGEMENT STRATEGIES, GENERAL NOTES AND INDEX OF SHEETS)	
C10.01	TRAFFIC CONTROL PHASING & SECTIONS	
C10.10	TRAFFIC CONTROL PLAN PHASE 1	STA. 10+00 THRU STA. 26+00
C10.11	TRAFFIC CONTROL PLAN PHASE 1	STA. 26+00 THRU STA. 46+00
C10.20	TRAFFIC CONTROL PLAN PHASE 2	STA. 10+00 THRU STA. 26+00
C10.21	TRAFFIC CONTROL PLAN PHASE 2	STA. 26+00 THRU STA. 46+00
C10.30	TRAFFIC CONTROL PLAN PHASE 3	STA. 10+00 THRU STA. 26+00
C10.31	TRAFFIC CONTROL PLAN PHASE 3	STA. 26+00 THRU STA. 46+00



VICINITY MAP
N.T.S.

811 Know what's below. Call before you dig.

NO SUBSURFACE UTILITY SURVEY (SUE) HAS BEEN PERFORMED FOR THE PREPARATION OF THESE PLANS. ADDITIONAL UNDERGROUND UTILITIES MAY BE IN THE AREA. CONTRACTOR SHALL NOTIFY "NC811" (811) OR (1-800-632-4949) AT LEAST 3 FULL BUSINESS DAYS PRIOR TO BEGINNING CONSTRUCTION OR EXCAVATION TO HAVE EXISTING UTILITIES LOCATED. CONTRACTOR TO CONTACT ANY LOCAL UTILITIES THAT PROVIDE THEIR OWN LOCATOR SERVICES INDEPENDENT OF "NC811". REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CURRENT TOWN OF WAKE FOREST, CITY OF RALEIGH AND NCDOT (WHERE APPLICABLE) ENGINEERING DESIGN AND CONSTRUCTION STANDARDS

These plans have been electronically approved for construction by the Town of Wake Forest Public Works and Engineering Department. This approval may not be edited once issued.

Public Works/Engineering

These plans have been electronically approved for construction by the Town of Wake Forest Planning Department. This approval may not be edited once issued.

Planning

FINAL DRAWING - RELEASED FOR CONSTRUCTION

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CONTACT

JEREMY FINCH
jfinch@mcadamsco.com
PHONE: 919. 361. 5000

CLIENT

TOWN OF WAKE FOREST
301 S. BROOKS STREET
WAKE FOREST, NC 27587-2901
Patrick Reidy
PHONE: 919. 435. 9510

PROJECT DIRECTORY

NORTH CAROLINA PROFESSIONAL SEAL 031452 ENGINEER JEREMY V. FINCH

Jeremy V Finch

Digitally signed by Jeremy V Finch
DN: cn=Jeremy V Finch, o=US, o=North Carolina, email=jfinch@mcadamsco.com
Date: 2023.03.24 08:24:46 -04'00'

REVISIONS

NO.	DATE
1	
2	
3	
4	
5	
6	

CONSTRUCTION DRAWINGS FOR:
TOWN OF WAKE FOREST SOUTH FRANKLIN STREET IMPROVEMENTS
0 SOUTH FRANKLIN STREET
WAKE FOREST, NORTH CAROLINA
PROJECT NUMBER: RAP-19000

X:\Projects\RAP\RAP-19000\04-Production\Engineering\Construction Drawings\Current Drawings\South Franklin Offsite\RAP19000-SF-CS1.dwg, 3/24/2023 7:18:28 AM, Dwayne Peterson

EXHIBIT B-1

The Costs Estimate

See attached.

EXHIBIT B-1 - THE COST ESTIMATE (ACTUAL COST TO BE DETERMINED AT BIDDING)

S. FRANKLIN STREET
ROADWORK
9/14/2023

ROW LENGTH	
RP HV LS	TOWF
2630 LF	3380 LF
43.76%	56.24%

	INITIAL BUDGET			
ITEM	**TOTAL**	**RP HV LAKESIDE**	**TOWN OF WF**	**NOTES**
SITEWORK CONTRACTOR				
General Conditions	$ 225,000	$ 98,460	$ 126,540	
Clearing & Grubbing	$ 93,000	$ 40,697	$ 52,303	
Erosion Control	$ 119,209	$ 52,166	$ 67,043	
Grading & Earthwork	$ 651,228	$ 284,977	$ 366,250	
Storm Drainage	$ 615,665	$ 269,415	$ 346,250	
Roadwork	$ 1,328,858	$ 581,508	$ 747,349	
Road Signs	$ 20,000	$ 8,752	$ 11,248	
Flatwork	$ 323,120	$ 141,397	$ 181,723	
Traffic Control	$ 450,000	$ 196,920	$ 253,080	
Change Orders	$ -	$ -	$ -	
Sitework Contractor Total	**$ 3,826,079**	**$ 1,674,292**	**$ 2,151,787**	
OTHER SCOPE & ALLOWANCES	**TOTAL**	**RP HV LAKESIDE**	**TOWN OF WF**	**NOTES**
Rock & Unsuitable Allowance	$ 20,000	$ 8,752	$ 11,248	Allowance
Landscaping	$ 80,000	$ 35,008	$ 44,992	Allowance
OTHER SCOPE TOTAL	**$ 100,000**	**$ 43,760**	**$ 56,240**	
PROFESSIONAL SERVICES	**TOTAL**	**RP HV LAKESIDE**	**TOWN OF WF**	**NOTES**
McAdams Construction Services	$ 62,150	$ 27,197	$ 34,953	
CMT	$ 10,000	$ 4,376	$ 5,624	Allowance
NPDES Monitoring	$ 10,000	$ 4,376	$ 5,624	Allowance
Bond Fees	$ -	$ -	$ 50,000	Allowance
Professional Services Total	**$ 82,150**	**$ 35,949**	**$ 96,201**	
SUBTOTAL (1)	**$ 4,008,229**	**$ 1,754,001**	**$ 2,304,228**	

(1) Total cost share based on right of way frontage.

HERITAGE	**TOTAL**	**RP HV LAKESIDE**	**TOWN OF WF**	**NOTES**
Heritage Retaining Walls	$ 371,621	$ -	$ 371,621	
Heritage Retaining Wall Fence	$ 20,000	$ -	$ 20,000	400 Linear Feet
Heritage Retaining Wall Landscape	$ 50,000	$ -	$ 50,000	Allowance
	$ -	$ -	$ -	
Professional Services Total	**$ 441,621**	**$ -**	**$ 441,621**	
SUBTOTAL	**$ 4,449,850**	**$ 1,754,001**	**$ 2,745,849**	

CONTINGENCY (10%)	**$ 444,985**	**$ 175,400**	**$ 274,585**	
SITEWORK - SUBTOTAL	**$ 4,894,835**	**$ 1,929,401**	**$ 3,020,434**	

CONSTRUCTION MANAGEMENT (10%)	**$ 489,484**	**$ 192,940**	**$ 302,043**	
SITEWORK - TOTAL (2)	**$ 5,384,319**	**$ 2,122,341**	**$ 3,322,477**	

(2) Bid bond and public bidding process only required for the Town of Wake Forest portion of the improvements.

DESIGN	**TOTAL**	**RP HV LAKESIDE**	**TOWN OF WF**	**NOTES**
McAdams - Town Reimbursement	$ -	$ (172,332)	$ 172,332	Actual Cost Incurred
McAdams - Town Expense	$ 30,000	$ -	$ 30,000	Allowance to Finish with Heritage Residents
ADJUSTED SITEWORK - TOTAL	**$ 5,414,319**	**$ 1,950,009**	**$ 3,524,809**	

EXHIBIT B-2

The Prior Design Costs

See attached.

35.425

EXHIBIT B-2

** Town (Heritage) - $45,606.25
* Town (Cost Share - 56.24%) - $172,332.20
Town Total = $172,332.20

* Developer (Cost Share - 43.76%) - $98,604.68

MCADAMS

Scott Lay (2)
Reader & Partners, LLC
5850 T.G. Lee Blvd
Suite 200
Orlando, FL 32822

August 14, 2023
Project No: 00RAP19000.01
Invoice No: 142241

RP Lake

Invoice Total **$4,673.75**

NC013
35.425
4563.73

Project Manager Jeremy Finch

Project 00RAP19000.01 Holding Village - SF

email: marlene@readercommunities.com ; scott@readercommunities.com

Professional Services from July 01, 2023 to July 31, 2023

Phase 001 Professional Services

Fee

Description	Fee	Percent Comp.	Total Billed		Prior Billed	Current Fee Billing
B2.41 S. Franklin St Topographic Survey	0.00	0.00	30,432.50	*	30,432.50	0.00
J3.40 S. Franklin St Design	0.00	0.00	138,693.75	*	136,463.75	2,230.00
B2.30 SUE	0.00	0.00	25,051.25	*	25,051.25	0.00
J3.41 Heritage Exhibits + Coordination	0.00	0.00	39,282.50	**	36,948.75	2,333.75
J4.10 NCDOT Culvert Analysis	0.00	0.00	8,638.75	*	8,638.75	0.00
J2.10 Add'l Heritage Lots Backyard Surve	0.00	0.00	8,657.50	**	8,657.50	0.00
D14.10 Traffic Control Plan Sheet & NCDO	8,500.00	100.00	8,500.00	*	8,500.00	0.00
L4.40 Stream/Wetland/Buffer Delineation & Impact Permitting	0.00	0.00	14,014.38	*	14,014.38	0.00
Total Fee	8,500.00		273,270.63		268,706.88	4,563.75

Total Fee 4,563.75

Total this Phase **$4,563.75**

Phase 999 Reimbursables

Reimbursable Expenses

Submittal Fees

6/2/2023	Finch, Jeremy	Town Of Wake Forest Custo	110.00	
	Total Reimbursables		**110.00**	**110.00**

Total this Phase **$110.00**

Thank you for your business!

Project	00RAP19000.01	Holding Village - SF	Invoice	142241
			Total this Invoice	**$4,673.75**

Outstanding Invoices

Number	Date	Balance
140964	7/14/2023	1,522.50
Total		**1,522.50**

	Current	Prior	Total
Billings to Date	**4,673.75**	**268,706.88**	**273,380.63**

TOWN OF WAKE FOREST
CAPITAL IMPROVEMENTS PROGRAM
CIP UPDATE FY 2023-2028

DEPARTMENT	PROJECT MANAGER	DEPARTMENTAL PRIORITY
GTP	Joe Guckavan	High

PROJECT TITLE
S. Franklin ST. Expansion

	TYPE OF PROJECT
	1 -Health/Safety/Welfare
	2 - Maintenance/Replacement
	3 - Existing Programs Expansion
X	4 - New Program

PROJECT DESCRIPTION
Widen S. Franklin St to increase LOS to accommodate increased traffic. The project includes widening the road from two lanes to 4 lanes with a median, sidewalk on both sides, and landscaping.

JUSTIFICATION
S. Franklin St connects the new development Holding Village to Rogers Rd. This expansion would provide an increased LOS to help relieve traffic congestion, and accommodate the new development in that area. This is consistent with the CTP. The TIA for Holding Village requires they contribute to the expansion to accommodate the additional traffic generated. This project is through a private/public partnership and will be constructed by a private developer.



PROJECT ALTERNATIVES
Construct as a Town Project at a higher cost.

OPERATING IMPACT/OTHER COMMENTS
Reimbursement over three years.

PROJECT STATUS New Project - FY 2024

Funds Approved to Date $ -

Funds Expended to Date $ -

CAPITAL COST BREAKDOWN	Prior to July 2023	2023-24	2024-25	2025-26	2026-27	2027-28	Future Years
Planning & Engineering	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Purchase	-	-	-	-	-	-	-
Construction	-	900,000	900,000	900,000	-	-	-
Equipment	-	-	-	-	-	-	-
Contingency	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Total Project Costs	$ -	$ 900,000	$ 900,000	$ 900,000	$ -	$ -	$ 2,700,000

FUNDING SOURCE(S)	Prior to July 2023	2023-24	2024-25	2025-26	2026-27	2027-28	Future Years
General Fund	$ -	$ 900,000	$ 900,000	$ 900,000	$ -	$ -	$ -
Other (PILOT) - Fee In-Lieu Payment	-	-	-	-	-	-	-
Total Funding Sources	$ -	$ 900,000	$ 900,000	$ 900,000	$ -	$ -	$ -

TOTAL PROJECT COST: **$ 2,700,000**

S. Franklin Expansion

PRESENTED BY

Joe Guckavan , PE

Director of Engineering

TOWN *of*
WAKE FOREST

South Franklin Expansion

S FRANKLIN ST EXISTING OVERALL SITE PLAN

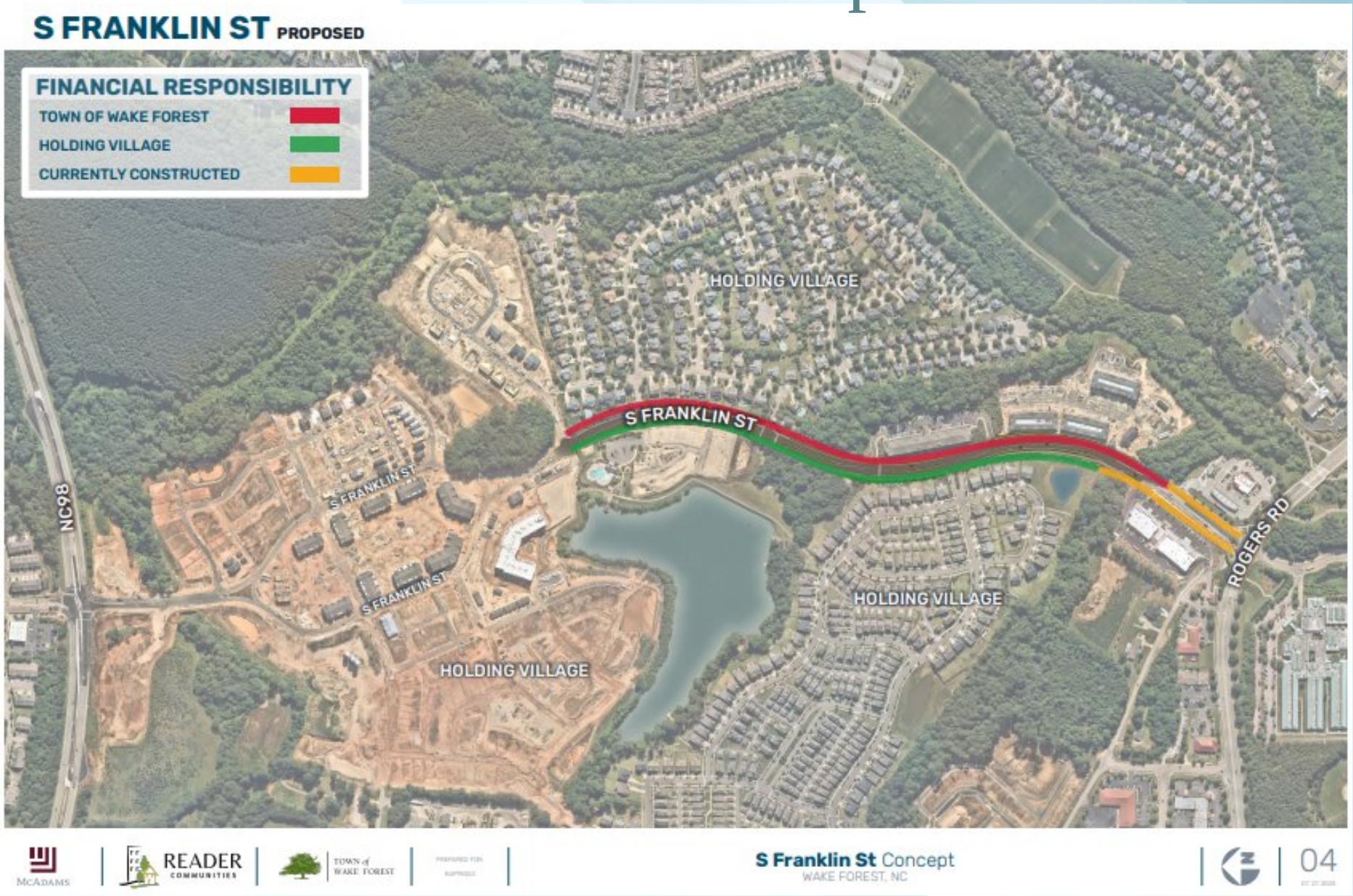


McADAMS | READER COMMUNITIES | TOWN of WAKE FOREST | PREPARED FOR: RAP19000

S Franklin St Concept
WAKE FOREST, NC

01
07.27.2023

South Franklin Expansion



South Franklin Expansion



South Franklin Expansion



South Franklin Expansion Initial Estimate

S. Franklin Street Expansion Cost Estimate Summary
(see Exhibit B-1 in the Developer's Agreement for a more detailed Cost estimate)

	Total	RP HV Lakeside	Town of WF
Site Contractor Work	$ 3,826,079.00	$ 1,674,292.00	$ 2,151,787.00
Other Scope and Allowances	$ 100,000.00	$ 43,760.00	$ 56,240.00
Professional Services	$ 82,150.00	$ 35,949.00	$ 96,201.00
Heritage Retaining wall, fence, landscape	$ 441,621.00	$ -	$ 441,621.00
Contingency	$ 444,985.00	$ 175,400.00	$ 274,585.00
Construction Management	$ 489,484.00	$ 192,940.00	$ 302,043.00
Design	$ 30,000.00	$ (172,332.00)	$ 202,332.00
Adjusted Sitework Total	$ 5,414,319.00	$ 1,950,009.00	$ 3,524,809.00



TOWN *of* WAKE FOREST

Questions?

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-266-
Submitted by: Aileen J. Staples
Submitting Department: Finance
Meeting Date: October 3, 2023

SUBJECT
August Financial Summaries

Recommendation:

Item Summary:

ATTACHMENTS
- Monthly Financial Report_summary.pdf
- August 31, 2023 Financial Summaries.pdf

Agenda Item: Monthly Financial Report

Summary: Staff prepares monthly financial reports for each of the respective operating funds for which an annual budget is authorized by the Board of Commissioners. The reports are accompanied by highlights during respective month for each fund.

Attachments: Financial reports

Town of Wake Forest
August 31, 2023

GENERAL FUND HIGHLIGHTS:

- Total year-to-date revenues are at 6.27% of annual budgeted amounts.
- Ad valorem taxes represent over 50% of the general fund revenues – they are due September 1. Penalties and interest do not accrue until January 2024. Majority of this revenue source comes in towards the end of December and before January 6.
- Unrestricted intergovernmental revenues (sales and utility franchise tax) represent over 20% of general fund revenues. The first distribution of these revenues will be received in mid-October.
- Other financing sources include installment purchase proceeds, interfund transfers and appropriated fund balance – reflective later in the fiscal year.
- Total year-to-date expenditures are at 21.06% of appropriations (includes encumbrances).
    - Departments that are above the guideline results from blanket purchase orders that are issued in July for services that cover the fiscal year, purchase orders carried forward (items not received in FY 23) and capital equipment being ordered earlier due to delayed delivery times.
    - Risk Management (431) – Worker's compensation, property and liability insurance invoices paid early in fiscal year.
- Net increase YTD (*decrease* fund balance) is ***$5.8 million.***
    - Typical for General Fund to operate at a deficit first few months of the fiscal year due to timing of property tax collections and receipt of sale tax revenues.

DEBT SERVICE FUND HIGHLIGHTS:

- $170,064 in debt service payments made in August.
- Net increase YTD *(increase* in fund balance) is ***$781,776.***

WF BIP:

- Other financing sources represents transfer from General Fund.
- Expenditures are below expected guideline (16.7%).

DMSD HIGHLIGHTS:

- Majority of DMSD tax revenue will come in December and early January.
- Transfers out to Debt Service and General Fund will occur later in the fiscal year.

WFRC HIGHLIGHTS:

- Expenditures are at 14.96% which is below the guideline (16.7%).
- Other financing sources represents transfer from General Fund for personnel costs.

August 31, 2023 - Financial Summaries – page 2

ELECTRIC FUND HIGHLIGHTS:

- Total year-to-date revenues are at 19.93% of budgeted amounts.
- Total expenses are at 44.05% (includes encumbrances) – without inventory encumbrance – 11.6%.
    - Purchase for resale – power for August **($1,296,691)** is paid in September and not reflected in the attached.
    - Purchase order for $4,383,350 was issued in April 2022 per bids received for transformers (inventory) – expected to arrive in early **2024**.
        - Purchases for inventory are accounted for on a cash basis during the fiscal year then reconciled to the balance sheet at year end.
        - Purchase orders for transformers carried forward from FY 22 and FY 23.
        - Shipment of transformers expected to arrive in October.
- Net gain YTD is ***$2,088,296.***
    - Please note that the margin is higher than August 2022 comparatively speaking.

Rate adjustments approved on March 21, 2023, with respective effective dates of April 1, 2023, and September 1, 2023.

AMERICAN RESCUE PLAN ACT (ARPA):

- Report is a “life to date” (LTD) meaning everything reported is cumulative from the beginning – July 2021.
- Due to reporting and accounting requirements, funds received to date are shown as “deferred revenue” and is recorded as revenue as we incur expenditures over the next few years. For monthly reporting purposes, it is shown that all funds have been received.

GENERAL FUND

August 31, 2023

Monthly Target Percentage 16.67%

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
REVENUES						
Ad Valorem Taxes	$ 38,078,440	$ 3,242,942	-	$ 34,835,498	8.52%	$ 3,140,355
Other Taxes	55,000	4,862	-	50,138	8.84%	4,389
Unrestricted Intergovernmental	18,435,300	-	-	18,435,300	0.00%	-
Restricted Governmental	2,297,540	476,544	-	1,820,996	20.74%	400,019
Permits and Fees	2,514,750	477,453	-	2,037,297	18.99%	525,350
Other Revenue	1,903,470	192,137	-	1,711,334	10.09%	162,669
Sales and Services	5,096,750	263,295	-	4,833,455	5.17%	222,820
Investment Earnings	650,000	132,232	-	517,768	20.34%	59,624
Other Financing Sources	7,659,660	19,317	-	7,640,343	0.25%	-
General Fund Total	$ 76,690,910	4,808,782	-	71,882,128	6.27%	$ 4,515,225

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
EXPENDITURES						
410 Board of Commissioners	$ 417,500	$ 69,233	$ -	$ 348,267	16.58%	$ 128,157
412 Legal Services	396,200	43,625	-	352,575	-	45,320
420 Town Manager's Office	895,650	105,880	20,750	769,020	14.14%	103,886
421 Town Clerk	250,500	33,210	-	217,290	13.26%	-
422 Organizational Performance	474,180	64,606	-	409,574	13.62%	-
423 Budget Management	232,785	17,149	-	215,636	7.37%	-
425 Communications	1,288,400	140,698	172,668	975,034	24.32%	179,824
430 Human Resources	1,162,910	225,080	23,968	913,863	21.42%	147,512
431 Risk Management	467,730	275,439	-	192,291	58.89%	-
435 Downtown Development	510,500	83,937	-	426,563	16.44%	76,307
440 Financial Services	1,275,635	91,311	1,275	1,183,049	7.26%	226,941
445 Information Technology	2,281,575	419,127	177,139	1,685,310	26.13%	276,060
480 Inspections	2,408,475	309,419	-	2,099,056	12.85%	264,402
490 Planning	4,265,250	351,527	951,914	2,961,810	30.56%	148,442
500 Public Facilities	3,082,000	434,956	879,129	1,767,915	42.64%	326,534
510 Police	16,328,175	2,488,706	627,889	13,211,580	19.09%	1,977,990
520 Fire	12,668,250	1,668,148	356,727	10,643,375	15.98%	1,609,426
530 Public Works Administration	313,115	53,184	-	259,931	16.99%	36,372
535 Urban Forestry	529,400	61,129	-	468,271	11.55%	53,422
540 Engineering	1,697,290	157,795	253,936	1,285,559	24.26%	175,941
545 Stormwater Management	796,560	66,963	3,350	726,247	8.83%	-
550 Fleet Maintenance	651,295	81,101	5,075	565,119	13.23%	62,619
560 Streets	3,901,430	417,358	813,148	2,670,924	31.54%	321,302
580 Solid Waste	5,985,500	183,345	-	5,802,155	3.06%	145,666
620 Parks and Recreation	6,208,965	735,202	1,286,024	4,187,739	32.55%	640,860
999 Transfers	8,201,640	2,000,412	-	6,201,228	24.39%	1,173,318
General Fund Total	$ 76,690,910	10,578,540	5,572,990	60,539,380	21.06%	$ 8,120,299

General Fund - Net Gain (Loss)	***$ (5,769,758)***	***$ (3,605,074)***

Debt Service Fund
August 31, 2023

Monthly Target Percentage 16.67%

Department	Amended Budget	YTD Actual	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
REVENUES					
Restricted Governmental	$ 1,290,595	-	1,290,595	0.00%	-
Permits and Fees	707,610	68,792	638,818	0.00%	59,724
Investment Earnings	30,520	2,896	27,624	0.00%	810
Other Financing Sources	6,078,775	1,503,444	4,575,331	24.73%	852,888
General Fund Total	**$ 8,107,500**	**1,575,132**	**6,532,368**	**19.43%**	**$ 913,422**

Department	Amended Budget	YTD Actual	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
EXPENDITURES					
440 Financial Services	$ 762,870	$ -	$ 762,870	$ -	$ -
445 Information Technology	397,135	196,009	201,126	49.36%	199,884
480 Building Inspections	54,455	47,397	7,058	87.04%	48,605
490 Planning	12,595	-	12,595	0.00%	-
500 Public Facilities	617,190	322,172	295,018	52.20%	291,292
510 Police	673,215	70,549	602,666	10.48%	-
520 Fire	290,355	134,543	155,812	46.34%	134,543
535 Urban Forestry Division	8,555	-	8,555	0.00%	-
540 Engineering	6,985	-	6,985	0.00%	-
550 Fleet Maintenance	20,715	-	20,715	0.00%	-
560 Streets	1,620,525	11,813	1,608,712	0.73%	13,618
570 Powell Bill	1,522,590	-	1,522,590	0.00%	-
580 Solid Waste	235,605	-	235,605	0.00%	-
620 Parks and Recreation	1,884,710	10,874	1,873,836	0.58%	12,543
General Fund Total	**$ 8,107,500**	**793,357**	**7,314,143**	**9.79%**	**$ 700,484**
Debt Service Fund - Net Gain (Loss)		***$ 781,776***			***$ 212,938***

DMSD Special Revenue Fund
August 31, 2023

Monthly Target Percentage 16.67%

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
REVENUES						
Ad Valorem Taxes	$ 155,570	$ 9,288	-	$ 146,282	5.97%	$ 20,961
Investment Earnings	9,430	1,705	-	7,725	18.08%	730
Other Financing Sources	-	-	-	-	0.00%	-
DMSD Special Revenue Fund Total	**$ 165,000**	**10,993**	**-**	**154,007**	**6.66%**	**$ 21,691**

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
EXPENDITURES						
Transfers In (Out)	$ 165,000	$ -	$ -	$ 165,000	0.00%	$ -
DMSD Special Revenue Fund Total	**$ 165,000**	**-**	**-**	**165,000**	**0.00%**	**$ -**

Downtown District - Net Gain (Loss) ***10,993*** ***21,691***

Wake Forest Renaissance Centre
August 31, 2023

Monthly Target Percentage 16.67%

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
REVENUES						
Sales and Services	$ 249,710	$ 29,897	$ -	$ 219,813	11.97%	$ 15,784
Other Revenue	140,700	35,870	-	104,830	25.49%	13,560
Other Financing Sources	757,785	180,946	-	576,839	23.88%	34,086
WFRC Fund Total	**$ 1,148,195**	**246,713**	**-**	**901,482**	**21.49%**	**$ 63,431**

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
EXPENDITURES						
626 Wake Forest Renaissance Centre	$ 1,148,195	$ 161,829	$ 9,908	$ 976,458	14.96%	$ 57,787
WFRC Fund Total	**$ 1,148,195**	**161,829**	**9,908**	**976,458**	**14.96%**	**$ 57,787**

WFRC Fund - Net Gain (Loss)	***$ 84,884***	***$ 5,644***

Wake Forest Business and Industry Partnership Fund (BIP) **Monthly Target Percentage** 16.67%

August 31, 2023

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
REVENUES						
Sales and Services	$ -	$ -	$ -	$ -	0.00%	$ -
Other Revenue	2,500	-	-	2,500	0.00%	-
Other Financing Sources	550,700	118,800	-	431,900	21.57%	60,878
WFRC Fund Total	**$ 553,200**	**118,800**	**-**	**434,400**	**21.48%**	**$ 60,878**

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
EXPENDITURES						
415 Economic Development	$ 553,200	$ 38,135	$ -	$ 515,065	6.89%	$ (1,588)
WFRC Fund Total	**$ 553,200**	**38,135**	**-**	**515,065**	**6.89%**	**$ (1,588)**

WFBIP Fund - Net Gain (Loss)	***$ 80,665***	***$ 62,465***

WAKE FOREST POWER (ELECTRIC FUND)

August 31, 2023

Monthly Target Percentage 16.67%

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
REVENUES						
Charges for Services	$ 22,616,900	$ 4,631,015	-	$ 17,985,885	20.48%	$ 4,175,589
Sales Tax - Utility	1,567,350	321,997	-	1,245,353	20.54%	290,247
Other Revenue	287,500	38,207	-	249,293	13.29%	86,868
Investment Earnings	31,250	8,275	-	22,975	26.48%	5,463
Other Financing Sources	582,000	-	-	582,000	0.00%	-
Electric Fund Total	**$ 25,085,000**	**4,999,494**	**-**	**20,085,506**	**19.93%**	**$ 4,558,167**

Department	Amended Budget	YTD Actual	Encumbrances	Remaining Budget (including encumbrances)	% Budget Used (includes encumbrances)	PY YTD Actuals
EXPENDITURES						
840 Electric - Billing & Collections	$ 575,820	$ 52,596	$ -	$ 523,224	9.13%	$ -
850 Electric - Operations	$ 23,890,635	2,810,891	8,131,433	12,948,311	45.80%	2,797,769
860 Electric - Tree Trimming	618,545	47,711	7,756	563,078	8.97%	70,031
Electric Fund Total	**$ 25,085,000**	**2,911,198**	**8,139,189**	**14,034,614**	**44.05%**	**$ 2,867,800**
Electric Fund - Net Gain (Loss)	$ -	***2,088,296***				***1,690,367***

AMERICAN RESCUE PLAN ACT (ARPA)
8/31/2023 (Cumulative - Life to Date)

Monthly Target Percentage N/A

N/A

Department	Amended Budget	LTD Actual	Encumbrances	Remaining Budget	% Budget Used	PY YTD Actuals
REVENUES						
Restricted Governmental	$ 14,541,000	14,541,846	-	(846)	100.01%	-
Investment Earnings	-	411,053	-	(411,053)	0.00%	-
Other Financing Sources	-	-	-	-	0.00%	-
General Fund Total	$ 14,541,000	14,952,898	-	(411,898)	102.83%	$ -

Department	Amended Budget	LTD Actual	Encumbrances	Remaining Budget	% Budget Used	PY YTD Actuals
EXPENDITURES						
445 Information Technology	$ 1,030,000	$ 166,780	$ -	$ 863,220	16.19%	$ -
525 Public Safety (ARPA)	2,800,000	1,284,047	1,859,360	(343,407)	112.26%	-
540 Engineering	6,325,000	346,992	585,461	5,392,547	14.74%	-
638 Other Improvements	4,386,000	1,851,041	596,646	1,938,313	55.81%	-
General Fund Total	$ 14,541,000	3,648,861	3,041,466	7,850,673	46.01%	$ -
ARPA Fund - Net Gain (Loss)		***$ 11,304,038***				***$ -***

Board of Commissioners Work Session Agenda Item Report

Agenda Item No.: 2023-270-
Submitted by: Terry Savary
Submitting Department: Administration
Meeting Date: October 3, 2023

SUBJECT
Review of Draft Agenda for Upcoming Regular Meeting

Recommendation:

Item Summary:

ATTACHMENTS
- DraftBOCAgenda_Oct202317.pdf

Wake Forest Board of Commissioners
Draft Meeting Agenda
October 17, 2023 at 6:00 PM
All items listed are for discussion and possible action.

Call to Order

Pledge of Allegiance

1.Approval of Agenda

2.Approval of Minutes

2.A. September 5, 2023 Work Session
September 19, 2023 Regular Meeting

3.Presentations

3.A. Proclamation Recognizing November 2023 as "Native American Heritage Month"

3.B. Introduction of Candidates for the Board of Adjustment and Planning Board

4.Public hearings / Public Comment

4.A. Public Hearing on LEGISLATIVE CASE RZ-20-05-01,Fuller Capital Boulevard Property, a rezoning map amendment filed by Red Line Engineering to rezone 29.367 acres located at 4925 Unicon Drive, 4975 Unicon Drive, and 10200 Capital Blvd (portion), being Wake County Tax PINs 1739-51-8319, 1739-61-2717, 1739-51-4482 (portion) from Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) to Light Industrial Conditional District (LI-CD).

4.B. Public Hearing on LEGISLATIVE CASE RZ-23-05, 2117 Averette Road, a rezoning map amendment filed by Douglas and Sarah Machado to rezone 2.822 acres located at 2117 Averette Road, being Wake County Tax PIN 1851-90-8235, from Wake County's Residential-30 (R-30) to General Residential 5 (GR5).

4.C. Public Hearing on LEGISLATIVE CASE RZ-21-08, Joyner Property, a rezoning filed by McAdams Company to rezone 124.68 acres located at 1180 and 1200 (portion) Club Villas Dr, being Wake County Tax PINs 1841091336 and 1831895139 (portion) from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special

Highway Overlay (SH1-O) to General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O). (*While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.)

4.D. Public Hearing to receive public comment on the Installment Financing (160A-20) of Street Resurfacing project

4.E. Public Hearing to receive public input on capital needs for inclusion in the five-year Capital Improvements Plan (CIP) update for FY 2024-2029

4.F. Public Hearing on Fire Impact Fee Update

4.G. Public hearing on a petition requesting annexation submitted by Douglas and Sarah Machado for property associated with the rezoning request RZ-23-03, located at 2117 Averette Road being Wake County PIN 1851-90-8235 being approximately 2.822 acres.

5.Consent Agenda

(A Consent Agenda is a group of items passed with a single motion and vote. These matters are of a generally routine nature. No debate is allowable on any item included on the Consent Agenda. If a Commissioner or any citizen of Wake Forest or its ETJ wants separate consideration of any item, it may be removed from the Consent Agenda by request.)

5.A. Approval of a resolution to schedule the public hearing and certify the sufficiency for a petition requesting annexation submitted by McAdams Company C/O Bill Andrews for property associated with the rezoning request RZ-22-07, located at 12621 and 12631 Capital Blvd being Wake County PINs 1831-85-3681 and 1831-85-5861 being approximately 5.54 acres.

5.B. Approval of authorizing the Town Manager to enter into agreement for the Streets Resurfacing Project FY24

5.C. Town Approval of the UNRBA Consensus Principles

5.D. Approval of Resolution Authorizing Primary and Secondary Agents for NC Department of Public Safety (FEMA) relative to Smith Creek Reservoir Dam Mitigation Project (LPDM-PF-04-NC-2022-001)

5.E. APPROVAL OF MUNICIPAL INFRASTRUCTURE IMPROVEMENTS AT THE U-TURNS ON HWY 98 NEAR THE SOUTH FRANKLIN INTERSECTION.

5.F. APPROVAL OF MUNICIPAL INFRASTRUCTURE IMPROVEMENTS

5.G. Approval of a resolution for the Town Manager to enter into an agreement for the FY24 Streets Resurfacing Project.

5.H. Approval of a Resolution Accepting a Downtown Revitalization Grant from Electricities of North Carolina

6.Legislative Items

6.A. Appointment of Candidates for the Board of Adjustment and Planning Board

7.Planning Items

7.A. Consideration of a petition requesting annexation submitted by Douglas and Sarah Machado for property associated with the rezoning request RZ-23-03, located at 2117 Averette Road being Wake County PIN 1851-90-8235 being approximately 2.822 acres.

7.B. Consideration of LEGISLATIVE CASE RZ-20-05-01,Fuller Capital Boulevard Property, a rezoning map amendment filed by Red Line Engineering to rezone 29.367 acres located at 4925 Unicon Drive, 4975 Unicon Drive, and 10200 Capital Blvd (portion), being Wake County Tax PINs 1739-51-8319, 1739-61-2717, 1739-51-4482 (portion) from Rural Holding District (RD) and Light Industrial Conditional District (LI-CD) to Light Industrial Conditional District (LI-CD).

7.C. Consideration of LEGISLATIVE CASE RZ-23-05, 2117 Averette Road, a rezoning map amendment filed by Douglas and Sarah Machado to rezone 2.822 acres located at 2117 Averette Road, being Wake County Tax PIN 1851-90-8235, from Wake County's Residential-30 (R-30) to General Residential 5 (GR5).

7.D. Consideration of LEGISLATIVE CASE RZ-21-08, Joyner Property, a rezoning filed by McAdams Company to rezone 124.68 acres located at 1180 and 1200 (portion) Club Villas Dr, being Wake County Tax PINs 1841091336 and 1831895139 (portion) from General Residential 3 Planned Unit Development* (GR3 PUD*); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O) to General Residential 10 Conditional District (GR10-CD); Falls Lake Watershed Protection Overlay (FL-WMA); and Special Highway Overlay (SH1-O). (*While these parcels are labeled as GR3 (PUD), the parcels are not subject to any PUD regulations as the PUD regulations were removed when SU-99-02-01 was approved. Due to the zoning map label, staff will refer to the current zoning as GR3 PUD until such time the official zoning map is amended to remove the PUD text.)

8.Administration and Financial Items

8.A. Consideration of a Resolution amending Fire Impact Fee Update

9.Public Services Items

10.Parks and Recreation Items

11.Public Safety Items

12.Other Business

12.A. Department Monthly Report

12.B. CIP Project Tracker

12.C. Strategic Plan

12.D. Wake County Tax Release

12.E. Commissioner Reports

13.Adjournment

APPENDIX B

TOWN OF WAKE FOREST, NORTH CAROLINA
SUPPLEMENTAL SERVICES AGREEMENT NO. [1]
TO THE MASTER SERVICE AGREEMENT FOR
ON-CALL PROFESSIONAL ENGINEERING SERVICES

SECTION I: PURPOSE

The purpose of this Supplemental Services Agreement (hereinafter "SSA") is for, AMT Engineering, the Consultant, to provide On-Call general engineering Professional Services, as assigned, in accordance with the Agreement titled, "TOWN OF WAKE FOREST, NORTH CAROLINA MASTER SERVICES AGREEMENT FOR ON-CALL PROFESSIONAL ENGINEERING SERVICES" between the Town and AMT Engineering, dated March 6, 2023 (hereinafter "Master Services Agreement" or "MSA").

SECTION II: SCOPE

Consultant will perform On-Call General engineering Professional Services on an as-needed basis upon receipt of request and assignment from the Town representative. The Consultant shall comply with all terms of the MSA, which agreement is incorporated into this SSA as if fully set forth verbatim herein. Duties will involve the scope of services outlined in Exhibit A.

Services to be provided include, but are not limited to the scope of services outlined in Exhibit A. Consultant and the Town will mutually determine at time of assignment of individual tasks the Consultant personnel to be assigned, schedule, and deliverables.

SECTION III: SCHEDULE

Consultant shall perform tasks as expeditiously as practical and in conformance with schedules developed at the time of assignment of individual tasks and agreed upon by the Town and Consultant.

SECTION IV: PERIOD OF SERVICE

This SSA shall be for a period of from August 28, 2023 to July 1, 2025.

SECTION V: COMPENSATION

Consultant shall perform the services detailed in the scope described in Section II above on the basis of the hourly rate schedule contained in the MSA or set fee for services and attached hereto.

Billing shall be on a monthly basis in conformance with Section VI of the MSA, and invoices for all compensation owed in accordance with this SSA shall be submitted to the Town with sufficient detail to process the invoice for payment and for a proper pre-audit and post-audit thereof in accordance with Town standards. The total amount billed to the Town under this Supplemental Service Agreement shall not exceed $167,984.74 nor shall the Consultant incur costs above $124,049.74 without the written permission of the Town.

SECTION VI: INSURANCE COVERAGE

Consultant shall provide insurance coverage as provided for in Section VII of the MSA.

SECTION VII: OTHER SPECIAL TERMS

The Town will provide the Consultant all pertinent information and data available to the Town and deemed necessary to perform assigned tasks.

SECTION VIII: PRE-AUDIT, if applicable

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

_____

(Signature of Finance Officer)
Town of Wake Forest
301 S. Brooks Street
Wake Forest, NC 27587

SECTION IX: CONTRACT MONITORING

Staff member responsible for monitoring the contract performance requirements is:

Name and Title: Chris Glass Senior Civil Engineer

Department Head Initials: _____

IN WITNESS WHEREOF, the Town of Wake Forest and the Consultant have caused this contract to be executed under seal by their respective duly authorized agents or officers.

TOWN OF WAKE FOREST:	CONSULTANT:
By: _____	By: _____
_____ Printed	_____ Printed
Witnessed by:	Witnessed by:
_____ Name	_____ Name
_____ Printed	_____ Printed
(SEAL)	(SEAL)

Exhibit A

SR 2049 (Forestville Road) at

Coach Lantern Avenue/Green Drake Drive

Signals/Signal Communications Scope of Services

July 14, 2023

General Description of Work

This project consists of all traffic signal work (warrant analysis, upgrades, and new installations) and intersection modification design work (**if required**) and wireless signal communication plans on the traffic signal project for SR 2049 (Forestville Road) from Coach Lantern Avenue/Green Drake Drive to SR 2051 (Burlington Mills Road).

The Town of Wake Forest (Town) has selected A. Morton Thomas and Associates (AMT) to conduct all design and analysis for this signal project.

Intersection modification design work and traffic signal design work shall be limited to the project intersection of SR 2049 (Forestville Road) and Coach Lantern Avenue/Green Drake Drive. Traffic signal interconnect design work will be limited to the corridor of SR 2049 (Forestville Road) between Coach Lantern Avenue/Green Drake Drive and SR 2045 (Burlington Mills Road). The work shall consist of the following elements:

Analysis including:

- **Task 1** -Conduct a Traffic Signal Warrant Analysis
  - Conduct turning movement counts for weekday (school in session)
  - Conduct turning movement counts for weekend (within school year)
  - Traffic Signal Warrant Analysis for the project intersection
  - Create Traffic Signal Warrant Analysis report for the project intersection
- **Task 2** -Create four alternatives for a Preliminary Pole Placement Analysis
  - Metal Strain Poles with optimal intersection reconfiguration
  - Mast Arms with optimal intersection reconfiguration
  - Wood Poles with optimal intersection reconfiguration
  - Maximum span configuration for future road widening

Plans, Special Provisions and Quantities including:

SIGNAL DESIGN:

- **Task 1** – Field Survey for Signal Plans:
  - Field survey trips to:
    - Check location of existing utilities, stormwater devices, and other roadway features
    - Survey locations for installation of new signal equipment
    - Validate and verify existing right-of-way and easements
    - Provide topography of existing site
- **Task 2** – Final Signal Designs with Electrical and Programming Details & Quantities for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive

- **Task 3** - Pedestrian Features on Final Signal Designs for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive
- **Task 4** – Metal Pole on Final Signal Designs for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive
- **Task 5** – Limited Intersection Modification Designs for:
  - SR 2049 (Forestville Road) at Coach Lantern Avenue/Green Drake Drive
- **Task 6** – General Design:
  - Title sheet
  - Summarize quantities
  - Special Provisions
- **Task 7** – Field Work/Meeting:
  - Field review – 1 trip for 2 people
  - Meetings for coordination, assume virtual meetings (when possible)
  - Preliminary Field Inspection (prior to R/W)
  - Final Field Inspection (prior to Let)
- **Task 8** – Miscellaneous Items:
  - Clearance Calculation figures and spreadsheet (part of signal design task 2)
  - Metal pole elevations and clearance calculations (part of signal design task 2)
  - Mast arm design (if required, part of signal design task 2)

SIGNAL COMMUNICATIONS:

- **Task 1** -Scoping:
  - Scoping Document
    - Use **Signal Communications** C**hecklist** below
  - Scoping meetings, discussions and coordination
- **Task 2** – CAD Design:
  - Basemap development
  - Transfer any existing plans to new basemap
- **Task 3** – Field Survey for UMR plans and Radio Signal Analysis:
  - Field Survey trips to:
    - Check location of existing communications and other ITS equipment
    - Survey locations for installation of new communications and ITS equipment
    - Preliminary utility data collection for UMR plans
    - Wireless Site Survey
    - Coordination with NCDOT Division 5 for bucket truck and field personnel for the Wireless Site Survey
- **Task 4** – UMR Plans (*if required)*:
  - First Draft UMR Plans
    - Tree diagrams for poles requiring UMR work
    - Existing heights above driveways and roadways
  - Coordinate with Utility Companies
    - Phone/email communications with Utility Companies
    - Provide preliminary UMR plans
    - Utility Walkthrough with all involved utilities

  - Draft UMR plans for DOT and utility company review
  - Final UMR Plans
-
- **Task 5** – Preliminary Design (Wireless):
  - Develop Preliminary Radio Plans for DOT review
  - Request up to date construction notes, common design practices and typical details
  - Address any comments with proper changes and quality control
- **Task 6** – Preliminary Specifications and Quantities:
  - Develop Preliminary Project Special Provisions for DOT review
    - Submit with preliminary radio plans
  - Develop Preliminary Quantities total for DOT review
    - Submit with final radio plans
- **Task 7** – Final Design – review and address NCDOT Comments
  - Develop Final Plans for NCDOT review
- **Task 8** – Final Submittal
  - Submit final sealed plan package to Town of Wake Forest
    - Include all plans sheets, special provisions and quantities

PUBLIC INVOLVEMENT:

- **Task 1** -Public Notice of Upcoming Signal Addition
  - Provide a public notice for release by the Town prior to submission of 75% design plans
- **Task 2** -Amend 75% Signal Plans based on Public Feedback
  - Provide a revision to 75% signal plans based off any public feedback the Town wishes to incorporate into the design

Design Considerations

The following are major **signal** design considerations for ***this*** project:

- The intersection will include **QFREE MAXTIME** controllers in **standard NCDOT 332** cabinets as listed on the NCDOT QPL.
- Final design will have all new equipment – poles, cabinets, detection, etc.
- Inductive loop detectors will be used for vehicle detection.
- The final intersection phasing will be determined after review of the preliminary pole location alternatives. Alternative phasing will be incorporated into the design if protected/permissive signal phasing is used. Split phasing will be omitted unless unavoidable.
- **MicroStation** will be used for the design of this project, using NCDOT CAD design standards.
- No signal preemption is intended for this signal
- The Town will determine pole material to be used after reviewing the preliminary pole placement alternatives

- Coordination with Division Utility Engineer is required for signal pole locations. Pole/Metal pole locations should be sent to the Division, **as soon as available**, for coordination with utilities.

- Pedestrian signal requirements will be provided for all legs of the intersection.

- High-visibility crosswalks will be used at signalized intersections on this project.

- Stopbar and crosswalk locations will be coordinated with the pavement marking designer. Signal designer is responsible for stopbar and crosswalk locations at signalized locations. Signal designer will provide turning simulations at all locations to validate stopbar and crosswalk locations.

- Roadway designer will be used for pavement markings and curb ramp updates.

- Roadway designer will be used to design modifications to existing nose of median on Coach Lantern Drive, if required.

- Water resources designer will be used for any necessary drainage improvements.
    - This scope only covers any required storm pipe rerouting of any, some, or all of the following existing drainage structures:
        - Approximately 180 LF pipe crossing the Coach Lantern Avenue approach
        - Approximately 90 LF pipe located in the NE quadrant of the intersection
        - Approximately 75 LF pipe crossing the SB Forestville Road approach
        - Approximately 30 LF pipe crossing the WB Green Drake Drive approach
    - Any additional required drainage work is outside the scope of this agreement.

- System detectors will be included in this design and used with the Wake Forest Signal System.

- AMT will directly transmit all submissions simultaneously to NCDOT Division 5 and NCDOT ITS/Signals.

- Town Staff will review all NCDOT submittal comments and provide a unified and consolidated feedback document listing NCDOT and Town comments to AMT between each submittal. Unless directed by NCDOT, AMT will not resubmit any submissions; instead, comments will be incorporated on the subsequent submittal.

- Resubmissions due to preferential design changes are outside the scope of this agreement.

Signal Communications Checklist:

The following are possible Signal Communications design considerations for ***this*** project

- Wireless Communications to tie into the Wake Forest Signal System as constructed under NCDOT TIP # U-6023 at the NCDOT signal # 05-1924 (SR 2049 at SR 2051)

- Interconnect *may* require installation of pole-mounted repeaters and antennas at key locations along Forestville Road.

- Ethernet Communications *may* be required

- Utility Make Ready (UMR) for the relocation of conflicting utilities or the installation of wireless signal interconnect equipment along SR 2049 (Forestville Road) *may* be necessary.

Work Standards

All work will be completed according to the standards established in the MUTCD, the NCDOT *Standard Specifications for Roads & Structures* and *Roadway Standard Drawings* (latest editions), the NCDOT Signals & Geometrics *Signal Design Manual*, and the "*Guidelines for the Preparation of ITS and Signal Plans by Private Engineering Firms*" located at https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals.aspx.

A database configuration file will be provided for the signal at this project location. The file will include all the necessary programming entries to achieve the desired operation of the Signal Design for the location. The file will be compatible with the local controller software that is being used and will be able to be downloaded directly to the controller unit without conversion.

Information and Services to be Provided by the Town (obtained from NCDOT)

1. Copies of all available signal file folder information and electronic (Microstation) for NCDOT Signal No. 05-1924 wherever available.
2. Copies of existing Communications Plans and Splice Diagrams (PDF and/or MicroStation) for NCDOT Signal No. 05-1924 wherever available.
3. Any known revisions to original plans for the existing system in this area.
4. Catalog cuts/existing equipment information for ITS/system equipment if available.

Schedule - Dates are calculated around the Plan Due Date (for NCDOT, this has typically been a week prior to the "Roadway Plans to Cont & Prop" date. For Centrally Managed projects this is typically 15 weeks prior to let. For Municipal or Division Managed projects, use their required date.)

Regular Scheduling		
Item	**Date**	**Weeks Prior to Plan Due Date**
Signal Warrant Analysis to Town	August 1, 2023	N/A
Preliminary Pole Location Sheet to Town	October 2, 2023	24
Town consolidates comments and sends to AMT	October 9, 2023	23
Public Notice to Town	October 16, 2023	22
75% Signal Plans, Communication Plans to NCDOT ITS/Signals (NO electrical details)	October 30, 2023	20
NCDOT ITS/Signals Returns Comments to Town	November 20, 2023	17
Town consolidates comments and sends to AMT	November 27, 2023	16
90% signals, electrical, comm. plans, PSP, and quantities to ITS & Signals	December 22, 2023	12
NCDOT ITS/Signals Returns Comments to Town	January 12, 2024	9
Town consolidates comments and sends to AMT	January 19, 2024	8
100% sealed PS&E submittal due to ITS & Signals	February 16, 2024	4
Plan Due Date to Town	**March 15, 2024**	0

Deliverables

1. Preliminary Pole Location Sheets
2. 75% unsealed signal plans, wireless communication plan
3. 90% unsealed traffic signal plans, electrical details with configuration file, and wireless communication plan
   - One (1) copy of clearance calculations, quantities, project special provisions, wireless communication plan, utility make-ready plans (if any), and autoturn sheets
4. 100% sealed traffic signal plans, electrical details with configuration file, wireless communication plan, utility make-ready plans (if any), and autoturn sheets
   - One (1) copy of clearance calculations, quantities, project special provisions (sealed) and autoturn sheets
5. Electronic project files – Electronically sealed, searchable PDFs. One PDF per plan sheet.
   - For Plan checking

Plans, Special Provisions and Quantities including:

Roadway Design:

A. Morton Thomas and Associates, Inc. (AMT) shall develop final plans and project special provisions in sufficient form and detail for the Town of Wake Forest (Town) to let construction contracts. All final designs for the Project shall conform to the following design specifications:

- NCDOTs *Roadway Design Manual*
- NCDOTs Roadway Standard Drawings
- NCDOTs Standard Specifications for Roads and Structures
- NCDOT's *Municipal / Developer Submittals Guidelines*
- NCDOT's *Guidelines for Drainage Study and Hydraulic Design*
- AASHTO's *A Policy on Geometric Design of Highways and Streets* (latest edition)
- FHWA'S *Manual on Uniform Traffic Control Devices* (latest edition)
- Town of Wake Forest's *Manual of Specifications, Standards & Design*

Plans shall be developed using MicroStation V8i and GEOPAK software. Final design plans shall include roadway and sidewalk design and details, construction traffic control plans, pavement marking plans, erosion control notes and details, and material quantities; and shall identify existing right-of-way, proposed right-of-way, and permanent, utility, and construction easements sufficient to encompass all improvements. The roadway plans will conform to the plan requirements described in NCDOT's *Municipal / Developer Submittal guidelines* so that if an encroachment permit with NCDOT is required, the plans will only require minimal, if any edits to submit to NCDOT.

AMT will coordinate with the Town for roadway plan reviews. A formal scoping meeting with NCDOT is not anticipated and is not included in this scope.

- **Task 1** – Preliminary Design (25% Plans):

Prior to developing preliminary design plans, AMT will develop conceptual level designs and evaluate alternatives regarding the transitions/taper from the existing typical section to the proposed typical section at both project termini points. The conceptual design will be sent to the Town for review. Redesign of the vertical and horizontal geometry, including pavement width, is not anticipated on Green Drake or Forestville Road. Widening and lane reconfigurations may be necessary on Coach Lantern.

All curb ramps and crosswalks within the project area will be upgraded/corrected to meet standards. The Preliminary Plans shall consist of roadway typical sections, plans, profiles and cross sections. The plans at this stage will represent approximately 25% of roadway design.

AMT shall prepare the preliminary roadway plans on plan and profile sheets at a scale of 1"=40' horizontal and 1"=4' vertical. AMT shall prepare preliminary cross sections at a scale of 1"=10' every 50' throughout the project area.

AMT shall prepare an Opinion of Probable Cost to be submitted to the Town along with the preliminary plans. After the Town has reviewed the plans and provided comments, AMT will revise the Preliminary Plans and resubmit.

Task 1 Schedule:
The roadway plans will follow the schedule laid out in the Signals and ITS scope of work. Preliminary Design Plans will be submitted for review on or before the Public Notice deliverable.

Task 1 Deliverables:

- Conceptual layout
- Preliminary Plans and Cross Sections (PDF)
- Opinion of Probable Cost (PDF/Excel)

- **Task 2** – Right of Way Plans (75% Plans):

All existing structures, utilities, proposed signal pole locations, and other items affected by the project shall be shown in addition to the proposed construction. The plans shall include horizontal geometrics, pavements, existing drainage layout, property lines, typical sections, traffic control plans, preliminary signing and pavement marking plans, preliminary signal design plans, erosion control notes and details, utility by other plans, and special details.

AMT shall prepare an Opinion of Probable Cost to be submitted to the Town along with the plans. After the Town has reviewed the plans and provided comments, AMT will revise the Plans and resubmit.

Task 2 Schedule:
The roadway plans will follow the schedule laid out in the Signals and ITS scope of work. Right of Way Plans will be submitted for review with the 90% Signal plans.

Task 2 Deliverables:

- 75% Roadway Plans and Cross Sections (PDF)
- Opinion of Probable Cost (PDF/Excel)

- **Task 3** – Final Roadway Design Plans (100% Plans)

Once the comments on the 75% plans have been addressed, AMT will compile Final Roadway Design Plans, Specifications, and Estimate (PS&E) package. Items include standard drawings, general notes, special provisions, and relevant summary plan sheet summaries. Before sealing, AMT will submit the plans (approximately 90% final construction plans) to the Town for their final review. Once all comments have been addressed the plans will be sealed and submitted with the final PS&E package.

Task 3 Schedule:
The roadway plans will follow the schedule laid out in the Signals and ITS scope of work. 90% Final construction plans will be submitted for review with the 100% Signal plans. If any comments occur, AMT will address them, seal the plans and submit the PS&E package.

Task 3 Deliverables:

- Unsealed plans for final review
- Sealed Roadway Plans and Cross Sections (PDF)
- Final Construction Quantities
- Special Provisions
- Opinion of Probable Cost (PDF/Excel)

Pavement Markings:

- **Task 4** – Initiate Signing & Delineation Design

AMT will develop a delineation design based on the Preliminary Design Plans. Pavement delineations will be in accordance with Manual of Uniform Traffic Control Devices (MUTCD), NCDOT Roadway Standard Drawings, and NCDOT Signing and Delineation Manual. Design plans will include existing signage inventory sheet and an attempt to re-use or modify the existing signage will be evaluated.

Task 4 Schedule:
The Initial Delineation Plans will follow the schedule laid out in the Signals and ITS scope of work and will be submitted with the 75% Signal Plans

Task 4 Deliverables:
- Initial Delineation Plans

- **Task 5** – Complete Delineation Design

After the comments from the preliminary pavement marking and signing plans are addressed, the signing and delineation design plans will be created. These will include quantity estimate for all signing and pavement marking items. Unsealed plans will be submitted for review. After comments from the unsealed plans are addressed, the plans will be sealed and submitted.

Task 5 Schedule:
The Unsealed Delineation Plans will follow the schedule laid out in the Signals and ITS scope of work and will be submitted with the 90% Signal Plans. If any comments occur, AMT will address them and submit the sealed Completed Delineation Plans with the Sealed Signal PS&E.

Task 5 Deliverables:
- Unsealed Delineation Plans
- Sealed Delineation Plans
- Project Special Provisions
- Quantities

Hydraulic Design and Erosion Control Plans:

- **Task 6** – Hydraulic Design

AMT will conduct field reconnaissance of existing and proposed drainage features and patterns associated with the project including storm drain systems, pipe crossings and ditches. It is assumed no Pre-Design meeting is required. S**ignificant redesign of the existing drainage conveyance systems is not anticipated.** Analysis of the existing drainage system will not occur unless impacted by the intersection improvement project.

If any drainage design is required, it will consist of designing proposed ditches and storm drain improvements necessary to accommodate the proposed intersection improvements. Design of structural BMP's such as detention ponds are not anticipated or included in this scope of work. A drainage report is not anticipated as a part of this scope.

Proposed drainage features will be included with all each roadway plan submittal. The Drainage plans, if required, shall include a title sheet, applicable details, notes and planimetric designs.

Task 6 Deliverables:
- Drainage Plan Sheets
- Project Special Provisions
- Quantities

- **Task 7** – Erosion Control

AMT does not anticipate more than 1 acre of disturbance with this scope of work. Should total land disturbance be more than one (1) acre, the Engineer, will submit erosion control plans to NCDEQ for review and approval. The Town will be responsible for signing and notarizing the NCDEQ Financial Responsibility Form and paying the required review fees for the project.

If the project disturbs more than one (1) acre, AMT will develop preliminary erosion control plans for the clearing and grubbing and intermediate/final grade phases to identify large erosion control features that will impact right-of-way and easement acquisitions. These features will be sized accordingly and included with the 75% roadway plan submittal. The design will specify erosion control measures, which minimize erosion and limit off-site sedimentation during construction of the Project.

Once the preliminary plans have been reviewed, AMT will incorporate the comments into the Final Erosion Control Plans. Erosion Control quantities and special provisions will be prepared based on the final plans.

Task 7 Deliverables:

- Erosion Plan Sheets
- Project Special Provisions
- Quantities

Scope of Services

Forestville Rd Intersection with Coach Lantern Ave. and Green Drake Dr. Intersection Improvements
Wake Forest
Wake County, NC

Phase 1 - Topographic Surveying, Mapping and Platting

Task includes the following activities:

- Perform property owner research on approximately 15parcels.
- Property owner notification letters.
- Survey Corridor shall be as shown on attached sketch
- NV5 will perform sufficient field surveys to delineate those existing property lines, rights-of-way and easements within the survey limits. Existing property lines will be mapped based on existing property monumentation in conjunction with recorded deeds and plats.
- Topographic surveys will be performed according to the requirements for a Class C Trigonometric Topographic Survey depicting one foot contour lines. The topographic survey will include existing conditions such as buildings, sidewalks, curb/gutter, paving, roadways, parking areas, drainage features, concrete slabs and fences within the survey limits. Visible utility structures, including fire hydrants, power poles, manholes, vaults, traffic signal cabinets, valves, etc., will be located on the survey. Corresponding top, bottom and invert elevations of storm and sanitary structures will also be recorded. Pipe sizes entering and exiting these structures will also be noted, where accurately attainable. Storm drainage and sanitary systems will be traced and located to one structure beyond the survey limits of the project. Other information that will be shown on the final deliverable includes location of flood plain and perimeter of wooded areas.
- Location and mapping of Level B SUE designation (See Phase 2).
- The survey will be horizontally tied to the North Carolina State Plane Coordinate System under the North American Datum of 1983 (NAD83). Vertically, the project will be tied to the North American Vertical Datum of 1988(NAVD88). The project's units will be the U.S. Survey Foot. Additionally, the survey will be performed based on the Rules of Standard Practice as outlined by the North Carolina Board of Registration for Engineers and Land Surveyors.

Phase 2 – Level B Subsurface Utility Designation

NV5, shall employ geophysical prospecting techniques to determine the existence and horizontal position of underground utilities within the project limits. The utilities will be marked on the ground using a universally recognized system of paint markings at 50 foot intervals along the utility and at all bends in the line. Non-metallic lines cannot be located using standard pipe and cable locating equipment. NV5 will however, attempt to locate these lines

using utility records and indirect methods such as ground penetrating radar (GPR). GPR technology complements standard electromagnetic techniques in the field. Allowing NV5 to detect all material types metallic and non-metallic, including plastics, concrete, ceramics, asphalt composites and more. NV5 cannot guarantee the accuracy of these locates and will not guarantee that all non-metallic lines can be located. Utilities buried in a common trench, or in close proximity to other utilities or metal structures, occasionally cannot be isolated. NV5 will, if possible attempt to isolate all lines. However, such isolation and location may not be possible or practicable and NV5 does not warrant or guarantee the location and/or isolation of the underground utilities designated during the investigation. This service does not include the location of stormwater or sanitary sewer (gravity). NV5 will provide a copy of digital field sketches of the appurtenances as well as utilities that were designated.

Deliverables:

Existing Conditions and Topographic survey in Microstation format.

DTM, DAT and TIN files in Microstation/Geopak format.

PDF copies of Deeds and Plats collected during the property research

Exclusions:

The following items are excluded from the Scope of Services:

- Right of way and Easement acquisition plats, exhibits or legal descriptions.
- Any other platting services not specifically included in the above scope of services.
- Any stakeout services.
- Determination of the presence or absence of hazardous chemicals, threatened and endangered species, or other issues not expressly described in the scope of work.
- Appearance before courts or boards on matters of litigation or hearings related to the project, unless expressly specified in the scope of the project.
- Expenses for overnight delivery services
- Vacuum Excavation

P22–0641 FORESTVILLE AT COACH LANTERN

SUE-160' wide within 200' of intersection on Forestville - 10' outside pavement for rest of survey limits.

60'
400'
200'
80'
80'
200'
80'
550'
60'

200 100 0 200 400

SCALE 1" = 200'

A. MORTON THOMAS AND ASSOCIATES, INC.
6131 FALLS OF NEUSE ROAD, SUITE 101 • RALEIGH, NC 27609
(919) 855-9989 • NC LICENSE NO. F-1049
WWW.AMTENGINEERING.COM

Fee Estimate
Project: Signal Installation at Forrestville/Coach Lantern
Firm: A Morton Thomas and Associates, Inc
Date: 8/8/23

LABOR

Task #	Description	Proposed Fee Type	Consultant Fee	Total Subconsultant Fee	Subconsultant
?	Survey			$66,119.74	NV5
1.0	Traffic Signal Warrant Analysis and Preliminary Pole Analysis		$ 7,335.00		
2.0	Traffic Signal Design		$ 30,990.00		
3.0	Final Roadway Design Plans - see Tasks 7.0 through 13.0 (if required)		$ -		
4.0	Signal Communications Plans		$ 19,605.00		
5.0	UMR Plans (if required)		$ 9,340.00		
6.0	Public Involvement		$ 1,470.00		
7.0	Preliminary Design (25% Plans) (if required)		$ 3,802.50		
8.0	Right of Way Plans (75% Plans) (if required)		$ 7,807.50		
9.0	Final Roadway Design Plans (100 % Plans) (if required)		$ 5,935.00		
10.0	Initiate Signing & Delineation Design (if required)		$ 3,335.00		
11.0	Complete Delineation Design (if required)		$ 1,875.00		
12.0	Hydraulic Design (if required)		$ 3,985.00		
13.0	Erosion Control Plans (if required)		$ 4,385.00		
		Subtotal	$ 99,865.00	$ 66,119.74	

EXPENSES

			Consultant	Subs
	REIMBURSEABLE EXPENSES		$2,000.00	
		Subtotal	$ 2,000.00	$ -

LABOR & EXPENSES TOTAL $ 167,984.74

ADDITIONAL SERVICES

				$ -

TOTAL $ 167,984.74

Contractor/Vendor Name: A. Morton Thomas and Associates

Vendor Number: 5746

Contract type: Consulting

Description / Scope of Work: Planning Signal location based on the CTP and providing construction documents for the signal design

Contract Amount: 167984.74

RFP/RFQ #:

Contractor signature:

E-SIGNED by Samuel Macdonald on 2023-09-07 18:33:42 GMT

Date: September 07, 2023

Finance Department signature:

Date:

Town Manager signature:

Date:

Attested By:

Date:

TOWN OF WAKE FOREST INCORPORATED SEAL FEB. 20, 1909 NORTH CAROLINA

This instrument has been pre-audited in a manner required by the Local Government Budget and Fiscal Control Act.

DocuSign Envelope ID: F344A97A-4AA5-49F3-98FB-C6DE7EB664CD

TOWN of WAKE FOREST

Planning Department
Wake Forest Town Hall – 3rd Floor
301 S. Brooks Street
Wake Forest, NC 27587
t 919.435.9510
f 919.435.9539
www.wakeforestnc.gov

CONTIGUOUS ANNEXATION PETITION APPLICATION

(Last updated: July 2013)

Submittal Date: _____

To the Board of Commissioners of the Town of Wake Forest:

I/we the undersigned owner(s) of real property respectfully request that the area described in the paragraph below and as shown in the attached survey map of the property be annexed into the Town of Wake Forest.

The area to be annexed is contiguous to the Town of Wake Forest corporate limits and the boundaries of such territory are as follows *(attach or insert below a metes & bounds description with a matching survey map)*:

See attached map and description.

Note: If ownership is a corporation or partnership, please provide such name and the name and signature of the person authorized to sign on behalf of the corporation or partnership. If in joint ownership, please provide names and signatures of ALL owners.

Name	Address	Signature	Date
Morris Wake Forest LLC	0, 1159, 1161, and 1163 N MAIN ST WAKE FOREST NC 2758	DocuSigned by: W. Kyle Graves 8B3B39201B7E4E8...	8/9/2023
Name	Address	Signature	Date
Name	Address	Signature	Date
Name	Address	Signature	Date

For additional information or assistance, please call the Planning Department at (919) 435-9510.