Lyndon Oaks Master Plan

Town of Knightdale
RMX-PUD Master Plan Submittal: ZMA-2-23
Sixth Submittal: 07/05/2024

Sheet List Table

DISTRIBUTION OF USES

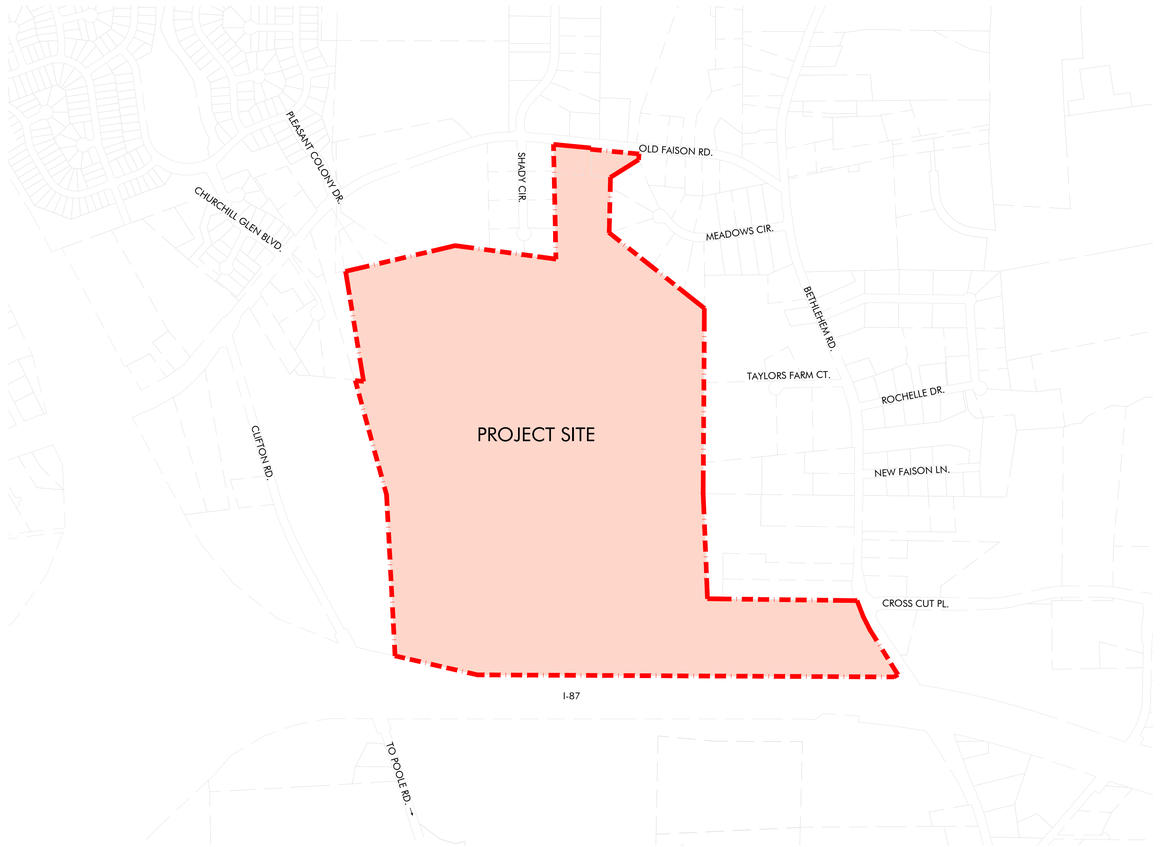
USE AREAS				
USE TYPE	TYP. LOT SIZE (SF)	# OF LOTS	TOTAL AREA (SF)	ACRES
SINGLE FAMILY				
30' LOT	3,600	51	183,600	
35' LOT	4,200	53	222,600	
40' LOT	4,800	27	129,600	
60' LOT	7,200	68	489,600	
70' LOT	8,400	25	210,000	
80' LOT	9,600	12	115,200	
			1,350,600	31.0
DUPLEX / TOWNHOUSE				
20' TH	1,800	116	208,800	
22' TH	1,980	126	249,480	
22' DUPLEX	2,160	22	47,520	
			505,800	11.6
COMM/RETAIL**			77,033	1.77

DISTRIBUTION OF USES	
	ACRES
GROSS SITE AREA (PER SURVEY)	171.8
DEDICATED RECREATIONAL OPEN SPACE	21.4
PUBLIC R/W	28.3
NET AREA***	122.1

USE TYPE	PROP. (AC)	MIN.-MAX. DISTRIBUTION(%)	PROV. DIST. (%)
SINGLE FAMILY	31.0	15%-60%	25.4%
DUPLEX / TOWNHOUSE	11.6	10%-40%	9.5%
COMMERCIAL / RETAIL	1.77	5%-20%	1.4%

** Retail is not required in Lyndon Oaks because there are no multi-family units being proposed.

*** Net area is calculated by removing the area of open space (required amount) and rights-of-way from the total site area. The Town of Knightdale UDO Sec 11.1.B states that the required distribution of uses shall be calculated as the net development area which excludes streets rights-of-way and dedicated open space.



VICINITY MAP 1" = 500'

GENERAL NOTES:

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF KNIGHTDALE AND NCDOT STANDARDS AND SPECIFICATIONS IF APPLICABLE.
2. THE CONTRACTOR SHALL OBTAIN A RIGHT-OF-WAY PERMIT FOR ANY WORK WHICH REQUIRES THE CLOSURE OF A TRAVEL LANE(S), PARKING SPACE, OR SIDEWALK FROM RIGHT-OF-WAY SERVICES AT LEAST 48 HOURS IN ADVANCE.
3. NO WORK WILL BE ALLOWED WITHIN NCDOT ROW UNTIL ALL ENCROACHMENT AGREEMENTS ARE APPROVED BY NCDOT.
4. IF CONSTRUCTION PLANS FOR PUBLIC AND PRIVATE STREETS OR UTILITIES SHOWN ON THIS PLAN ARE REQUIRED, THEY MUST BE APPROVED BY THE PUBLIC WORKS DEPARTMENT AND PUBLIC UTILITIES DEPARTMENT PRIOR TO ISSUANCE OF PERMITS OR RECORDING OF ANY PLAT FOR THIS DEVELOPMENT.
5. FIELD ADJUSTMENTS TO THIS PLAN MAY BE REQUIRED BY TOWN OF KNIGHTDALE INSPECTOR AS NEEDED DURING CONSTRUCTION.
6. ALL PROPOSED CURB AND GUTTER WITHIN PUBLIC RIGHT OF WAY SHOWN ON PLANS TO BE 30" TOWN OF KNIGHTDALE STANDARD CONCRETE CURB AND GUTTER, AND ALL OTHER PROPOSED CURB AND GUTTER TO BE 24" CONCRETE CURB AND GUTTER UNLESS OTHERWISE STATED ON PLANS.
7. ALL DIMENSIONS SHOWN ARE TO BACK OF CURB, UNLESS OTHERWISE STATED ON PLANS.
8. WITHIN THE SIGHT TRIANGLES SHOWN ON THIS PLAN, NO OBSTRUCTION BETWEEN 2 FEET AND 8 FEET IN HEIGHT ABOVE THE CURB LINE ELEVATION SHALL BE LOCATED IN WHOLE OR PART. OBSTRUCTIONS INCLUDE BUT ARE NOT LIMITED TO ANY BERM, FOLIAGE, FENCE, WALL, SIGN, OR PARKED VEHICLE.
9. UNLESS NOTED, ACCESS ROUTE FOR EMERGENCY VEHICLES SHALL PROVIDE AN INSIDE TURNING RADIUS OF 28' MINIMUM.
10. TRASH AND CARDBOARD DUMPSTER(S) ENCLOSURE SHALL COMPATIBLE WITH MATERIAL AND/OR COLOR OF THE PRINCIPAL BUILDING.
11. CONTRACTOR TO FIELD LOCATE AND VERIFY ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO LANDSCAPE ARCHITECT PRIOR TO ANY CONSTRUCTION ACTIVITIES. CONTACT NC ONE AT 811 FOR FIELD LOCATION OF UNDERGROUND UTILITIES.
12. HANDICAP PARKING SPACE(S) AND HC ACCESS AISLE(S) SHALL BE NO GREATER THAN TWO PERCENT (2%) PITCH IN ANY DIRECTION(S) AS PER ADA STANDARDS.
13. PROVIDE SIGNAGE AND STRIPING OF HANDICAP SPACES AS PER ADA STANDARDS.
14. ALL RETAINING WALLS GREATER THAN 30" IN HEIGHT TO INCLUDE SAFETY RAIL OR FENCE. NO RETAINING WALLS ARE PERMITTED IN THE RIGHT-OF-WAY UNLESS APPROVED BY ENCROACHMENT.
15. THE MINIMUM CORNER CLEARANCE FROM THE CURB LINE OF INTERSECTING STREETS SHALL BE AT LEAST 20 FEET FROM THE POINT OF TANGENCY OF THE CURB FOR RESIDENTIAL DRIVEWAY. NO DRIVEWAYS SHALL ENCROACH ON THIS MINIMUM CORNER CLEARANCE.
16. WC ACCESS RAMPS WILL BE PROVIDED IN ACCORDANCE WITH TOWN OF KNIGHTDALE PUBLIC WORKS DEPARTMENT STANDARDS, PROWAG STANDARDS AND ADAAG SPECIFICATIONS
17. ALL RAMPS AND HANDRAILS SHALL BE CONFORM TO ANSI STANDARDS.
18. ALL ABOVE GROUND UTILITY DEVICES (TO INCLUDE BUT NOT LIMITED TO TELEPHONE AND CABLE PEDESTALS, ELECTRICAL TRANSFORMERS, BACKFLOW DEVICE HOTBOX, ETC) SHALL BE SCREENED FROM OFF-SITE VIEW BY EVERGREEN SHRUBS, FENCE, OR WALL.
19. ALL SIDEWALKS MUST BE ACCESSIBLE TO PERSONS WHO ARE BLIND, HAVE LOW VISION AND PEOPLE WITH MOBILITY DISABILITIES. PEDESTRIAN EXISTING ROUTES AND ALTERNATE PEDESTRIAN ROUTES DURING CONSTRUCTION WILL BE REQUIRED TO BE COMPLIANT WITH THE PUBLIC RIGHTS OF WAY ACCESSIBILITY GUIDELINES (PPOWAG), 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
20. IF UNFORESEEN CONDITIONS DEVELOP DURING CONSTRUCTION, REFER TO NCDOT SPECIFICATIONS AND DETAILS AND CONTACT TOWN OF KNIGHTDALE PUBLIC WORKS DEPARTMENT FOR FURTHER GUIDANCE.
21. PRIOR TO START OF CONSTRUCTION, THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE TOWN OF KNIGHTDALE ENGINEERING DEPARTMENT TO REVIEW THE SPECIFIC COMPONENTS OF THE PLAN AND OPERATION OF THESE FACILITIES DURING CONSTRUCTION. CONTACT TOWN OF KNIGHTDALE INSPECTIONS OFFICE AT 919-217-2250 TO SET UP THE MEETING.
22. THE CONTRACTOR SHALL CONDUCT THE WORK IN A SAFE MANNER AND WITH A MINIMUM AMOUNT OF INCONVENIENCE TO TRAFFIC.
23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND SHALL ADHERE TO THE PROVISIONS OF THE MUTCD (MOST CURRENT EDITION).
24. PRIOR TO CONSTRUCTION BEGINNING, ALL SIGNAGE AND TRAFFIC CONTROL SHALL BE IN PLACE
25. THE PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE AT THE TIME OF SITE PLAN/CONSTRUCTION DOCUMENTS.

BUILDING SETBACKS

TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN
COMMERCIAL	
- FRONT:	10' MIN
- REAR:	0' MIN
- SIDE:	6' MIN
CLUBHOUSE	
- FRONT:	10' MIN
- REAR:	0' MIN
- SIDE:	6' MIN

CONTACT INFO:

OWNER:
CONTACT: TERRY LANCE FERRELL, RANDAL HUTCHINS FERRELL
ADDRESS: 26 SAINT JULIANS CT
PAWLEYS ISLAND, SC 29585-6309

OWNER:
CONTACT: WAYNE L. HARPER, EUGENE J. HARPER
ADDRESS: 4113 BREWSTER DR
RALEIGH, NC 27606-1711

OWNER:
CONTACT: DEBORAH JANE TART, MELTON E JR
ADDRESS: 4325 OLD FASION RD
KNIGHTDALE NC 27545-9179

OWNER:
CONTACT: MILTON EDWARD III TART, JANET STANLEY TART
ADDRESS: 106 TART FARM RD
KNIGHTDALE NC 27545-8134

OWNER:
CONTACT: LEE T ALFORD
ADDRESS: 4313 OLD FASION RD
KNIGHTDALE NC 27545-9179

OWNER:
CONTACT: MILTON E JR TART, PATSY P TART
ADDRESS: 4325 OLD FASION RD
KNIGHTDALE NC 27545-9179

CIVIL ENGINEER:
URBAN DESIGN PARTNERS PLLC
CONTACT: SALMAN MOAZZAM, PE
ADDRESS: 150 FAYETTEVILLE ST. SUITE 1310
RALEIGH, NC 27601
PHONE: 919-275-5002
EMAIL: SMOAZZAM@URBANDESIGNPARTNERS.COM

LANDSCAPE ARCHITECT:
URBAN DESIGN PARTNERS PLLC
CONTACT: BRIAN RICHARDS, PLA
ADDRESS: 150 FAYETTEVILLE ST. SUITE 1310
RALEIGH, NC 27601
PHONE: 919-275-5002
EMAIL: BRICHARDS@URBANDESIGNPARTNERS.COM

DEVELOPER:
D.R. HORTON
CONTACT: REESE BRIDGES , PE
ADDRESS: 7208 FALLS OF NEUSE RD. SUITE 201
RALEIGH, NC 27615
PHONE: 984-247-9614
EMAIL: TBRIDGES@DRHORTON.COM

SITE DATA:

PIN(S):	1743953683; 1743971085; 1753071583; 1743976575; 1743989384; 1743986356;1753152116
TOTAL ACRES:	± 171.88 ACRES
EXISTING ZONING:	RT (RURAL TRANSITIONAL)
PROPOSED ZONING:	RMX-PUD
EXISTING USE:	RESIDENTIAL & AGRICULTURAL
PROPOSED USE:	RESIDENTIAL & COMMERCIAL OUTPARCEL

DEVELOPMENT SUMMARY:

COMMERCIAL:

•TOTAL LAND AREA:	± 1.77 AC
•BUILDINGS:	1 BLDG (± 15,000 SF)
•BUILDING HEIGHT:	MAXIMUM 2 STORIES
•ALLOWABLE USES*:	CHILD/ADULT DAY CARE CENTER (6 OR MORE PEOPLE), PERSONAL SERVICES, PROFESSIONAL SERVICES, MEDICAL SERVICES, NEIGHBORHOOD RETAIL/RESTAURANT (2,000 SF OR LESS), ALLOWED RMX ACCESSORY USES, BAR/TAVERN/MICROBREWERY, STUDIO (ARTS, DANCE, MARTIAL ARTS, MUSIC)
	NOTE: SEE PUD DOCUMENT FOR MORE INFORMATION

RESIDENTIAL:

•TOTAL LAND AREA:	± 129.32 AC
•PROPOSED DENSITY:	482 UNITS/171.88 AC
	2.8 UNITS/AC
•PROPOSED UNITS:	482 DU TOTAL (UP TO 500 DU PERMITTED)
→ TOWNHOMES/DUPLEXES	
20' UNIT	117 UNITS
22' TOWNHOME	130 UNITS
22' DUPLEX	26 UNITS
→ SINGLE FAMILY (REAR-LOAD)	
30' LOT	46 LOTS
35' LOT	39 LOTS
40' LOT	24 LOTS
→ SINGLE FAMILY (FRONT-LOAD)	
60' LOT	66 LOTS
70' LOT	24 LOTS
80' LOT	10 LOTS

OPEN SPACE:

→ REQUIRED:	17.26 AC TOTAL REQUIRED
- ACTIVE:	8.63 AC (50% OF REQ. OPEN SPACE)
- PASSIVE:	8.63 AC (50% OF REQ. OPEN SPACE)
→ PROPOSED:	21.40 AC TOTAL PROPOSED
- ACTIVE:	9.03 AC ACTIVE OPEN SPACE PROP.
- PASSIVE:	12.37 AC PASSIVE OPEN SPACE PROP.

TREE PRESERVATION:

→ REQUIRED:	6.46 AC TOTAL REQUIRED
→ PROPOSED:	19.39 AC TOTAL PROPOSED

PARKING CALCS: SEE SHEET C-3.0 FOR BREAKDOWN & REQUIREMENTS

LAND USE TOTALS:

→ TOTAL ACRES:	171.88 AC TOTAL
- COMMERCIAL:	± 1.77 AC TOTAL PROP.
- RESIDENTIAL:	± 129.32 AC TOTAL PROP.
- RECREATIONAL OPEN SPACE:	± 21.40 AC TOTAL PROP.
- TREE PRESERVATION:	± 19.39 AC TOTAL PROP.

URBAN DESIGN PARTNERS
150 fayetteville st ste 1310
raleigh, nc 27601
p 919.275.5002
urbandesignpartners.com
nc firm no: P-2671 sc coa no: C-03044

PRELIMINARY DRAWING FOR REVIEW PURPOSES ONLY

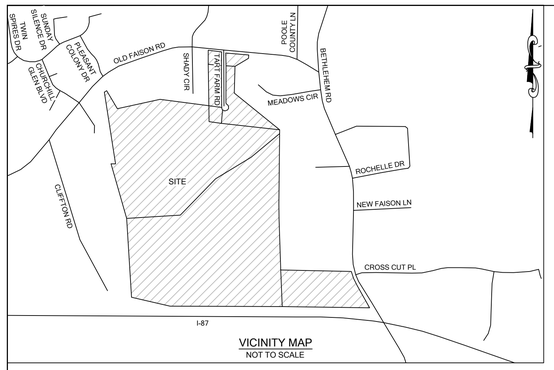
07/05/2024

D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan
Cover Sheet
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	06/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:
C-1.0



VICINITY MAP
NOT TO SCALE

LEGEND

- EXISTING BOUNDARY CORNER FOUND
- BOUNDARY CORNER SET (3/4" IPS UNLESS OTHERWISE NOTED)
- COMPUTED POINT
- CONCRETE MONUMENT FOUND
- CLEAN OUT
- TRANSFORMER / ELECTRIC BOX
- LIGHT POLE
- UTILITY POLE
- WATER METER
- FIRE HYDRANT
- UTILITY VALVE
- TELEPHONE PEDESTAL
- CABLE PEDESTAL
- CATCH BASIN
- DROP INLET
- UTILITY MANHOLE
- UTILITY HAND HOLE
- AIR CONDITIONING UNIT
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- SIGN
- F — UNDERGROUND FIBER
- T — UNDERGROUND TELEPHONE
- GAS — UNDERGROUND GAS
- E — UNDERGROUND ELECTRIC
- SD — STORM DRAIN
- OHE — OVERHEAD UTILITY
- GUY WIRE
- BURIED UTILITY MARKER

EIP	EXISTING IRON PIPE
EIR	EXISTING IRON REBAR
IPS	IRON PIPE SET
PKS	PK NAIL SET
PKF	PK NAIL FOUND
SSMH	SANITARY SEWER MANHOLE
N	NORTH
E	EAST
S	SOUTH
W	WEST
NE	NORTHEAST
SE	SOUTHEAST
SW	SOUTHWEST
NW	NORTHWEST
DB	DEED BOOK
PG	PAGE
BM	BOOK OF MAPS
R/W	RIGHT OF WAY
POB	POINT OF BEGINNING
(T)	TOTAL
⟷	TIE (INDICATES TWO PARTS OF THE SAME PARCEL)

NOTES

1. THE PROPERTY LIES IN ZONE "X" PER NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP COMMUNITY NUMBER 3720174300K, DATED 07/19/2022.
2. ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES AND ALL BEARINGS ARE BASED ON GPS OBSERVATIONS, NAD 83/NSRS 2011/SPC UNLESS OTHERWISE SHOWN.
3. SITE ZONED "RT" AND "GR3" FOR THE TOWN OF KNIGHTDALE PER WAKE COUNTY GIS.
4. AREAS COMPUTED BY COORDINATE METHOD.
5. THIS SURVEY WAS PREPARED BY BATEMAN CIVIL SURVEY COMPANY, UNDER THE SUPERVISION OF STEVEN P. CARSON, PLS.
6. THIS MAP HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS.
7. NO CEMETERIES OR GRAVES WERE OBSERVED AS A RESULT OF THIS SURVEY.
8. WETLANDS SHOWN PER FLAGGING SET BY SAGE ECOLOGICAL SERVICES AND REVISED WETLAND SKETCH MAP DATED FEBRUARY 6, 2024

TO: DHI TITLE OF NORTH CAROLINA, AND D. R. HORTON, INC., A DELAWARE CORPORATION

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS OF TABLE A THEREOF (NONE SELECTED). THE FIELDWORK WAS COMPLETED ON OCTOBER 3RD, 2022.

PRELIMINARY

STEVEN P. CARSON, PLS — DATE
NC LICENSE NO. 4752

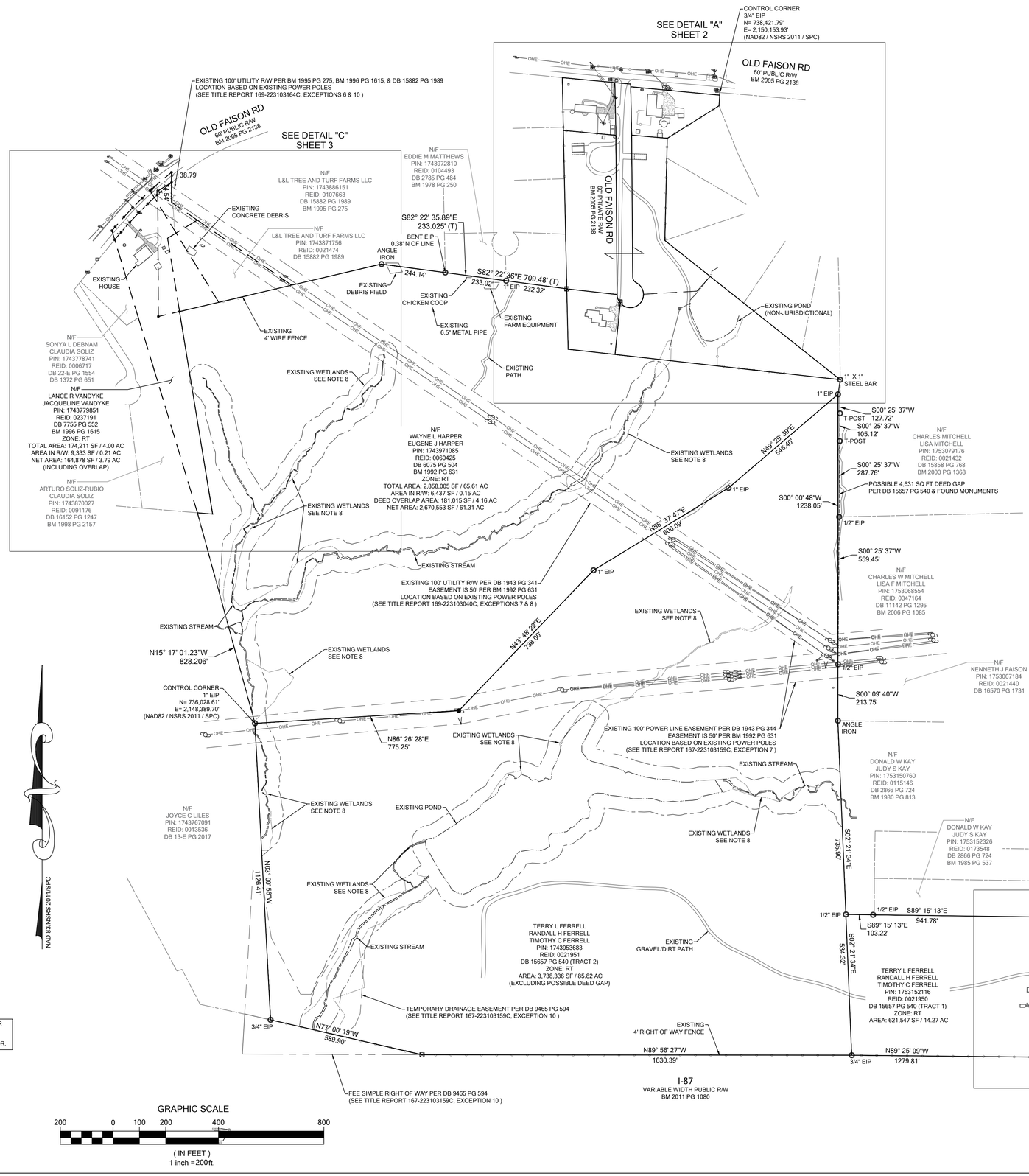
I, STEVEN P. CARSON, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DEED REFERENCES AS SHOWN IN TITLE BLOCK); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND AS SHOWN HERE ON; THAT THE RATIO OF PRECISION AS CALCULATED IS 1: 10,000 + ; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS _____ DAY OF _____, A.D., 2022.

I, FURTHER THAT IN ACCORDANCE WITH G.S. 47-30-F-11-C-1; CERTIFY 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

STEVEN P. CARSON, PLS
NC LICENSE NO. 4752

THIS MAP IS CONSIDERED PRELIMINARY, NOT FOR RECORDATION, CONVEYANCE OR SALES UNLESS SIGNED AND SEALED BY THE LICENSED SURVEYOR.



P:\2022 Projects\220655 Old Faison ALTA - DR Horton\DWG\220655 Old Faison ALTA.dwg

BATEMAN CIVIL SURVEY COMPANY
ENGINEERS • SURVEYORS • PLANNERS
2524 RELIANCE AVENUE, APEX, NC 27539
PHONE: (919) 577-1080 FAX: (919) 577-1081
INFO@BATEMANCIVILSURVEY.COM
NCBELS FIRM# C-2378

ALTA/NSPS/LAND TITLE SURVEY

EXCLUSIVELY FOR: DR HORTON

PROPERTY PINS: 1753152116, 1743953683, 1743971085, 1743986356, 1743989384, 1753071583, 1743976575 & 1743779851

AS RECORDED IN: DB 15657 PG 540, DB 2253 PG 285, DB 15474 PG 755, BM 2000, PG 1887, DB 9018 PG 621, DB 6075 PG 504 & DB 7755 PG 552

ST MATTHEWS TOWNSHIP - WAKE COUNTY - NORTH CAROLINA

REVISIONS

1.
2.
3.
4.
5.

DESIGNED BY: N/A
DRAWN BY: ELS
CHECKED BY: SPC
SCALE: 1" = 200'
DATE: 1/27/2023
JOB NUMBER: 220655

SHEET 1 OF 4

LEGEND

- EXISTING BOUNDARY CORNER FOUND
- BOUNDARY CORNER SET (3/4" IPS UNLESS OTHERWISE NOTED)
- COMPUTED POINT
- CONCRETE MONUMENT FOUND
- CLEAN OUT
- TRANSFORMER / ELECTRIC BOX
- LIGHT POLE
- UTILITY POLE
- WATER METER
- FIRE HYDRANT
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- SD — STORM DRAIN
- OHE — OVERHEAD UTILITY
- GUY WIRE
- BURIED UTILITY MARKER

EIP	EXISTING IRON PIPE
EIR	EXISTING IRON REBAR
IPS	IRON PIPE SET
PKS	PK NAIL SET
PKF	PK NAIL FOUND
SSMH	SANITARY SEWER MANHOLE
N	NORTH
E	EAST
S	SOUTH
W	WEST
NE	NORTHEAST
SE	SOUTHEAST
SW	SOUTHWEST
NW	NORTHWEST
DB	DEED BOOK
PG	PAGE
BM	BOOK OF MAPS
R/W	RIGHT OF WAY
POB	POINT OF BEGINNING
(T)	TOTAL
	TIE (INDICATES TWO PARTS OF THE SAME PARCEL)

THIS MAP IS CONSIDERED PRELIMINARY, NOT FOR RECORDATION, CONVEYANCE OR SALES UNLESS SIGNED AND SEALED BY THE LICENSED SURVEYOR.

LINE TABLE		
LINE#	DIRECTION	LENGTH
L1	S01° 05' 59"E	10.07'
L2	S03° 29' 06"W	10.01'
L3	N84° 58' 28"W	135.68'

CURVE TABLE				
CURVE#	LENGTH	RADIUS	BEARING	CHORD
C1	27.23'	25.00'	S31° 34' 11"E	25.90'
C2	54.05'	50.00'	N31° 56' 37"W	51.46'
C3	122.14'	50.00'	N68° 58' 19"E	93.96'
C4	35.74'	50.00'	S21° 05' 20"E	34.98'

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

DETAIL "A"

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

DETAIL "B"

P:\2022 Projects\220655 Old Faison ALTA - DR Horton\DWG\220655 Old Faison ALTA.dwg

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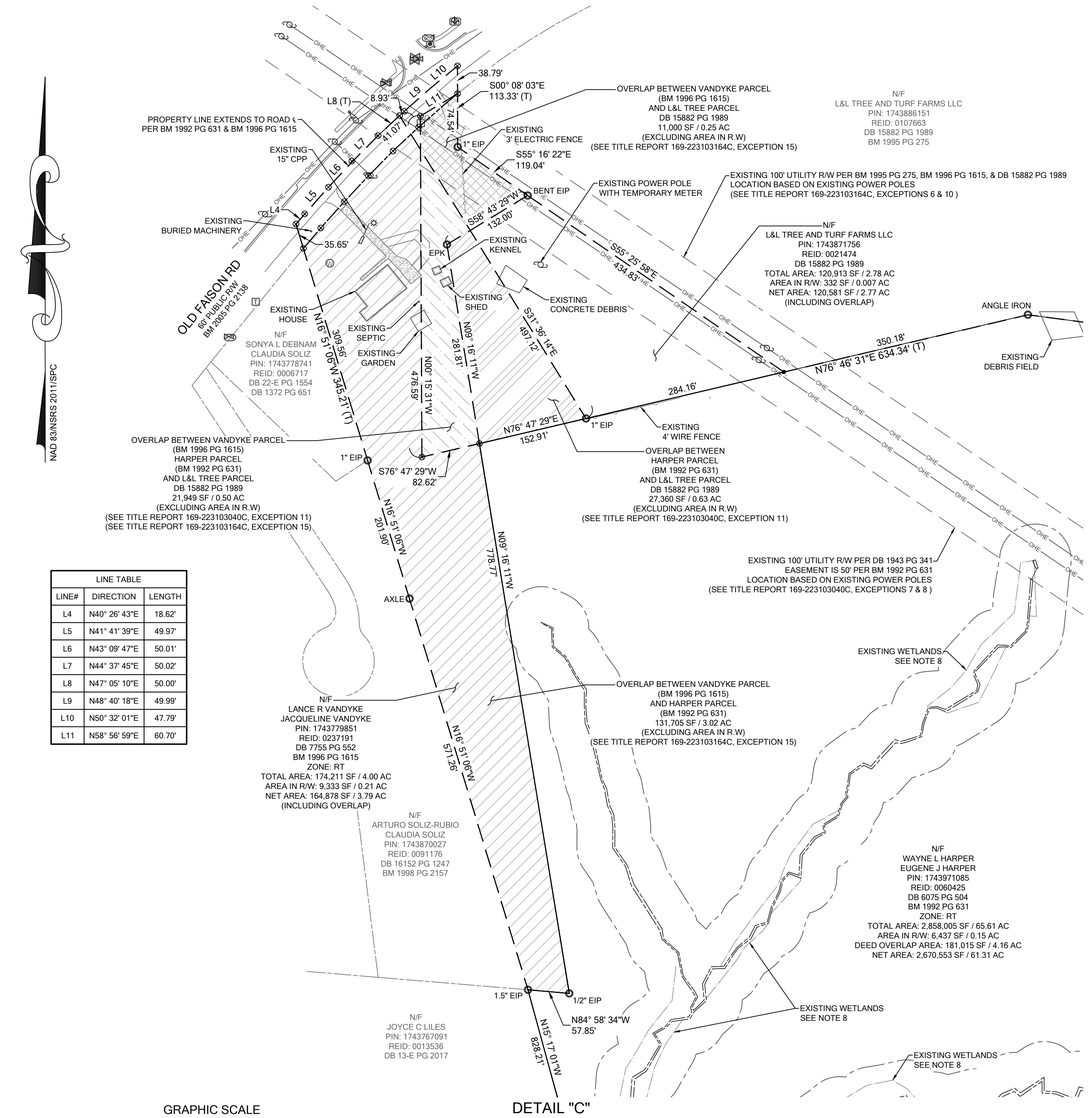
AS RECORDED IN: DB 15657 PG 540, DB 2253 PG 285, DB 15474 PG 755, BM 2000, PG 1887, DB 9018 PG 621, DB 6075 PG 504 & DB 7755 PG 552

ST MATTHEW'S TOWNSHIP - WAKE COUNTY - NORTH CAROLINA

REVISIONS

1.
2.
3.
4.
5.

DESIGNED BY: N/A
DRAWN BY: ELS
CHECKED BY: SPC
SCALE: VARIES
DATE: 1/27/2023
JOB NUMBER: 220655



LINE TABLE		
LINE#	DIRECTION	LENGTH
L4	N40° 26' 43"E	18.62'
L5	N41° 41' 39"E	49.97'
L6	N43° 09' 47"E	50.01'
L7	N44° 37' 45"E	50.02'
L8	N47° 05' 10"E	50.00'
L9	N48° 40' 18"E	49.99'
L10	N50° 32' 01"E	47.79'
L11	N58° 56' 59"E	60.70'

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

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LEGEND

○	EXISTING BOUNDARY CORNER FOUND
●	BOUNDARY CORNER SET (3/4" IPS UNLESS OTHERWISE NOTED)
⊗	COMPUTED POINT
⊠	CONCRETE MONUMENT FOUND
CO	CLEAN OUT
T	TRANSFORMER / ELECTRIC BOX
☼	LIGHT POLE
	UTILITY POLE
WM	WATER METER
	FIRE HYDRANT
UV	UTILITY VALVE
TP	TELEPHONE PEDESTAL
CP	CABLE PEDESTAL
CB	CATCH BASIN
DI	DROP INLET
UM	UTILITY MANHOLE
UHH	UTILITY HAND HOLE
AC	AIR CONDITIONING UNIT
W	WELL
	SIGN
F	UNDERGROUND FIBER
T	UNDERGROUND TELEPHONE
GAS	UNDERGROUND GAS
E	UNDERGROUND ELECTRIC
SD	STORM DRAIN
OHE	OVERHEAD UTILITY
	GUY WIRE
	BURIED UTILITY MARKER
EIP	EXISTING IRON PIPE
EIR	EXISTING IRON REBAR
IPS	IRON PIPE SET
PKS	PK NAIL SET
PKF	PK NAIL FOUND
SSMH	SANITARY SEWER MANHOLE
N	NORTH
E	EAST
S	SOUTH
W	WEST
NE	NORTHEAST
SE	SOUTHEAST
SW	SOUTHWEST
NW	NORTHWEST
DB	DEED BOOK
PG	PAGE
BM	BOOK OF MAPS
R/W	RIGHT OF WAY
POB	POINT OF BEGINNING
(T)	TOTAL
	TIE (INDICATES TWO PARTS OF THE SAME PARCEL)

SURVEY COMMENTS
SURVEY MADE BY BATEMAN CIVIL SURVEY COMPANY
DATED 12/12/2022, JOB NO. 220655

SCHEDULE A

ISSUING OFFICE: DHI TITLE OF NORTH CAROLINA, 12276 SAN JOSE BLVD, SUITE 739, JACKSONVILLE, FL 32223
COMMITMENT NO.: 167-223103159C
PROPERTY ADDRESS: LOT ACQUISITION FERRELL; MASTER, N/A, NC 00000

1. COMMITMENT DATE: NOVEMBER 8, 2022 AT 09:00 AM

2. POLICY TO BE ISSUED:
(A) ALTA OWNER'S POLICY (06-16-07)
PROPOSED INSURED: D.R. HORTON, INC., A DELAWARE CORPORATION
PROPOSED POLICY AMOUNT: $10,000.00

3. THE ESTATE OR INTEREST IN THE LAND DESCRIBED OR REFERRED TO IN THIS COMMITMENT IS:
FEE SIMPLE

4. THE TITLE IS, AT THE COMMITMENT DATE, VESTED IN:
TIMOTHY CLARENCE FERRELL, RANDALL HUTCHINS FERRELL, AND TERRY LANCE FERRELL AND CHERYL ANNE FERRELL, TRUSTEES OF THE TERRY LANCE FERRELL AND CHERYL ANN FERRELL FAMILY TRUST DATED JULY 26, 2018

5. THE LAND IS DESCRIBED AS FOLLOWS:
LYING AND BEING IN WAKE COUNTY, NORTH CAROLINA, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

FIRST TRACT:
LOCATED ON THE WEST SIDE OF PAVED ROAD NO. 2049 AND BEGINNING AT POINT IN CENTER OF SAID ROAD BEING THE SOUTHEAST CORNER OF TRACT NO. 2 ON MAP HEREINAFTER REFERRED TO, AND RUNS THENCE SOUTH 29 DEG. 00 MIN. EAST 632 FEET TO CORNER IN SAID ROAD; THENCE NORTH 85 DEG. 33. MIN. WEST 1350 FEET TO CORNER; THENCE NORTH 00 DEG. 48 MIN. EAST 551 FEET TO THE SOUTHWEST CORNER OF THE NORTH PORTION OF TRACT NO. L; THENCE A DIVIDING LINE BETWEEN THE NORTH AND SOUTH PORTIONS OF TRACT NO. L, SOUTH 85 DEG. 33 MIN. EAST 1045 FEET TO THE POINT OF BEGINNING, AND BEING THE SOUTH PORTION OF TRACT NO. L OF THE PROPERTY OF THE J. I. FERRELL HEIRS AS SHOWN ON MAP PREPARED BY SMITH AND SMITH, APEX N. C. FROM DEEDS NOTED ON SAID MAP. CONTAINS 14 ½ ACRES MORE OR LESS.

SECOND TRACT:
BOUNDED ON THE NORTH BY A ROAD; ON THE EAST BY THE FAISON AND FERRELL LAND; ON THE SOUTH BY A. C. SPARKS AND ON THE WEST BY A BRANCH, AND DESCRIBED AS FOLLOWS; BEGINNING AT A FENCE POST, CORNER BETWEEN J. I. FERRELL AND A.C. SPARKS, AND RUNS THENCE NORTH 86 DEG, WEST 2331 FEET TO A BRANCH, SAID POINT BEING WITNESSED BY A STAKE AND POINTERS; THENCE ALONG SAID BRANCH IN A NORTHERLY DIRECTION 1100 FEET TO A ROAD; THENCE ALONG SAID ROAD THE FOLLOWING COURSES AND DISTANCES, N. 88 DEG. 30 MIN. EAST 770 FEET; N. 48 DEG. 10 MIN. E. 758 FEET; N. 53 DEG. E. 600 FEET; N. 53 DEG 50 MIN. E. 548.3 FEET TO A STAKE IN FAISON'S LINE ON SOUTH SIDE OF SAID ROAD, THENCE ALONG FAISON'S LINE S. 4 DEG. 40 MIN. W. 1238.7 FEET TO A STAKE, A CORNER BETWEEN THE FAISON AND FERRELL LANDS; THENCE ALONG THE FERRELL LINE S. L DEG. 45 MIN W. 1295 FEET TO THE BEGINNING, CONTAINING 82 ACRES MORE OR LESS ACCORDING TO A SURVEY AND MAP MADE BY PITTMAN STELL, C.S. DATED DEC. 14, 1944, AND BEING THE NORTHERN END OF TRACT NO. 13 OF "THE OAKS FARM", SEE SURVEY AND MAP MADE G. SAM ROWE, C.E. DATED NOVEMBER 1944.

LESS AND EXCEPT THAT PROPERTY DESCRIBED IN THE CONSENT JUDGMENT WITH THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION OF RECORD IN BOOK 9465, PAGE 594, WAKE COUNTY REGISTRY.

COMMITMENT NO.: 167-223103159C

SCHEDULE B, PART II
EXCEPTIONS

THIS COMMITMENT DOES NOT REPUBLISH ANY COVENANT, CONDITION, RESTRICTION, OR LIMITATION CONTAINED IN ANY DOCUMENT REFERRED TO IN THIS COMMITMENT TO THE EXTENT THAT THE SPECIFIC COVENANT, CONDITION, RESTRICTION, OR LIMITATION VIOLATES STATE OR FEDERAL LAW BASED ON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, GENDER IDENTITY, HANDICAP, FAMILIAL STATUS, OR NATIONAL ORIGIN.

THE POLICY WILL NOT INSURE AGAINST LOSS OR DAMAGE RESULTING FROM THE TERMS AND PROVISIONS OF ANY LEASE OR EASEMENT IDENTIFIED IN SCHEDULE A, AND WILL INCLUDE THE FOLLOWING EXCEPTIONS UNLESS CLEARED TO THE SATISFACTION OF THE COMPANY:

1. ANY DEFECT, LIEN, ENCUMBRANCE, ADVERSE CLAIM, OR OTHER MATTER THAT APPEARS FOR THE FIRST TIME IN THE PUBLIC RECORDS OR IS CREATED, ATTACHES, OR IS DISCLOSED BETWEEN THE COMMITMENT DATE AND THE DATE ON WHICH ALL OF THE SCHEDULE B, PART I - REQUIREMENTS ARE MET.
(NO MATTER OF SURVEY)

2. TAXES AND ASSESSMENTS FOR THE YEAR 2023, A LIEN NOW DUE AND PAYABLE AND SUBSEQUENT YEARS, A LIEN NOT YET DUE AND PAYABLE.
(NO MATTER OF SURVEY)

3. TITLE TO ANY AREAS WITHIN STREET, HIGHWAY OR RAILROAD RIGHTS OF WAY, IF ANY.
(NO MATTER OF SURVEY)

4. THE CREATION OR LOSS OF LAND BY NATURAL OR ARTIFICIAL CHANGES ALONG WATER FORMING PART OF THE BOUNDARY OF THE LAND; AND/OR TITLE TO LAND LYING BELOW THE HIGHER OF THE MEAN HIGH WATER MARK AND/OR THE NORMAL BOUNDS OF ANY BODY OF WATER; AND/OR RIPARIAN RIGHTS INCIDENT TO ANY BRANCHES, CREEKS, STREAMS, LAKES OR OTHER WATERS COURSING OR ABUTTING THE LAND.
(NO MATTER OF SURVEY)

5. ANY DISCREPANCY, CONFLICT, ACCESS, SHORTAGE IN AREA OR BOUNDARY LINES, ENCROACHMENT, ENCUMBRANCE, VIOLATION, OVERLAP, SETBACK, EASEMENT OR CLAIMS OF EASEMENT, RIPARIAN RIGHT, AND TITLE TO LAND WITHIN ROADS, WAYS, RAILROADS, WATERCOURSES, BURIAL GROUNDS, MARSHES, DREDGED OR FILLED AREAS OR LAND BELOW THE MEAN HIGHWATER MARK OR WITHIN THE BOUNDS OF ANY ADJOINING BODY OF WATER, OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY A CURRENT INSPECTION AND ACCURATE AND COMPLETE LAND SURVEY OF THE LAND.
(AS SHOWN HEREON)

6. ALL DEFERRED TAXES
(NO MATTER OF SURVEY)

7. EASEMENTS TO CAROLINA POWER & LIGHT RECORDED IN BOOK 1828, PAGE 340; BOOK 1943, PAGE 344; AND BOOK 4023, PAGE 701, WAKE COUNTY REGISTRY.
(AS SHOWN HEREON)

8. MEMORANDUM OF CONTRACT DATED JULY 14, 2022, RECORDED IN BOOK 19098, PAGE 869, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

9. THE CORRECTNESS OF THE SQUARE FOOTAGE/ACREAGE COMPUTATION CONTAINED IN THE DESCRIPTION OF THE LAND IS NOT INSURED.
(NO MATTER OF SURVEY)

10. CONSENT JUDGMENT IN FAVOR OF THE DEPARTMENT OF TRANSPORTATION FOR 1.193 ACRES, WAKE COUNTY CIVIL ACTION 01-CVS-3306, RECORDED IN BOOK 9465, PAGE 594, WAKE COUNTY REGISTRY.
(AS SHOWN HEREON)

11. UTILITY EASEMENTS AFFECTING THE LAND.
(NO DOCUMENTS CITED)

12. ACCESS TO SECOND TRACT THE LAND IS AVAILABLE ONLY BY MEANS OF ACCESS OVER FIRST TRACT, AND IS CONDITIONED UPON OWNERSHIP OF SAID ADJOINING PARCEL BY THE INSURED.
(NO MATTER OF SURVEY)

13. ACCESS BY WAY OF INTERSTATE 87, A CONTROLLED ACCESS HIGHWAY, IS NOT INSURED.
(NO MATTER OF SURVEY)

14. NO CLOSING SERVICES INSURANCE: AS TO THE TRANSACTION FOR WHICH THIS COMMITMENT IS ISSUED, THE COMPANY DOES NOT AFFORD INSURED CLOSING PROTECTION/CLOSING SERVICES INSURANCE ABSENT REVISION OF THIS COMMITMENT TO INCLUDE A STATEMENT THAT COVERAGE IS AFFORDED TO THOSE PARTIES IDENTIFIED IN A SEPARATE CLOSING PROTECTION LETTER ISSUED SIMULTANEOUSLY WITH REVISION OF THE COMMITMENT. ANY CLOSING PROTECTION COVERAGE OR LETTER WHICH HERETOFORE MAY HAVE BEEN ISSUED IS HEREBY RESCINDED AND SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION. ANY CLOSING PROTECTION LETTER SUBSEQUENTLY ISSUED SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION ABSENT THE ACCOMPANYING REQUISITE REVISION OF THIS COMMITMENT.
(NO MATTER OF SURVEY)

BATEMAN CIVIL SURVEY COMPANY
ENGINEERS ● SURVEYORS ● PLANNERS
2524 RELIANCE AVENUE, APEX, NC 27539
PHONE: (919) 577-1080 FAX: (919) 577-1081
INFO@BATEMANCIVILSURVEY.COM
NCBELS FIRM# C-2378

ALTA/NSPS/LAND TITLE SURVEY

EXCLUSIVELY FOR: DR HORTON

PROPERTY PINS: 1753152116, 1743953683, 1743971085, 1743986356, 1743989384, 1753071583, 1743976575 & 1743779851

AS RECORDED IN: DB 15657 PG 540, DB 2255 PG 285, DB 15474 PG 755, BM 2000, PG 1887, DB 9018 PG 621, DB 6075 PG 504 & DB 7755 PG 552

ST MATTHEW'S TOWNSHIP - WAKE COUNTY - NORTH CAROLINA

REVISIONS

1.
2.
3.
4.
5.

DESIGNED BY: N/A
DRAWN BY: ELS
CHECKED BY: SPC
SCALE: 1" = 100'
DATE: 1/27/2023
JOB NUMBER: 220655

SHEET 3 OF 4

P:\2022 Projects\220655 Old Faison ALTA - DR Horton\DWG\220655 Old Faison ALTA.dwg

SURVEY COMMENTS
SURVEY MADE BY BATEMAN CIVIL SURVEY COMPANY
DATED 12/12/2022, JOB NO. 220655

SCHEDULE A

ISSUING OFFICE: DHI TITLE OF NORTH CAROLINA, 12276 SAN JOSE BLVD, SUITE 739, JACKSONVILLE, FL 32223
COMMITMENT NO.: 169-223103040C
PROPERTY ADDRESS: LOT ACQUISITION TRACT 12, N/A, NC 00000

1. COMMITMENT DATE: OCTOBER 28, 2022 AT 12:00 AM

2. POLICY TO BE ISSUED:
(A) ALTA OWNER'S POLICY (06-16-07)
PROPOSED INSURED: D.R. HORTON, INC., A DELAWARE CORPORATION
PROPOSED POLICY AMOUNT: $10,000.00

3. THE ESTATE OR INTEREST IN THE LAND DESCRIBED OR REFERRED TO IN THIS COMMITMENT IS:
FEE SIMPLE

4. THE TITLE IS, AT THE COMMITMENT DATE, VESTED IN:
WAYNE L. HARPER AND EUGENE J. HARPER

5. THE LAND IS DESCRIBED AS FOLLOWS:

ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING IN SAINT MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA, CONTAINING 61.35 ACRES MORE OR LESS, AND BEING MORE PARTICULARLY SHOWN ON THAT CERTAIN PLAT OF SURVEY TITLED, "SURVEY OF TRACT #12 OF THE OAKS FARM IN THE D.J. ROBERTSON ESTATE", BY TALLEY AND ASSOCIATES, WHICH PLAT IS RECORDED IN BOOK OF MAPS 1992, PAGE 631, WAKE COUNTY REGISTRY, AND IS BY REFERENCE, INCORPORATED HEREIN AS A PART OF THIS DESCRIPTION.

COMMITMENT NO.: 169-223103040C

SCHEDULE B, PART II
EXCEPTIONS

THIS COMMITMENT DOES NOT REPUBLISH ANY COVENANT, CONDITION, RESTRICTION, OR LIMITATION CONTAINED IN ANY DOCUMENT REFERRED TO IN THIS COMMITMENT TO THE EXTENT THAT THE SPECIFIC COVENANT, CONDITION, RESTRICTION, OR LIMITATION VIOLATES STATE OR FEDERAL LAW BASED ON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, GENDER IDENTITY, HANDICAP, FAMILIAL STATUS, OR NATIONAL ORIGIN.

THE POLICY WILL NOT INSURE AGAINST LOSS OR DAMAGE RESULTING FROM THE TERMS AND PROVISIONS OF ANY LEASE OR EASEMENT IDENTIFIED IN SCHEDULE A, AND WILL INCLUDE THE FOLLOWING EXCEPTIONS UNLESS CLEARED TO THE SATISFACTION OF THE COMPANY:

1. ANY DEFECT, LIEN, ENCUMBRANCE, ADVERSE CLAIM, OR OTHER MATTER THAT APPEARS FOR THE FIRST TIME IN THE PUBLIC RECORDS OR IS CREATED, ATTACHES, OR IS DISCLOSED BETWEEN THE COMMITMENT DATE AND THE DATE ON WHICH ALL OF THE SCHEDULE B, PART I - REQUIREMENTS ARE MET.
(NO MATTER OF SURVEY)

2. TAXES AND ASSESSMENTS FOR THE YEAR 2023, A LIEN NOW DUE AND PAYABLE AND SUBSEQUENT YEARS, A LIEN NOT YET DUE AND PAYABLE.
(NO MATTER OF SURVEY)

3. TITLE TO ANY AREAS WITHIN STREET, HIGHWAY OR RAILROAD RIGHTS OF WAY, IF ANY.
(NO MATTER OF SURVEY)

4. THE CREATION OR LOSS OF LAND BY NATURAL OR ARTIFICIAL CHANGES ALONG WATER FORMING PART OF THE BOUNDARY OF THE LAND; AND/OR TITLE TO LAND LYING BELOW THE HIGHER OF THE MEAN HIGH WATER MARK AND/OR THE NORMAL BOUNDS OF ANY BODY OF WATER; AND/OR RIPARIAN RIGHTS INCIDENT TO ANY BRANCHES, CREEKS, STREAMS, LAKES OR OTHER WATERS COURSING OR ABUTTING THE LAND.
(NO MATTER OF SURVEY)

5. ANY DISCREPANCY, CONFLICT, ACCESS, SHORTAGE IN AREA OR BOUNDARY LINES, ENCROACHMENT, ENCUMBRANCE, VIOLATION, OVERLAP, SETBACK, EASEMENT OR CLAIMS OF EASEMENT, RIPARIAN RIGHT, AND TITLE TO LAND WITHIN ROADS, WAYS, RAILROADS, WATERCOURSES, BURIAL GROUNDS, MARSHES, DREDGED OR FILLED AREAS OR LAND BELOW THE MEAN HIGHWATER MARK OR WITHIN THE BOUNDS OF ANY ADJOINING BODY OF WATER, OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY A CURRENT INSPECTION AND ACCURATE AND COMPLETE LAND SURVEY OF THE LAND.
(AS SHOWN HEREON)

6. ALL DEFERRED TAXES.
(NO MATTER OF SURVEY)

7. ANY RIGHT, EASEMENT, SETBACK, INTEREST, CLAIM, ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATIONS OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE DISCLOSED BY PLAT(S) RECORDED IN BOOK OF MAPS 1992, AT PAGE 631 AND MATTERS SHOWN THEREON.
(AS SHOWN HEREON)

8. RIGHT OF WAY TO CAROLINA POWER AND LIGHT OF RECORD IN BOOK 1943, PAGE 341, BOOK 4945, PAGE 929, WAKE COUNTY REGISTRY.
(AS SHOWN HEREON)

9. RIGHT OF WAY TO THE NC STATE HIGHWAY COMMISSION OF RECORD IN BOOK 1445, PAGE 577, WAKE COUNTY REGISTRY.
(NO PLOTTABLE DESCRIPTION FOUND)

10. ANY RIGHT, EASEMENT, SETBACK, INTEREST, CLAIM, ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATIONS OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE DISCLOSED BY PLAT(S) RECORDED IN BOOK OF MAPS 1996, AT PAGE 1615 AND MATTERS SHOWN THEREON.
(AS SHOWN HEREON)

11. SUBJECT TO THE CLAIMS OF L&L TREE AND TURF FARMS, LLC BASED UPON THE DEED INTO L&L TREE AND TURF FARMS, LLC IN BOOK 15882, PAGE 1989 (TRACT 3).
(AS SHOWN HEREON)

12. THE CORRECTNESS OF THE SQUARE FOOTAGE/ACREAGE COMPUTATION CONTAINED IN THE DESCRIPTION OF THE LAND IS NOT INSURED.
(NO MATTER OF SURVEY)

13. ANY RIGHT, EASEMENT, SETBACK, INTEREST, CLAIM, ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATIONS OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE DISCLOSED BY PLAT(S) RECORDED IN BOOK OF MAPS _____, AT PAGE ____ AND MATTERS SHOWN THEREON.
(NO DOCUMENT CITED)

14. NO CLOSING SERVICES INSURANCE: AS TO THE TRANSACTION FOR WHICH THIS COMMITMENT IS ISSUED, THE COMPANY DOES NOT AFFORD INSURED CLOSING PROTECTION/CLOSING SERVICES INSURANCE ABSENT REVISION OF THIS COMMITMENT TO INCLUDE A STATEMENT THAT COVERAGE IS AFFORDED TO THOSE PARTIES IDENTIFIED IN A SEPARATE CLOSING PROTECTION LETTER ISSUED SIMULTANEOUSLY WITH REVISION OF THE COMMITMENT. ANY CLOSING PROTECTION COVERAGE OR LETTER WHICH HERETOFORE MAY HAVE BEEN ISSUED IS HEREBY RESCINDED AND SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION. ANY CLOSING PROTECTION LETTER SUBSEQUENTLY ISSUED SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION ABSENT THE ACCOMPANYING REQUISITE REVISION OF THIS COMMITMENT.
(NO MATTER OF SURVEY)

THIS MAP IS CONSIDERED PRELIMINARY, NOT FOR RECORDATION, CONVEYANCE OR SALES UNLESS SIGNED AND SEALED BY THE LICENSED SURVEYOR.

SURVEY COMMENTS
SURVEY MADE BY BATEMAN CIVIL SURVEY COMPANY
DATED 12/12/2022, JOB NO. 220655

SCHEDULE A

ISSUING OFFICE: DHI TITLE OF NORTH CAROLINA, 12276 SAN JOSE BLVD, SUITE 739, JACKSONVILLE, FL 32223
COMMITMENT NO.: 167-223103038C
PROPERTY ADDRESS: FOUR TRACTS IN WAKE COUNTY TO BE KNOWN AS TART, N/A, NC 00000

1. COMMITMENT DATE: OCTOBER 27, 2022 AT 12:00 AM

2. POLICY TO BE ISSUED:
(A) ALTA OWNER'S POLICY (06-16-07)
PROPOSED INSURED: D.R. HORTON, INC., A DELAWARE CORPORATION
PROPOSED POLICY AMOUNT: $1,800,000.00

3. THE ESTATE OR INTEREST IN THE LAND DESCRIBED OR REFERRED TO IN THIS COMMITMENT IS:
FEE SIMPLE

4. THE TITLE IS, AT THE COMMITMENT DATE, VESTED IN:
TRACT 1
DEBORAH JANE TART AND MILTON E. TART, JR. AS TENANTS IN COMMON

TRACT 2
MILTON EDWARD TART, III AND WIFE, JANET STANLEY TART

TRACT 3
MILTON EDWARD TART, JR. AND WIFE, PATSY PRICE TART

TRACT 4
LEE T. ALFORD

5. THE LAND IS DESCRIBED AS FOLLOWS:

TRACT 1
PARCEL 1
ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING IN SAINT MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA, CONTAINING 2.694 ACRES MORE OR LESS, AND BEING MORE PARTICULARLY SHOWN AS LOT 2 ON THAT CERTAIN PLAT OF SURVEY ENTITLED, " FINAL PLAT MINOR FAMILY SUBDIVISION GLADYS F. TART", BY GIL CLARK SURVEYING, WHICH PLAT IS RECORDED IN BOOK OF MAPS 2003, PAGE 1494, WAKE COUNTY REGISTRY, AND IS BY REFERENCE, INCORPORATED HEREIN AS A PART OF THIS DESCRIPTION.

PARCEL 2
ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING IN SAINT MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA, CONTAINING 3.896 ACRES MORE OR LESS, AND BEING MORE PARTICULARLY SHOWN AS LOT 5 ON THAT CERTAIN PLAT OF SURVEY BY GIL CLARK SURVEYING, WHICH PLAT IS RECORDED IN BOOK OF MAPS 2003, PAGE 1494, WAKE COUNTY REGISTRY, AND IS BY REFERENCE, INCORPORATED HEREIN AS A PART OF THIS DESCRIPTION.

PARCEL 3
ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING IN SAINT MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA, CONTAINING 2.166 ACRES MORE OR LESS, AND BEING MORE PARTICULARLY SHOWN AS LOT 3 ON THAT CERTAIN PLAT OF SURVEY BY GIL CLARK SURVEYING, WHICH PLAT IS RECORDED IN BOOK OF MAPS 2005, PAGE 2138, WAKE COUNTY REGISTRY, AND IS BY REFERENCE, INCORPORATED HEREIN AS A PART OF THIS DESCRIPTION.

PARCEL 4
ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING IN SAINT MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA, SHOWN AS "TART FARM RD. NEW 6' PRIVATE R/W" ON THAT CERTAIN PLAT OF SURVEY BY GIL CLARK SURVEYING, WHICH PLAT IS RECORDED IN BOOK OF MAPS 2000, PAGE 1877, WAKE COUNTY REGISTRY, AND IS BY REFERENCE, INCORPORATED HEREIN AS A PART OF THIS DESCRIPTION.

TRACT 2
ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING IN SAINT MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA, CONTAINING 1.000 ACRE MORE OR LESS, AND BEING MORE PARTICULARLY SHOWN AS LOT 1 ON THAT CERTAIN PLAT OF SURVEY BY GIL CLARK SURVEYING, WHICH PLAT IS RECORDED IN BOOK OF MAPS 2000, PAGE 1877, WAKE COUNTY REGISTRY, AND IS BY REFERENCE, INCORPORATED HEREIN AS A PART OF THIS DESCRIPTION.

TRACT 3
BEGINNING AT A NAIL AND CAP IN THE CENTER OF FAISON ROAD (STATE ROAD 2515) AND THE NORTHEASTERN CORNER OF THE PROPERTY OF JAMES R. FAISON, SOUTHERN LINE OF THE PROPERTY HERETOFORE BELONGING TO OLLIE W. FAISON AND WIFE DAISY P. FAISON AND FROM THE POINT AND PLACE OF BEGINNING SOUTH 00 DEGREES 19 MINUTES WEST 230.74 FEET TO A STAKE IN THE EASTERN LINE OF THE PROPERTY OF JAMES R. FAISON AND THE WESTERN LINE OF GLADYS FAISON TART; THENCE SOUTH 83 DEGREES 4 MINUTES EAST 200 FEET TO A STAKE; THENCE NORTH 00 DEGREES 19 MINUTES EAST 230.74 FEET TO A NAIL AND CAP LOCATES IN THE CENTER OF FAISON ROAD (STATE ROAD 2515); THENCE WITH THE CENTER OF SAID ROAD NORTH 83 DEGREES 4 MINUTES WEST 200 FEET TO THE POINT AND PLACE OF BEGINNING CONTAINING 1.05 ACRES MORE OR LESS INCLUSIVE OF THE RIGHT OF WAY OF FAISON ROAD (STATE ROAD 2515).

TRACT 4
ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING IN SAINT MATTHEWS TOWNSHIP, WAKE COUNTY, NORTH CAROLINA, CONTAINING 1.079 ACRES MORE OR LESS, AND BEING MORE PARTICULARLY SHOWN AS LOT 4 ON THAT CERTAIN PLAT OF SURVEY BY GIL CLARK SURVEYING, WHICH PLAT IS RECORDED IN BOOK OF MAPS 2005, PAGE 2138, WAKE COUNTY REGISTRY, AND IS BY REFERENCE, INCORPORATED HEREIN AS A PART OF THIS DESCRIPTION.

COMMITMENT NO.: 167-223103038C

SCHEDULE B, PART II
EXCEPTIONS

THIS COMMITMENT DOES NOT REPUBLISH ANY COVENANT, CONDITION, RESTRICTION, OR LIMITATION CONTAINED IN ANY DOCUMENT REFERRED TO IN THIS COMMITMENT TO THE EXTENT THAT THE SPECIFIC COVENANT, CONDITION, RESTRICTION, OR LIMITATION VIOLATES STATE OR FEDERAL LAW BASED ON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, GENDER IDENTITY, HANDICAP, FAMILIAL STATUS, OR NATIONAL ORIGIN.

THE POLICY WILL NOT INSURE AGAINST LOSS OR DAMAGE RESULTING FROM THE TERMS AND PROVISIONS OF ANY LEASE OR EASEMENT IDENTIFIED IN SCHEDULE A, AND WILL INCLUDE THE FOLLOWING EXCEPTIONS UNLESS CLEARED TO THE SATISFACTION OF THE COMPANY:

1. ANY DEFECT, LIEN, ENCUMBRANCE, ADVERSE CLAIM, OR OTHER MATTER THAT APPEARS FOR THE FIRST TIME IN THE PUBLIC RECORDS OR IS CREATED, ATTACHES, OR IS DISCLOSED BETWEEN THE COMMITMENT DATE AND THE DATE ON WHICH ALL OF THE SCHEDULE B, PART I - REQUIREMENTS ARE MET.
(NO MATTER OF SURVEY)

2. TAXES AND ASSESSMENTS FOR THE YEAR 2023, A LIEN NOW DUE AND PAYABLE AND SUBSEQUENT YEARS, A LIEN NOT YET DUE AND PAYABLE.
(NO MATTER OF SURVEY)

3. TITLE TO ANY AREAS WITHIN STREET, HIGHWAY OR RAILROAD RIGHTS OF WAY, IF ANY.
(NO MATTER OF SURVEY)

4. THE CREATION OR LOSS OF LAND BY NATURAL OR ARTIFICIAL CHANGES ALONG WATER FORMING PART OF THE BOUNDARY OF THE LAND; AND/OR TITLE TO LAND LYING BELOW THE HIGHER OF THE MEAN HIGH WATER MARK AND/OR THE NORMAL BOUNDS OF ANY BODY OF WATER; AND/OR RIPARIAN RIGHTS INCIDENT TO ANY BRANCHES, CREEKS, STREAMS, LAKES OR OTHER WATERS COURSING OR ABUTTING THE LAND.
(NO MATTER OF SURVEY)

5. ANY DISCREPANCY, CONFLICT, ACCESS, SHORTAGE IN AREA OR BOUNDARY LINES, ENCROACHMENT, ENCUMBRANCE, VIOLATION, OVERLAP, SETBACK, EASEMENT OR CLAIMS OF EASEMENT, RIPARIAN RIGHT, AND TITLE TO LAND WITHIN ROADS, WAYS, RAILROADS, WATERCOURSES, BURIAL GROUNDS, MARSHES, DREDGED OR FILLED AREAS OR LAND BELOW THE MEAN HIGHWATER MARK OR WITHIN THE BOUNDS OF ANY ADJOINING BODY OF WATER, OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY A CURRENT INSPECTION AND ACCURATE AND COMPLETE LAND SURVEY OF THE LAND.
(AS SHOWN HEREON)

6. ALL DEFERRED TAXES
(NO MATTER OF SURVEY)

7. TRACT 1:
A. ANY RIGHT, EASEMENT, SETBACK, INTEREST, CLAIM, ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATIONS OR OTHER ADVERSE CIURCUMSTANCE AFFECTING THE TITLE DISCLOSED BY PLAT(S) RECORDED IN BOOK MAP 2003, AT PAGE 1494 AND BOOK MAP 2005, PAGE 2138 AND MATTERS SHOWN THEREON.
(AS SHOWN HEREON)

8. TRACTS 1 AND 2:
A. EASEMENTS TO CAROLINA POWER & LIGHT COMPANY OF RECORD IN BOOK 1946, PAGE 168; BOOK 4327, PAGE 198; AND BOOK 9483, PAGE 792, WAKE COUNTY REGISTRY.
(LOCATION CANNOT BE DETERMINED FROM RECORD DOCUMENTS)

B. ORDER GRANTING A VARIANCE BY THE KNIGHTDALE BOARD OF ADJUSTMENT, DATED JULY 19, 2000, OF RECORD IN BOOK 8647, PAGE 1755, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

C. ROAD MAINTENANCE AGREEMENT FOR TART FARM ROAD BETWEEN GLADYS F. TART, MILTON EDWARD TART, JR., AND MILTON EDWARD TART, III, OF RECORD IN BOOK 8692, PAGE 161, AND RE-RECORDED IN BOOK 8710, PAGE 2779, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

D. MEMORANDUM OF CONTRACT WITH D.R. HORTON, INC. OF RECORD IN BOOK 19098, PAGE 791, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

9. TRACT 2:
A. ANY RIGHT, EASEMENT, SETBACK, INTEREST, CLAIM, ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATIONS OR OTHER ADVERSE CIURCUMSTANCE AFFECTING THE TITLE DISCLOSED BY PLAT(S) RECORDED IN BOOK MAP 2000, AT PAGE 1877 AND MATTERS SHOWN THEREON.
(AS SHOWN HEREON)

10. TRACTS 3 AND 4:
A. RIGHT OF WAY AGREEMENT BETWEEN MILTON E. TART, GLADYS F. TART, AND THE STATE HIGHWAY COMMISSION FOR SR# 2515, RECORDED IN BOOK 1445, PAGE 579, WAKE COUNTY REGISTRY.
(NO PLOTTABLE DESCRIPTION FOUND)

B. EASEMENTS TO CAROLINA POWER AND LIGHT RECORDED IN BOOK 1946, PAGE 168; BOOK 4327, PAGE 199; AND BOOK 9483, PAGE 790, WAKE COUNTY REGISTRY.
(LOCATION CANNOT BE DETERMINED FROM RECORD DOCUMENTS)

C. ROAD MAINTENANCE AGREEMENT FOR TART FARM ROAD BETWEEN GLADYS F. TART, MILTON EDWARD TART, JR., AND MILTON EDWARD TART, III, OF RECORD IN BOOK 8692, PAGE 161, AND RE-RECORDED IN BOOK 8710, PAGE 2779, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

D. MEMORANDUM OF CONTRACT WITH D.R. HORTON, INC., DATED JULY 13, 2022, OF RECORD IN BOOK 19098, PAGE 791, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

E. ORDER GRANTING A VARIANCE BY THE KNIGHTDALE BOARD OF ADJUSTMENT, DATED JULY 19, 2000, OF RECORD IN BOOK 8647, PAGE 1755, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

11. TRACT 4:
A. ANY RIGHT, EASEMENT, SETBACK, INTEREST, CLAIM, ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATIONS OR OTHER ADVERSE CIURCUMSTANCE AFFECTING THE TITLE DISCLOSED BY PLAT(S) RECORDED IN BOOK MAP 2005, AT PAGE 2138 AND MATTERS SHOWN THEREON.
(AS SHOWN HEREON)

12. THE CORRECTNESS OF THE SQUARE FOOTAGE/ACREAGE COMPUTATION CONTAINED IN THE DESCRIPTION OF THE LAND IS NOT INSURED.
(NO MATTER OF SURVEY)

13. NO CLOSING SERVICES INSURANCE: AS TO THE TRANSACTION FOR WHICH THIS COMMITMENT IS ISSUED, THE COMPANY DOES NOT AFFORD INSURED CLOSING PROTECTION/CLOSING SERVICES INSURANCE ABSENT REVISION OF THIS COMMITMENT TO INCLUDE A STATEMENT THAT COVERAGE IS AFFORDED TO THOSE PARTIES IDENTIFIED IN A SEPARATE CLOSING PROTECTION LETTER ISSUED SIMULTANEOUSLY WITH REVISION OF THE COMMITMENT. ANY CLOSING PROTECTION COVERAGE OR LETTER WHICH HERETOFORE MAY HAVE BEEN ISSUED IS HEREBY RESCINDED AND SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION. ANY CLOSING PROTECTION LETTER SUBSEQUENTLY ISSUED SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION ABSENT THE ACCOMPANYING REQUISITE REVISION OF THIS COMMITMENT.
(NO MATTER OF SURVEY)

SURVEY COMMENTS
SURVEY MADE BY BATEMAN CIVIL SURVEY COMPANY
DATED 12/12/2022, JOB NO. 220655

SCHEDULE A

ISSUING OFFICE: DHI TITLE OF NORTH CAROLINA, 12276 SAN JOSE BLVD, SUITE 739, JACKSONVILLE, FL 32223
COMMITMENT NO.: 169-223103164C
PROPERTY ADDRESS: ACQUISITION TRACT 4, ED PLUMMER ESTATE PROPERTY, N/A, NC 00000

1. COMMITMENT DATE: NOVEMBER 8, 2022 AT 12:00 AM

2. POLICY TO BE ISSUED:
(A) ALTA OWNER'S POLICY (06-16-07)
PROPOSED INSURED: D.R. HORTON, INC., A DELAWARE CORPORATION
PROPOSED POLICY AMOUNT: $1,400,000.00

3. THE ESTATE OR INTEREST IN THE LAND DESCRIBED OR REFERRED TO IN THIS COMMITMENT IS:
FEE SIMPLE

4. THE TITLE IS, AT THE COMMITMENT DATE, VESTED IN:
LANCE R. VANDYKE AND WIFE, JACQUELINE VANDYKE

5. THE LAND IS DESCRIBED AS FOLLOWS:

BEING ALL OF TRACT 4 OF THE ED PLUMMER ESTATE PROPERTY ON OLD FAISON RD. AS DEPICTED IN MAP BOOK 1996, PAGE 1615, WAKE COUNTY REGISTRY.

COMMITMENT NO.: 169-223103164C

SCHEDULE B, PART II
EXCEPTIONS

THIS COMMITMENT DOES NOT REPUBLISH ANY COVENANT, CONDITION, RESTRICTION, OR LIMITATION CONTAINED IN ANY DOCUMENT REFERRED TO IN THIS COMMITMENT TO THE EXTENT THAT THE SPECIFIC COVENANT, CONDITION, RESTRICTION, OR LIMITATION VIOLATES STATE OR FEDERAL LAW BASED ON RACE,COLOR, RELIGION, SEX,SEXUAL ORIENTATION, GENDER IDENTITY,HANDICAP, FAMILIAL STATUS,OR NATIONAL ORIGIN.

THE POLICY WILL NOT INSURE AGAINST LOSS OR DAMAGE RESULTING FROM THE TERMS AND PROVISIONS OF ANY LEASE OR EASEMENT IDENTIFIED IN SCHEDULE A, AND WILL INCLUDE THE FOLLOWING EXCEPTIONS UNLESS CLEARED TO THE SATISFACTION OF THE COMPANY:

1. ANY DEFECT, LIEN, ENCUMBRANCE, ADVERSE CLAIM, OR OTHER MATTER THAT APPEARS FOR THE FIRST TIME IN THE PUBLIC RECORDS OR IS CREATED, ATTACHES, OR IS DISCLOSED BETWEEN THE COMMITMENT DATE AND THE DATE ON WHICH ALL OF THE SCHEDULE B, PART I-REQUIREMENTS ARE MET.
(NO MATTER OF SURVEY)

2. TAXES AND ASSESSMENTS FOR THE YEAR 2022 AND SUBSEQUENT YEARS, NOT YET DUE AND PAYABLE.
(NO MATTER OF SURVEY)

3. TITLE TO ANY AREAS WITHIN STREET, HIGHWAY OR RAILROAD RIGHTS OF WAY, IF ANY.
(NO MATTER OF SURVEY)

4. THE CREATION OR LOSS OF LAND BY NATURAL OR ARTIFICIAL CHANGES ALONG WATER FORMING PART OF THE BOUNDARY OF THE LAND; AND/OR TITLE TO LAND LYING BELOW THE HIGHER OF THE MEAN HIGH WATER MARK AND/OR THE NORMAL BOUNDS OF ANY BODY OF WATER; AND/OR RIPARIAN RIGHTS INCIDENT TO ANY BRANCHES, CREEKS, STREAMS, LAKES OR OTHER WATERS COURSING OR ABUTTING THE LAND.
(NO MATTER OF SURVEY)

5. ANY DISCREPANCY, CONFLICT, ACCESS, SHORTAGE IN AREA OR BOUNDARY LINES, ENCROACHMENT, ENCUMBRANCE, VIOLATION, OVERLAP, SETBACK, EASEMENT OR CLAIMS OF EASEMENT, RIPARIAN RIGHT, AND TITLE TO LAND WITHIN ROADS, WAYS, RAILROADS, WATERCOURSES, BURIAL GROUNDS, MARSHES, DREDGED OR FILLED AREAS OR LAND BELOW THE MEAN HIGHWATER MARK OR WITHIN THE BOUNDS OF ANY ADJOINING BODY OF WATER, OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY A CURRENT INSPECTION AND ACCURATE AND COMPLETE LAND SURVEY OF THE LAND.
(AS SHOWN HEREON)

6. ANY RIGHT, EASEMENT, SETBACK, INTEREST, CLAIM, ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATIONS OR OTHER ADVERSE CIRCUMSTANCE AFFECTING THE TITLE DISCLOSED BY PLAT(S) RECORDED IN BOOK OF MAPS 1996, AT PAGE 1615, OF THE WAKE COUNTY REGISTRY.
(AS SHOWN HEREON)

7. EASEMENT FOR ROADWAY DATED 11/10/1945 IN BOOK 930, PAGE 590, WAKE COUNTY REGISTRY
(NO PLOTTABLE DESCRIPTION FOUND)

8. RIGHT OF WAY EASEMENT DATED 4/11/1949 IN BOOK 1018, PAGE 553, WAKE COUNTY REGISTRY.
(EASEMENT HAS TERMINATED PER TERMS)

9. EASEMENT TO CAROLINA POWER AND LIGHT DATED 9/13/1956 OF RECORD IN BOOK 1252, PAGE 485, WAKE COUNTY REGISTRY.
(EASEMENT IS BLANKET IN NATURE)

10. RIGHT OF WAY AGREEMENT DATED 12/7/1960 TO THE STATE HIGHWAY COMMISSION IN BOOK 1445, PAGE 575, WAKE COUNTY REGISTRY.
(NO PLOTTABLE DESCRIPTION FOUND)

11. EASEMENT TO CAROLINA POWER AND LIGHT DATED 7/14/1970 OF RECORD IN BOOK 1939, PAGE 230, WAKE COUNTY REGISTRY.
(AS SHOWN HERON)

12. EASEMENT TO CAROLINA POWER AND LIGHT DATED 1/13/1972 OF RECORD IN BOOK 2052, PAGE 131, WAKE COUNTY REGISTRY.
(EASEMENT IS BLANKET IN NATURE)

13. EQUITY LINE DEED OF TRUST TO COASTAL FEDERAL CREDIT UNION DATED 2/14/2022 OF RECORD IN BOOK 18924, PAGE 945, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

14. MEMORANDUM OF CONTRACT WITH DR HORTON, INC. OF RECORD IN BOOK 19098, PAGE 653, WAKE COUNTY REGISTRY.
(NO MATTER OF SURVEY)

15. SUBJECT TO THE CLAIMS OF PROPERTY OWNERS TO THE EAST BASED UPON THE MAP IN BM 1996, PAGE 1615, WHICH CREATES AN OVERLAP AND SHOWS THE ADJACENT TRACT WITH NO ACCESS AND NOT ADJACENT TO THE PUBLIC ROAD
(AS SHOWN HEREON)

16. NO CLOSING SERVICES INSURANCE: AS TO THE TRANSACTION FOR WHICH THIS COMMITMENT IS ISSUED, THE COMPANY DOES NOT AFFORD INSURED CLOSING PROTECTION/CLOSING SERVICES INSURANCE ABSENT REVISION OF THIS COMMITMENT TO INCLUDE A STATEMENT THAT COVERAGE IS AFFORDED TO THOSE PARTIES IDENTIFIED IN A SEPARATE CLOSING PROTECTION LETTER ISSUED SIMULTANEOUSLY WITH REVISION OF THE COMMITMENT. ANY CLOSING PROTECTION COVERAGE OR LETTER WHICH HERETOFORE MAY HAVE BEEN ISSUED IS HEREBY RESCINDED AND SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION. ANY CLOSING PROTECTION LETTER SUBSEQUENTLY ISSUED SHALL NOT BE EFFECTIVE AS TO THIS TRANSACTION ABSENT THE ACCOMPANYING REQUISITE REVISION OF THIS COMMITMENT.
(NO MATTER OF SURVEY)

BATEMAN CIVIL SURVEY COMPANY
ENGINEERS ● SURVEYORS ● PLANNERS
2524 RELIANCE AVENUE, APEX, NC 27539
PHONE: (919) 577-1080 FAX: (919) 577-1081
INFO@BATEMANCIVILSURVEY.COM
NCBELS FIRM# C-2378

ALTA/NSPS/LAND TITLE SURVEY

EXCLUSIVELY FOR: DR HORTON

PROPERTY PINS: 1753152116, 1743953683, 1743971085, 1743986356, 1743893384, 1753071583, 1743976575 & 1743779851

AS RECORDED IN: DB 15657 PG 540, DB 2253 PG 285, DB 15474 PG 755, BM 2000, PG 1887, DB 9018 PG 621, DB 6075 PG 504 & DB 7755 PG 552

ST MATTHEWS TOWNSHIP - WAKE COUNTY - NORTH CAROLINA

REVISIONS

1.

2.

3.

4.

5.

DESIGNED BY: N/A

DRAWN BY: ELS

CHECKED BY: SPC

SCALE: VARIES

DATE: 1/27/2023

JOB NUMBER: 220655

SHEET 4 OF 4

P:\2022 Projects\220655 Old Faison ALTA - DR Horton\DWG\220655 Old Faison ALTA.dwg

NOTES:

TOPOGRAPHY PER WAKE COUNTY GIS

GRAPHIC SCALE

0 100 200 400 800

(IN FEET)

1 inch = 200 ft.

URBAN DESIGN PARTNERS

150 fayetteville st ste 1310
raleigh, nc 27601
p 919.275.5002
urbandesignpartners.com

nc firm no: P-2671 sc coa no: C-03044

FOR REFERENCE ONLY

07/05/2024

D.R. Horton

7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan

Existing Conditions TOPO

Knightdale, North Carolina

NO. DATE: BY: REVISIONS:

Project No: 22-RDU-083

Date: 07/05/2024

Sheet No:

--

NOTE: Location, shape and size of depicted features on the evaluated site are approximate and should be surveyed by a licensed NC surveyor for final site planning.

NOTE: This map is a revision of the previously submitted map based on the ite meeting with Matt Martin of the U.S. Army Corp of Engineers Raleigh Regulatory Field Office on January 25, 2024.

Pond 2

SE01 Start Stream

SF01 Start Stream

SD01 Start Stream

Potential Wetland Waters of the US WE-2 - 0.1 Ac.

Potential Wetland Waters of the US WE-1 - 0.17 Ac.

Potential Wetland Waters of the US WD-3 - 0.08 Ac.

Potential Non-Wetland Waters of the US SF - 550 LF

Potential Non-Wetland Waters of the US SE - 1330 LF

Potential Non-Wetland Waters of the US SD - 2085 LF

Potential Wetland Waters of the US WD-2 - 0.4 Ac.

DP2 Up

DP1 Wet

Potential Wetland Waters of the US WE-3 - 0.6 Ac.

Potential Wetland Waters of the US WD-1 - 0.6 Ac.

Potential Non-Wetland Waters of the US SG - 750 LF

WGDP2 up

Potential Wetland Waters of the US WC-1 - 0.42 Ac.

DP3 Up

WGDP1 Wet

Potential Wetland Waters of the US WG-1 - 0.73 Ac.

Potential Wetland Waters of the US WB-2 - 0.08 Ac.

DP4 Up

Potential Wetland Waters of the US WG-2 - 0.23 Ac.

Potential Wetland Waters of the US WB-4 - 0.006 Ac.

SFSB1-1

SFSB1-2

DP7 Up

Potential Wetland Waters of the US WB-3 - 0.16 Ac.

Stream SB

Potential Non-Wetland Waters of the US Pond 1 - 4.9 Ac.

Potential Non-Wetland Waters of the US SB1 - 217 LF

DP5 Up

SFSB-1

Potential Non-Wetland Waters of the US SB - 1390 LF

Potential Wetland Waters of the US WB-1 - 1.2 Ac.

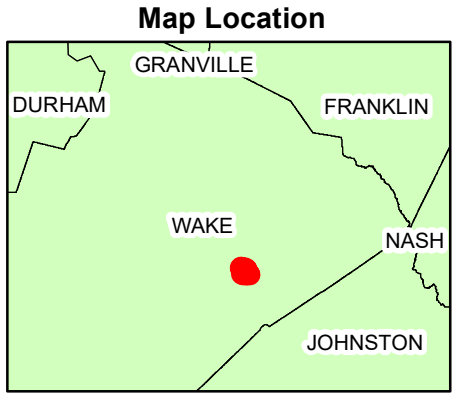
DP6 Wet

Spires Dr
Woodfield Ln
Old Faison Rd
Wooded Pine Ln
Pine Sap Ln
Pleasant Colony Dr
Shady Acres Loop
Shady Acres Loop
Shady Cir
Tant Farm Rd
Meadows Cir
Moon Valley Ln
Quiet Way
Rochelle Dr
Bethlehem Rd
Taylors Farm Ct
Rochelle Dr
New Faison Ln
Cross Cut Pl
Clifton Rd
I 495 Ramp SB
I 495 Ramp SB
I 87 SB
US 64 Hwy WB
I 495 Ramp NB
US 64 Hwy EB
Clifton Rd

Legend

- Project Study Area
- 2' Contour
- AJD Boundary
- Stream Form
- Data Point
- Potential Non-Wetland - Non-Buffered Intermittent Stream - Jurisdictional Waters of the US
- Potential Non-Wetland - Perennial Stream - Jurisdictional Waters of the US; Subject to 50-Foot Neuse River Riparian Buffers
- Potential Wetlands - Jurisdictional Waters of the US
- Non-Jurisdictional Pond - Pond Built In High Ground
- Potential Non-Wetland - Pond - Jurisdictional Waters of the US; Subject to 50-Foot Neuse River Riparian Buffer

Map Location



AJD/ PJD Revised Wetland Sketch Map

Bethlehem Rd. Project
Sage Project # 2022.105

February 6, 2024

1" = 400'

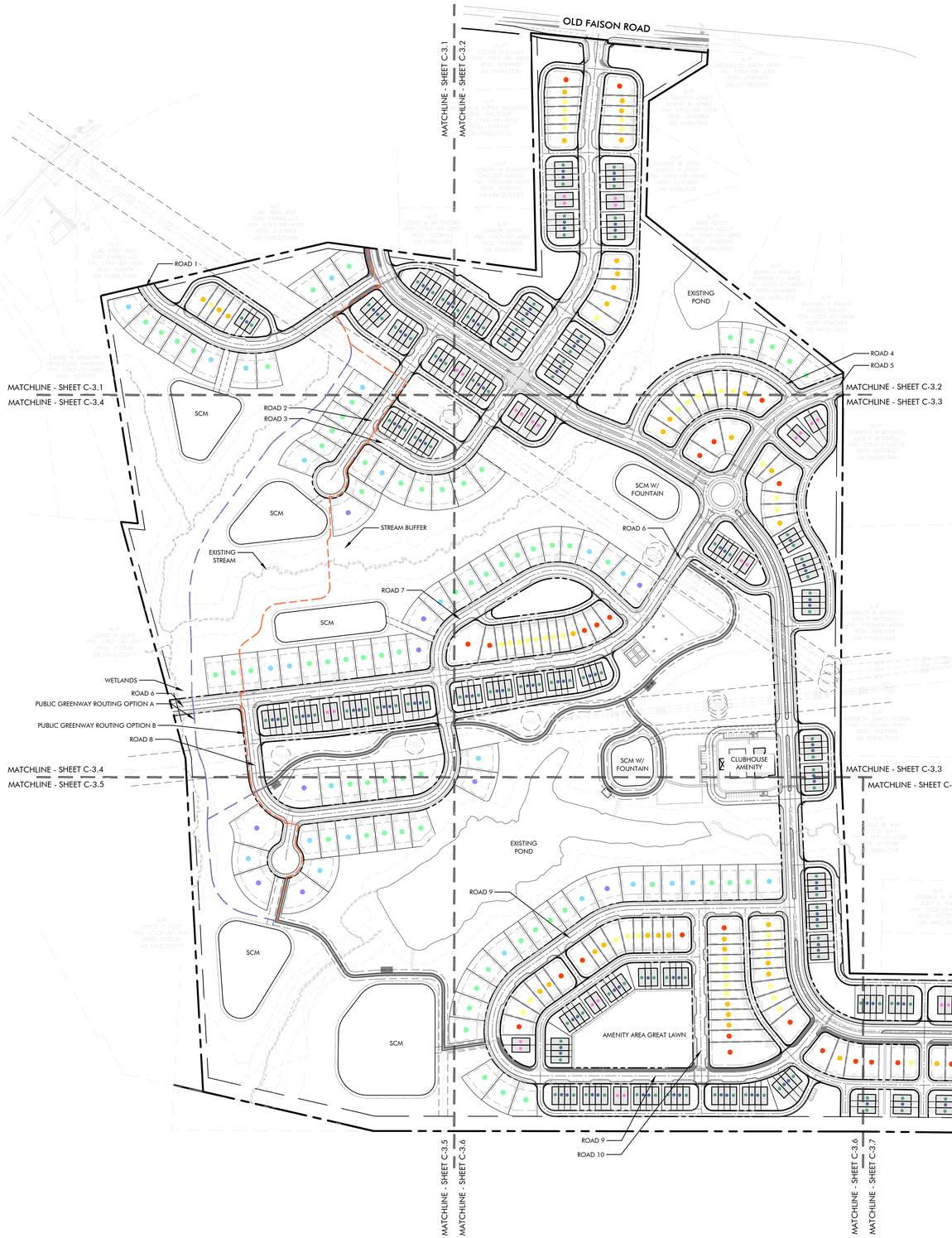
N

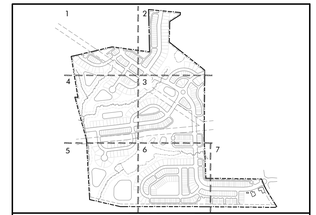
0 205 410 Feet

Figure 3

Drawn By:
David Gainey

Sage Ecological Services, Inc.
Office: 919-335-6757
Cell: 919-559-1537





KEY MAP

PARKING CALCS

COMMERCIAL*

VEHICULAR PARKING

- REQUIRED: 27- 53 SPACES
  (15,000 SF x 3.5 SP/1000 SF = 52.5 MAX
  52.5/2 = 26.2 MIN
- PROPOSED: 60 SPACES

BICYCLE PARKING

- REQUIRED: 3 SPACES
- PROPOSED: 3 SPACES

RESIDENTIAL*

TOWNHOMES/DUPLEX

- REQUIRED: 819 SP (1.0 SP/BED)
  273 DU x 3 BED** = 819 SP
- PROPOSED: 819 SPACES TOTAL

SINGLE FAMILY REAR-LOADED

- REQUIRED: 327 SP (1.0 SP/BED)
  109 DU x 3 BED** = 327 SP
- PROPOSED: 327 SPACES TOTAL

SINGLE FAMILY FRONT-LOADED

- REQUIRED: 300 SP (1.0 SP/BED)
  100 DU x 3 BED** = 300 SP
- PROPOSED: 300 SPACES TOTAL

ON STREET PARKING: 230 SPACES PROP.

*NOTE: VEHICULAR, BICYCLE, AND ELECTRIC VEHICLE CHARGING STATION TOTALS SUBJECT TO CHANGE AS MASTER PLAN SET PROGRESSES AND AS USES/TENANTS ARE ESTABLISHED.

**NOTE: ALL RESIDENTIAL UNITS ASSUMED TO BE 3 BEDROOMS.

BUILDING SETBACKS

TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN
COMMERCIAL	
- FRONT:	10' MIN
- REAR:	0' MIN
- SIDE:	6' MIN
CLUBHOUSE	
- FRONT:	10' MIN
- REAR:	0' MIN
- SIDE:	6' MIN

SITE DATA:

PIN(S):	1743953683; 1743971085; 1753071583; 1743976575; 1743989384; 1743986356; 1753152116
TOTAL ACRES:	± 171.88 ACRES
EXISTING ZONING:	RT (RURAL TRANSITIONAL)
PROPOSED ZONING:	RMX-PUD
EXISTING USE:	RESIDENTIAL & AGRICULTURAL
PROPOSED USE:	RESIDENTIAL & COMMERCIAL OUTPARCEL

DEVELOPMENT SUMMARY:

COMMERCIAL

•TOTAL LAND AREA:	± 1.77 AC (77,033 SF)
•BUILDINGS:	1 BLDG
•BUILDING HEIGHT:	MAX. 2 STORIES
•POTENTIAL USES:	USES SET FORTH IN PLANNED UNIT DEVELOPMENT (SEE ZMA-2-23)

RESIDENTIAL

•TOTAL LAND AREA:	± 129.3 AC
•PROPOSED UNITS:	482 DU (UP TO 500 DU ALLOWED)
→ TOWNHOMES	247 TOWNHOMES
20' (MIN.) UNIT	117 UNITS
TYP LOT SIZE:	20' X 90' (1,800 SF)
22' (MIN.) UNIT	130 UNITS
TYP LOT SIZE:	22' X 90' (1,980 SF)
→ DUPLEX	26 DUPLEX UNITS
22' (MIN.) UNIT	26 UNITS
TYP LOT SIZE:	32' X 90' (2,880 SF)
→ SINGLE FAMILY (REAR-LOAD)	109 REAR LOAD SINGLES
30' (MIN.) LOT	46 LOTS
TYP LOT SIZE:	30' X 120' (3,600 SF)
35' (MIN.) LOT	39 LOTS
TYP LOT SIZE:	35' X 120' (4,200 SF)
40' (MIN.) LOT	24 LOTS
TYP LOT SIZE:	40' X 120' (4,800 SF)
→ SINGLE FAMILY (FRONT-LOAD)	100 FRONT LOAD SINGLES
60' (MIN.) LOT	66 LOTS
TYP LOT SIZE:	60' X 120' (7,200 SF)
70' (MIN.) LOT	24 LOTS
TYP LOT SIZE:	70' X 120' (8,400 SF)
80' (MIN.) LOT	10 LOTS
TYP LOT SIZE:	80' X 120' (9,600 SF)

811

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CALL 811 OR 1-800-632-4949
N.C. ONE-CALL CENTER
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GRAPHIC SCALE

0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

URBAN DESIGN PARTNERS
150 fayetteville st ste 1310
raleigh, nc 27601
p 919.275.5002
urbandesignpartners.com
nc firm no: P-2671 sc coa no: C-03044

PRELIMINARY DRAWING
FOR REVIEW PURPOSES ONLY

07/05/2024

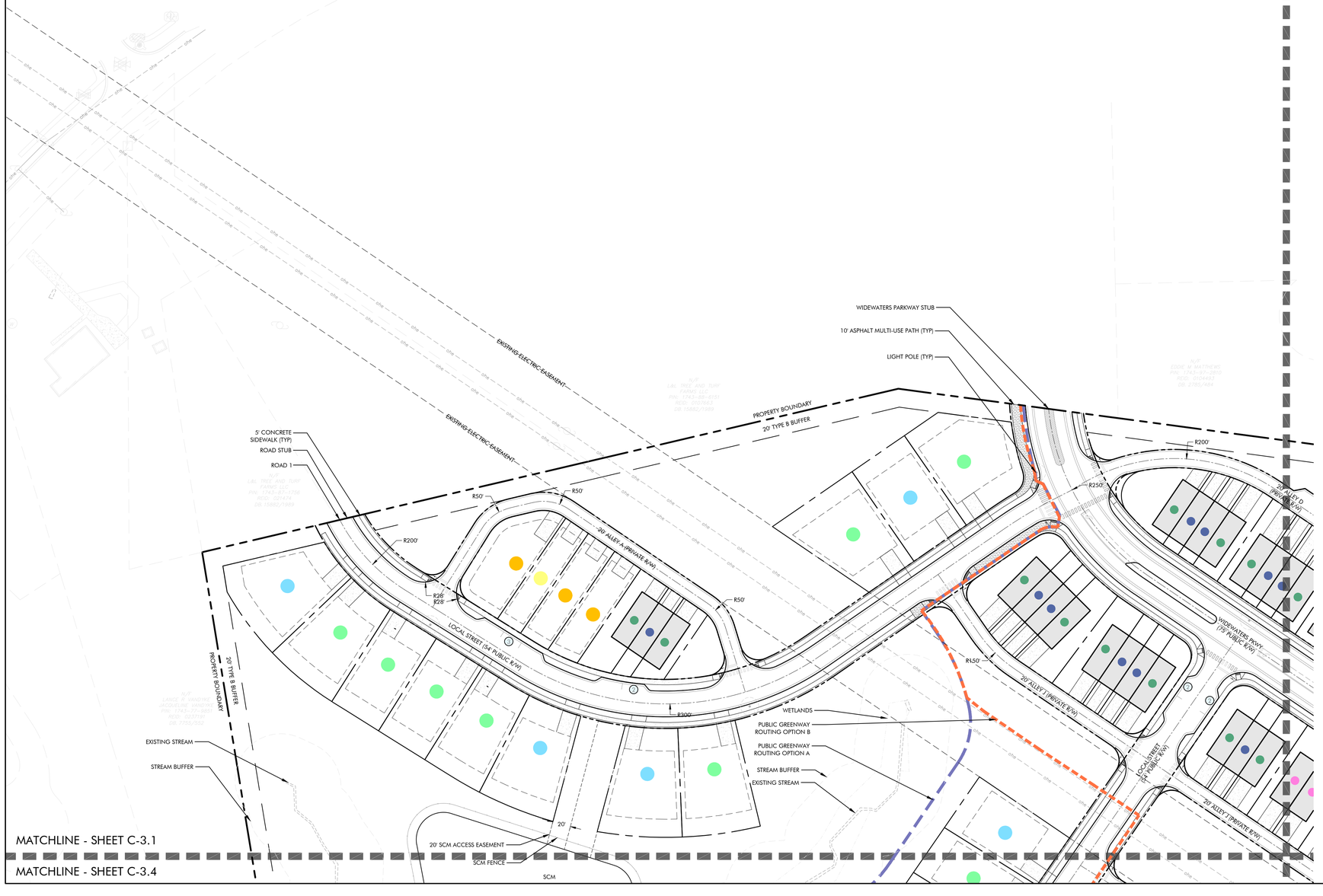
D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan
Overall Site Plan
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/02/2024		
#5	05/31/2024		

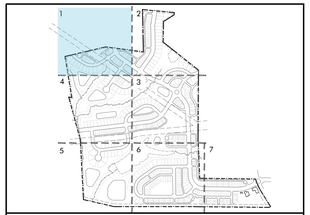
Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-3.0



BUILDING SETBACKS

TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN



KEY MAP

LEGEND

UNIT TYPE	DU COUNT*
TOWNHOMES	21 DU
20' UNIT	*10 DU*
22' UNIT	*11 DU*
DUPLEXES	0 DU
22' UNIT	*0 DU*
SINGLE FAM. (REAR-LOAD)	4 DU
30' LOT	*1 DU*
35' LOT	*3 DU*
40' LOT	*0 DU*
SINGLE FAM. (FRONT-LOAD)	12 DU
60' LOT	*7 DU*
70' LOT	*5 DU*
80' LOT	*0 DU*

*NOTE: UNIT COUNTS REFLECT NUMBER OF UNITS THAT FIT WITHIN MATCHLINES OF EACH SHEET. ANY UNITS SHOWN OUTSIDE OF MATCHLINES WILL BE COUNTED ON THEIR RESPECTIVE SHEETS.

TOTAL UNIT COUNT FOUND ON OVERALL SITE PLAN SHEET & COVER SHEET.

NOTES:

1. BOUNDARY AND TOPOGRAPHIC INFORMATION PROVIDED BY:
   BATEMAN CIVIL SURVEY COMPANY
   2524 RELIANCE AVENUE
   APEX, NC 27539
   919-577-1080
2. CONTACT THE UTILITY COMPANY TO RELOCATE ANY EXISTING UTILITY POLES. ALL EXISTING FACILITIES WHICH CONFLICT WITH THE IMPROVEMENTS UNDER THE SCOPE OF THIS PROJECT MUST BE RELOCATED AT THE EXPENSE OF THE APPLICANT.
3. DIMENSIONS SHOWN ARE TO THE FACE OF CURB UNLESS OTHERWISE NOTED.
4. LOCATIONS OF SITE LIGHTING ARE APPROXIMATE. THE FINAL NUMBER AND LOCATIONS OF LIGHTS SHALL BE DETERMINED BY THE OWNER AND DUKE ENERGY.
5. ALL UTILITIES WILL BE UNDERGROUND.
6. UNIT MIX SUBJECT TO CHANGE AS MASTER PLAN SET PROGRESSES.

BEFORE YOU DIG!
CALL 811 OR 1-800-632-4949
N.C. ONE-CALL CENTER
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GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

URBAN DESIGN PARTNERS
150 fayetteville st ste 1310
raleigh, nc 27601
p 919.275.5002
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nc firm no: P-2671 sc coa no: C-03044

PRELIMINARY DRAWING
FOR REVIEW PURPOSES ONLY

07/05/2024

D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan
Site Plan Enlargement 1
Knightdale, North Carolina

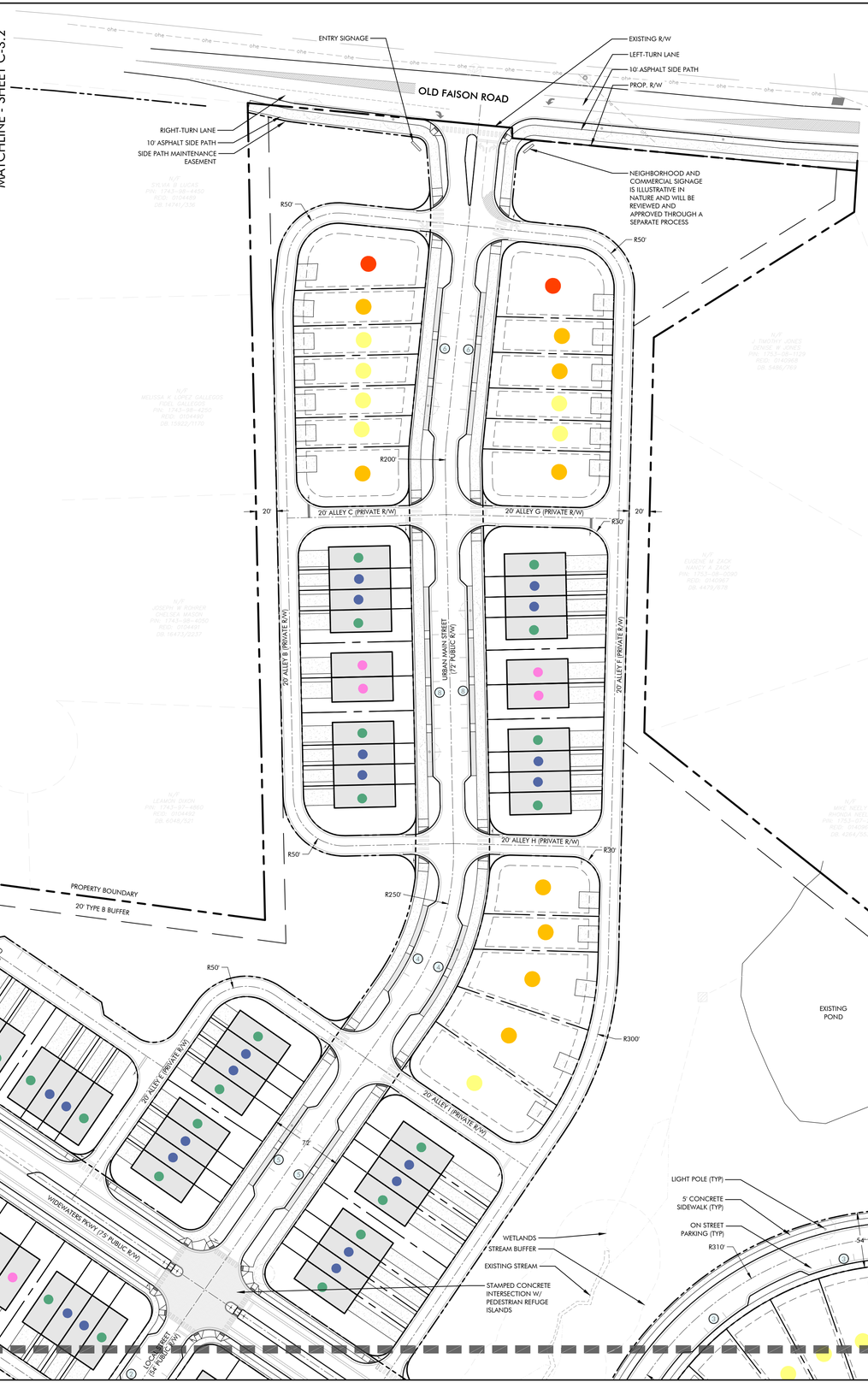
NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-3.1

MATCHLINE - SHEET C-3.1

MATCHLINE - SHEET C-3.2



MATCHLINE - SHEET C-3.2

MATCHLINE - SHEET C-3.3

BUILDING SETBACKS

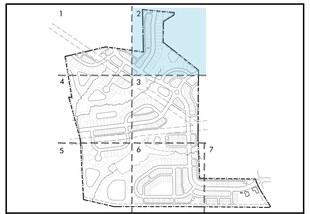
TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN

LEGEND

UNIT TYPE	DU COUNT*
TOWNHOMES	41 DU
20' UNIT	*20 DU*
22' UNIT	*21 DU*
DUPLEXES	6 DU
22' UNIT	*6 DU*
SINGLE FAM. (REAR-LOAD)	22 DU
30' LOT	*10 DU*
35' LOT	*10 DU*
40' LOT	*2 DU*
SINGLE FAM. (FRONT-LOAD)	5 DU
60' LOT	*5 DU*
70' LOT	*0 DU*
80' LOT	*0 DU*

*NOTE: UNIT COUNTS REFLECT NUMBER OF UNITS THAT FIT WITHIN MATCHLINES OF EACH SHEET. ANY UNITS SHOWN OUTSIDE OF MATCHLINES WILL BE COUNTED ON THEIR RESPECTIVE SHEETS.

TOTAL UNIT COUNT FOUND ON OVERALL SITE PLAN SHEET & COVER SHEET.



KEY MAP

NOTES:

1. BOUNDARY AND TOPOGRAPHIC INFORMATION PROVIDED BY:
   BATEMAN CIVIL SURVEY COMPANY
   2524 RELIANCE AVENUE
   APEX, NC 27539
   919-577-1080
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5. ALL UTILITIES WILL BE UNDERGROUND.
6. UNIT MIX SUBJECT TO CHANGE AS MASTER PLAN SET PROGRESSES.

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GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

URBAN DESIGN PARTNERS
150 fayetteville st ste 1310
raleigh, nc 27601
p 919.275.5002
urbandesignpartners.com
nc firm no: P-2671 sc coa no: C-03044

PRELIMINARY DRAWING FOR REVIEW PURPOSES ONLY

07/05/2024

D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan
Site Plan Enlargement 2
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/02/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-3.2

MATCHLINE - SHEET C-3.2

MATCHLINE - SHEET C-3.3

MATCHLINE - SHEET C-3.4

MATCHLINE - SHEET C-3.3

LOCAL STREET (54' PUBLIC R/W)

20' ALLEY J (PRIVATE R/W)

R60'

R150'

R300'

WIDEWATERS PKWY. (75' PUBLIC R/W)

LOCAL STREET (54' PUBLIC R/W)

R310'

32' ALLEY L (PUBLIC R/W)

R169'

MAIN STREET (70' PUBLIC R/W)

R400'

R50'

32' ALLEY I (PUBLIC R/W)

POLLINATOR GARDEN

RRFB

SCM W/ FOUNTAIN

LANDSCAPE MEDIAN

LIGHT POLE (TYP)

RRFB

LANDSCAPE MEDIAN

LANDSCAPED ROUNDABOUT

R202'

PROPERTY BOUNDARY

20' TYPE B BUFFER

EXISTING ELECTRIC EASEMENT

EXISTING ELECTRIC EASEMENT

ROAD 6

POLLINATOR GARDEN

EXISTING ELECTRIC STRUCTURES W/ 25' CLEAR SPACE

19'

19'

19'

32' ALLEY H (PUBLIC R/W)

R298'

LANDSCAPE MEDIAN

R69'

R200'

ROAD 7

LOCAL STREET (54' PUBLIC R/W)

MULTI-USE FIELD

R243'

20' ALLEY O (PRIVATE R/W)

DOG PARK

FITNESS AREA

R150'

R400'

PICKLEBALL COURTS

LOCAL STREET (54' PUBLIC R/W)

PRIVATE GREENWAY TRAIL (10' PAVEMENT & 30' ESMT)

25' CLEAR SPACE AROUND STRUCTURES

EXISTING ELECTRIC STRUCTURES

WETLANDS

WORKOUT STATION

R50'

EXISTING ELECTRIC EASEMENT

20' ALLEY P (PRIVATE R/W)

R300'

R300'

WIDEWATERS PKWY. (75' PUBLIC R/W)

7' BUFFERED BIKE LANE

5' CONCRETE SIDEWALK

WIDEWATERS PARKWAY

R50'

SCM FENCE

20' SCM ACCESS EASEMENT

20'

R50'

AMENITY PARKING

9'

9'

LANDSCAPE MEDIAN

EXISTING POND

SCM W/ FOUNTAIN

PLAYGROUND

POOL

CLUBHOUSE AMENITY

(AMENITY SITE IS ILLUSTRATIVE IN NATURE AND WILL BE REVIEWED FOR COMPLIANCE AT CDS)

10'

RRFB

20' ALLEY Q (PRIVATE ALLEY)

MATCHLINE - SHEET C-3.3

MATCHLINE - SHEET C-3.6

BUILDING SETBACKS

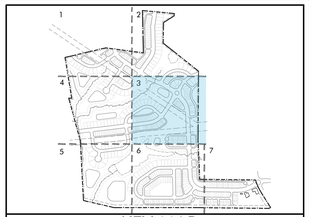
TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN
CLUBHOUSE	
- FRONT:	10' MIN
- REAR:	0' MIN
- SIDE:	6' MIN

LEGEND

UNIT TYPE	DU COUNT*
TOWNHOMES	41 DU
20' UNIT	*20 DU*
22' UNIT	*21 DU*
DUPLEXES	10 DU
22' UNIT	*10 DU*
SINGLE FAM. (REAR-LOAD)	29 DU
30' LOT	*14 DU*
35' LOT	*6 DU*
40' LOT	*9 DU*
SINGLE FAM. (FRONT-LOAD)	15 DU
60' LOT	*11 DU*
70' LOT	*3 DU*
80' LOT	*1 DU*

*NOTE: UNIT COUNTS REFLECT NUMBER OF UNITS THAT FIT WITHIN MATCHLINES OF EACH SHEET. ANY UNITS SHOWN OUTSIDE OF MATCHLINES WILL BE COUNTED ON THEIR RESPECTIVE SHEETS.

TOTAL UNIT COUNT FOUND ON OVERALL SITE PLAN SHEET & COVER SHEET.



KEY MAP

NOTES:

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07/05/2024

D.R. Horton
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Raleigh, NC 27615

LYNDON OAKS
Master Plan
Site Plan Enlargement 3
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-3.3

MATCHLINE - SHEET C-3.1

MATCHLINE - SHEET C-3.4

20' SCM ACCESS EASEMENT

SCM FENCE

SCM

ROAD 2

ROAD 3

20' ALLEY K (PRIVATE R/W)

LOCAL STREET (54' PUBLIC R/W)

LOCAL STREET (54' PUBLIC R/W)

R150'

CUL-DE-SAC 1

96'

SCM

20' SCM ACCESS EASEMENT

SCM FENCE

STREAM BUFFER

EXISTING STREAM

MATCHLINE - SHEET C-3.4

MATCHLINE - SHEET C-3.3

70' TYPE B BUFFER

PROPERTY BOUNDARY

SCM FENCE

20' SCM ACCESS EASEMENT

SCM

R150'

PUBLIC GREENWAY ROUTING OPTION A

5' CONCRETE SIDEWALK (TYP)

ROAD 6

ROAD STUB (TO CONNECT TO CLIFTON ROAD WHEN PROPERTY TO WEST IS DEVELOPED)

EXISTING STREAM

PUBLIC GREENWAY ROUTING OPTION B

WETLANDS

ROAD 8

WORKOUT STATION

EXISTING ELECTRIC EASEMENT

LOCAL STREET (54' PUBLIC R/W)

LOCAL STREET (54' PUBLIC R/W)

20' ALLEY P (PRIVATE R/W)

EX. ELECTRIC STRUCTURE W/ 25' CLEAR SPACE

R150'

MATCHLINE - SHEET C-3.4

MATCHLINE - SHEET C-3.5

BUILDING SETBACKS

TOWNHOMES/DUPLEX (REAR-LOADED):
- FRONT: 0' MIN TO 25' MAX
- SIDE: 10' MIN

SINGLE FAMILY DETACHED (REAR-LOADED)
- FRONT: 10' MIN
- REAR: 10' MIN
- SIDE: 3' MIN
- CORNER: 10' MIN

SINGLE FAMILY DETACHED (FRONT-LOADED)
- FRONT: 10' MIN
- REAR: 20' MIN
- SIDE: 5' MIN
- CORNER: 10' MIN

LEGEND

UNIT TYPE	DU COUNT*
TOWNHOMES	28 DU
20' UNIT	*14 DU*
22' UNIT	*14 DU*
DUPLEXES	2 DU
22' UNIT	*2 DU*
SINGLE FAM. (REAR-LOAD)	0 DU
30' LOT	*0 DU*
35' LOT	*0 DU*
40' LOT	*0 DU*
SINGLE FAM. (FRONT-LOAD)	27 DU
60' LOT	*19 DU*
70' LOT	*5 DU*
80' LOT	*3 DU*

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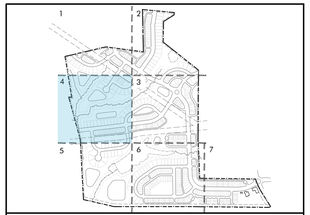
TOTAL UNIT COUNT FOUND ON OVERALL SITE PLAN SHEET & COVER SHEET.



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LYNDON OAKS
Master Plan
Site Plan Enlargement 4
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
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#5	05/31/2024		

Project No: 22-RDU-083

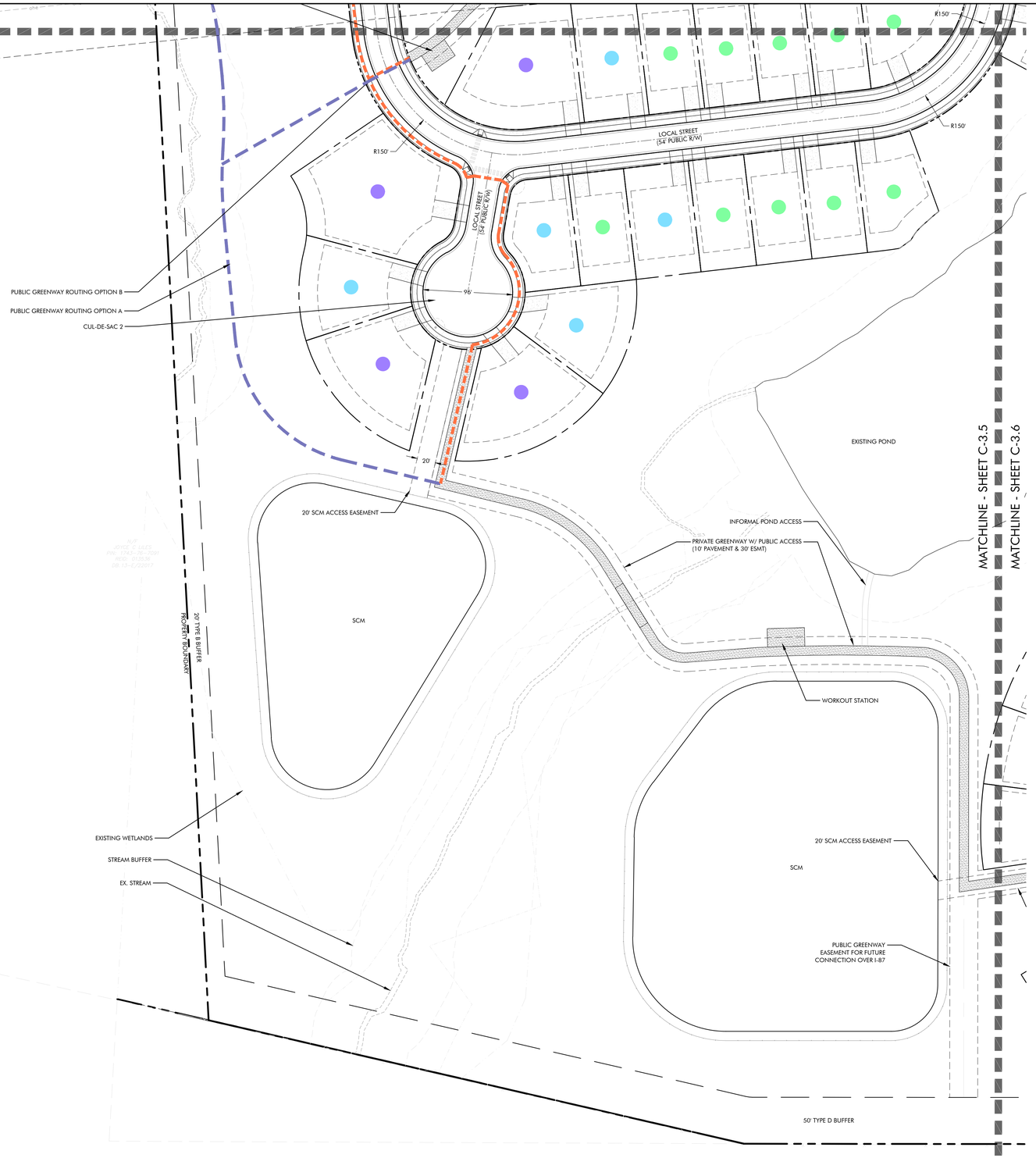
Date: 07/05/2024

Sheet No:

C-3.4

MATCHLINE - SHEET C-3.4

MATCHLINE - SHEET C-3.5



BUILDING SETBACKS

TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN

LEGEND

UNIT TYPE	DU COUNT*
TOWNHOMES	0 DU
20' UNIT	*0 DU*
22' UNIT	*0 DU*
DUPLEXES	0 DU
22' UNIT	*0 DU*
SINGLE FAM. (REAR-LOAD)	0 DU
30' LOT	*0 DU*
35' LOT	*0 DU*
40' LOT	*0 DU*
SINGLE FAM. (FRONT-LOAD)	18 DU
60' LOT	*9 DU*
70' LOT	*5 DU*
80' LOT	*4 DU*

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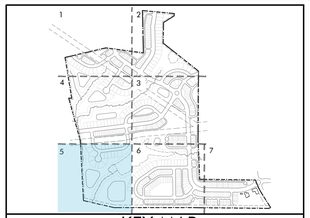

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LYNDON OAKS
Master Plan
Site Plan Enlargement 5
Knightdale, North Carolina

NO.	DATE:	BY: REVISIONS:
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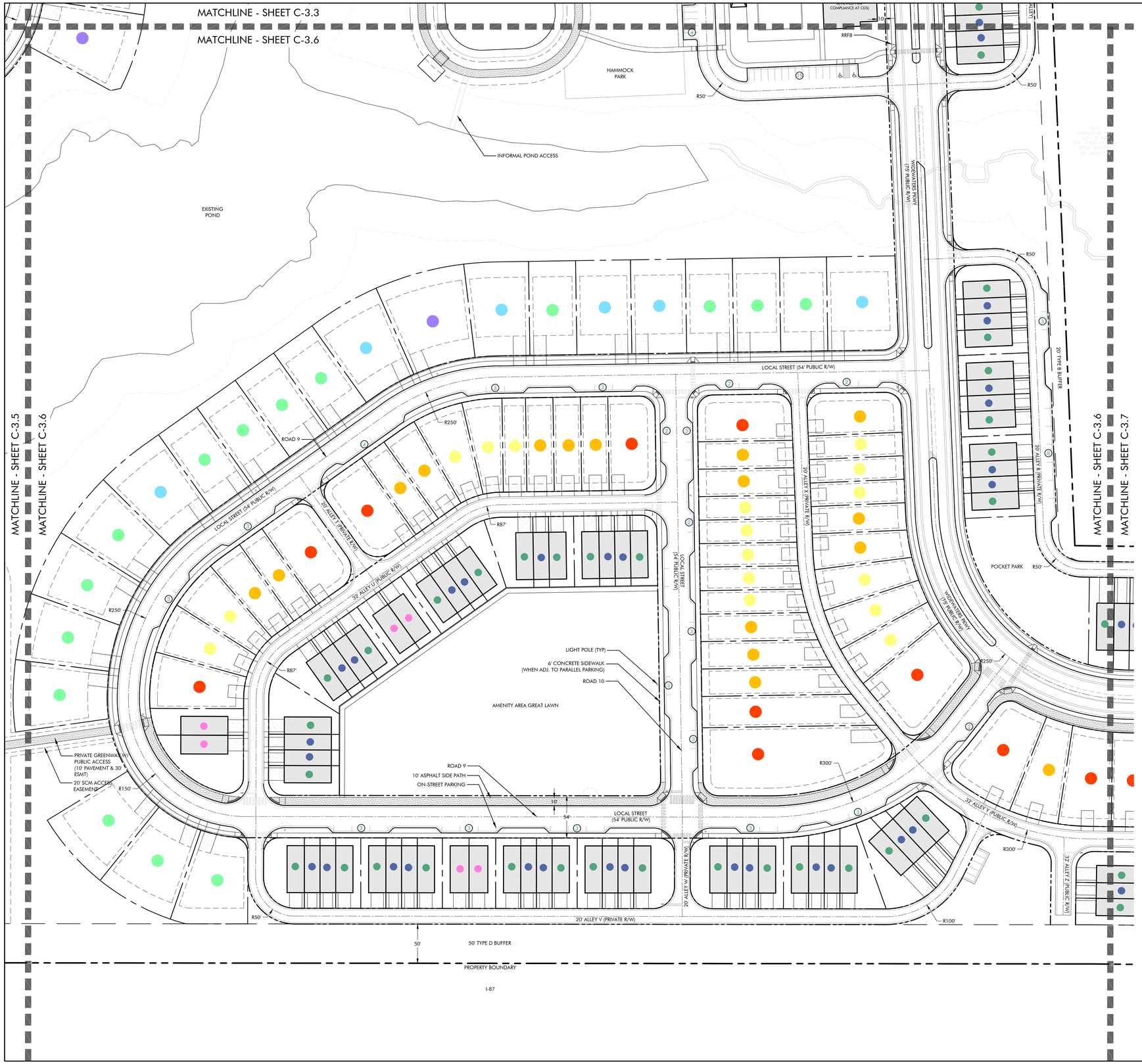
#2	02/05/2024	
#3	03/28/2024	
#4	05/02/2024	
#5	05/31/2024	

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-3.5



BUILDING SETBACKS

TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN

LEGEND

UNIT TYPE	DU COUNT*
TOWNHOMES	62 DU
20' UNIT	*30 DU*
22' UNIT	*32 DU*
DUPLEXES	6 DU
22' UNIT	*6 DU*
SINGLE FAM. (REAR-LOAD)	42 DU
30' LOT	*16 DU*
35' LOT	*16 DU*
40' LOT	*10 DU*
SINGLE FAM. (FRONT-LOAD)	23 DU
60' LOT	*15 DU*
70' LOT	*6 DU*
80' LOT	*2 DU*

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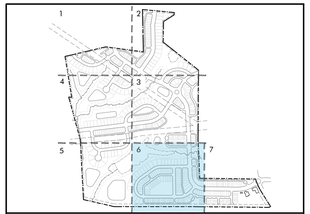
TOTAL UNIT COUNT FOUND ON OVERALL SITE PLAN SHEET & COVER SHEET.



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LYNDON OAKS
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Site Plan Enlargement 6
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Sheet No:
C-3.6

BUILDING SETBACKS

TOWNHOMES/DUPLEX (REAR-LOADED):	
- FRONT:	0' MIN TO 25' MAX
- SIDE:	10' MIN
SINGLE FAMILY DETACHED (REAR-LOADED)	
- FRONT:	10' MIN
- REAR:	10' MIN
- SIDE:	3' MIN
- CORNER:	10' MIN
SINGLE FAMILY DETACHED (FRONT-LOADED)	
- FRONT:	10' MIN
- REAR:	20' MIN
- SIDE:	5' MIN
- CORNER:	10' MIN
COMMERCIAL	
- FRONT:	10' MIN
- REAR:	0' MIN
- SIDE:	6' MIN

LEGEND

UNIT TYPE	DU COUNT*
TOWNHOMES	54 DU
20' UNIT	*23 DU*
22' UNIT	*31 DU*
DUPLEXES	2 DU
22' UNIT	*2 DU*
SINGLE FAM. (REAR-LOAD)	12 DU
30' LOT	*5 DU*
35' LOT	*4 DU*
40' LOT	*3 DU*
SINGLE FAM. (FRONT-LOAD)	0 DU
60' LOT	*0 DU*
70' LOT	*0 DU*
80' LOT	*0 DU*

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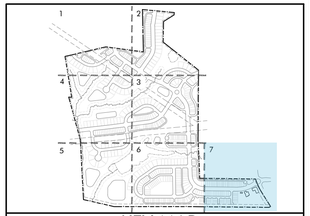

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LYNDON OAKS
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Sheet No:
C-3.7

WATER ALLOCATION

WATER ALLOCATION POLICY

	MAJOR SUBDIVISION	
	MAJOR SUBDIVISION BASE POINTS	15 pts.
1	CONSERVATION OF NATURAL HABITAT	7 pts.
2	CONSTRUCT A FOUNTAIN WITHIN THE BMP	4 pts.
3	ON-STREET PARKING	4 pts.
	RESIDENTIAL ARCHITECTURAL STANDARDS	15 pts.
4	3,000' OR MORE OF A 6-FOOT WIDE PATH	3 pts.
5	RESORT STYLE POOL	2 pts.
6	DECK/PATIO (2,000 SF MIN.)	2 pts.
7	CLUBHOUSE (NO MEETING SPACE, BATHROOMS & CHANGING ROOMS ONLY)	3 pts.
8	IPEMA CERTIFIED PLAYGROUND EQUIPMENT	4 pts.
9	PICKLEBALL COURTS	5 pts.
10	OUTDOOR DISPLAY OF PUBLIC ART	4 pts.
	TOTAL	**68 pts.**

	SINGLE-USE RETAIL	
	SINGLE USE RETAIL BASE POINTS	41 pts.
A	CONSTRUCTION OF GATEWAY LANDSCAPING	5 pts.
B	DECK/PATIO (2,000 SF MIN)	2 pts.
C	OUTDOOR DISPLAY OF PUBLIC ART	4 pts.
	TOTAL	**52 pts.**

NOTE: SINGLE-USE RETAIL WATER ALLOCATION POLICY POINTS ARE PRELIMINARY AND SUBJECT TO CHANGE WHEN THE DEVELOPER OF THE OUTPARCEL SUBMITS A SITE PLAN.

OPEN SPACE LEGEND

ACTIVE OPEN SPACE

PASSIVE OPEN SPACE

GREENWAY LENGTH

PUBLIC GREENWAY*:	2,385'
PRIVATE GREENWAY:	3,426'
PRIVATE GREENWAY (PUBLIC ACCESS):	1,391'
TOTAL LENGTH:	7,202'

*LENGTH OF PUBLIC GREENWAY SUBJECT TO CHANGE DEPENDING ON ROUTING OPTION SELECTED. SEE C-3.0 FOR ROUTING OPTIONS

OPEN SPACE CALCULATIONS

TOTAL SITE AREA: ± 171.88 ACRES

DWELLING UNITS: 482 DU PROP. TOTAL (UP TO 500 DU ALLOWED)
- SINGLE FAM. DETACHED: 209 DU
- TOWNHOMES/DUPLEXES: 273 DU

DENSITY: 2.8 DU/AC

RECREATIONAL OPEN SPACE DEDICATION:
- PROXIMITY ZONE: OUTSIDE ¼ MILE
- BEDROOM ESTIMATE:
  - →SINGLE FAMILY DETACHED: 209 DU x 3 BEDS = 627 BEDS
  - →TOWNHOMES/DUPLEXES: 273 DU x 3 BEDS = 819 BEDS
- DEDICATION RATE*: 520
  - →SINGLE FAMILY DETACHED: 627 BEDS x 520 SF = 326,040 SF
  - →TOWNHOMES/DUPLEXES: 819 BEDS x 520 SF = 425,880 SF
- CALCS: 326,040 SF + 425,880 SF = 751,920 SF
  ± 751,920 SF (17.26 AC) TOTAL OPEN SPACE REQ.
- REQUIRED OPEN SPACE: 17.26 AC TOTAL REQUIRED
  - →REQ. ACTIVE: 8.63 AC (50% OF REQ. OPEN SPACE)
  - →REQ. PASSIVE: 8.63 AC (50% OF REQ. OPEN SPACE)
- PROPOSED OPEN SPACE: 21.40 AC TOTAL PROPOSED (4.14 AC EXTRA PROV.)
  - →PROP. ACTIVE: 9.03 AC ACTIVE OPEN SPACE PROPOSED
    - *REQUIRED:* *8.63 AC (TO MEET 50% OF TOTAL REQ. OPEN SPACE)*
    - *CREDIT:* *2.16 AC CREDIT DUE TO PROP. NEIGHBORHOOD AMENITIES***
    - *REQ. AFTER CREDIT:* *6.47 AC REQ. AFTER CREDIT*
    - *PROPOSED (W/ CREDIT):* *9.03 AC ACTIVE OPEN SPACE PROP.*
    - *NET:* *0.4 AC EXTRA PROVIDED*
  - →PROP. PASSIVE: 12.37 AC PASSIVE OPEN SPACE PROPOSED
    - *REQUIRED:* *8.63 AC (TO MEET 50% OF TOTAL REQ. OPEN SPACE)*
    - *CREDIT:* *2.16 AC CREDIT DUE TO PROP. NEIGHBORHOOD AMENITIES***
    - *REQ. AFTER CREDIT:* *6.47 AC REQ. AFTER CREDIT*
    - *PROPOSED (W/ CREDIT):* *12.37 AC PASSIVE OPEN SPACE PROP.*
    - *NET:* *3.74 AC EXTRA PROVIDED*

* PER DEDICATION MATRIX LOCATED IN TOWN OF KNIGHTDALE UDO SEC. 11.2-C.4
** PER TOWN OF KNIGHTDALE UDO SECTION 11.2.D.3, "DEVELOPMENTS THAT PROVIDE NEIGHBORHOOD AMENITY FACILITIES WILL RECEIVE A CREDIT OF TWENTY-FIVE (25) PERCENT OF THE REQUIRED PASSIVE OPEN SPACE, AND TWENTY-FIVE (25) PERCENT OF THE REQUIRED ACTIVE OPEN SPACE TO BE EQUALLY DIVIDED.

ACTIVE OPEN SPACE TABLE

NAME	AREA SF	AREA AC
PUBLIC PLAZA	2,000.0	0.05
CLUBHOUSE & POOL *	41,751.87	0.96
PICKLEBALL COURTS & FITNESS AREAS	26,550.45	0.61
PLAYGROUND	21,654.80	0.50
WORKOUT STATION #1	408.86	0.01
WORKOUT STATION #2	307.05	0.01
WORKOUT STATION #3	391.68	0.01
PUBLIC GREENWAY TRAIL**	72,436.34	1.66
PRIVATE GREENWAY W/ PUBLIC ACCESS	41,370.84	0.95
PRIVATE GREENWAY TRAIL	40,816.97	0.94
PRIVATE GREENWAY UNDER EASEMENT	19,112.89	0.44
PRIVATE GREENWAY CONNECTOR	4,993.58	0.11
MULTI-PURPOSE FIELD	27,717.99	0.64
OPEN SPACE CREDIT	93,990.00	2.16
TOTAL	393,503.31	9.03

PASSIVE OPEN SPACE TABLE

NAME	AREA SF	AREA AC
SCM W/ FOUNTAIN & POLLINATOR GARDENS	77,052.62	1.77
PRIVATE GREENWAY, SCM W/ FOUNTAIN, OVERLOOK & GAZEBO	52,051.25	1.19
VILLAGE GREEN	89,987.06	2.07
EXISTING POND NATURAL ACCESS AREA	11,902.75	0.27
DOG PARK	19,113.65	0.44
BENCHES & LANDSCAPE AREA 1	2,506.12	0.06
BENCHES & LANDSCAPE AREA 2	4,806.12	0.11
BENCHES & LANDSCAPE AREA 3	17,085.84	0.39
BENCHES & LANDSCAPE AREA 4	4,800.00	0.11
BENCHES & LANDSCAPE AREA 5	4,800.00	0.11
BENCHES & LANDSCAPE AREA 6	4,800.00	0.11
BENCHES & LANDSCAPE AREA 7	3,671.76	0.08
BENCHES & LANDSCAPE AREA 8	3,671.76	0.08
BENCHES & LANDSCAPE AREA 9	3,671.76	0.08
HAMMOCK PARK	9,103.07	0.21
POCKET PARK 1	4,721.25	0.11
POCKET PARK 2	3,170.44	0.07
POCKET PARK 3	27,240.63	0.63
POCKET PARK 4	18,005.71	0.41
BENCH SWING PARK	34,583.45	0.79
PUBLIC DISPLAY OF ART	6,660.19	0.15
ENTRY MONUMENT & LANDSCAPING 1	11,328.43	0.26
ENTRY MONUMENT & LANDSCAPING 2	29,953.95	0.69
OPEN SPACE CREDIT	93,990.00	2.16
TOTAL	538,677.83	12.37

* PER TOWN OF KNIGHTDALE UDO SECTION 11.2.D.3, "DEVELOPMENTS THAT PROVIDE NEIGHBORHOOD AMENITY FACILITIES WILL RECEIVE A CREDIT OF TWENTY-FIVE (25) PERCENT OF THE REQUIRED PASSIVE OPEN SPACE, AND TWENTY-FIVE (25) PERCENT OF THE REQUIRED ACTIVE OPEN SPACE TO BE EQUALLY DIVIDED.
**LOCATION OF PUBLIC GREENWAY TRAIL SUBJECT TO CHANGE AS DESIGN PROGRESSES. WILL COORDINATE WITH TOWN OF KNIGHTDALE STAFF.

811

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GRAPHIC SCALE

0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

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raleigh, nc 27601
p 919.275.5002
urbandesignpartners.com
nc firm no: P-2671 sc coa no: C-03044

PRELIMINARY DRAWING FOR REVIEW PURPOSES ONLY

07/05/2024

D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan
Open Space Plan
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
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#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-3.8

NOTES:

1. COMMERCIAL PARCEL WILL BE PLATTED WITH FIRST PHASE OF DEVELOPMENT.
2. PHASING PLAN SUBJECT TO CHANGE THROUGH CONSTRUCTION DRAWINGS.

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LYNDON OAKS
Master Plan
Phasing Plan
Knightdale, North Carolina

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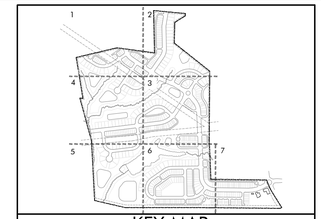
C-3.9

STREET TABLE	
NAME	LENGTH (LF)
ROAD 1	934'
ROAD 2	443'
ROAD 3	698'
ROAD 4	740'
ROAD 5	513'
ROAD 6	2,081'
ROAD 7	923'
ROAD 8	1,372'
ROAD 9	2,504'
ROAD 10	565'
CUL-DE-SAC 1	200'
CUL-DE-SAC 2	152'
TART FARM ROAD	1,235'
WIDEWATERS PARKWAY	4,424'

ALLEY TABLE	
NAME	LENGTH
ALLEY A	501'
ALLEY B	913'
ALLEY C	156'
ALLEY D	465'
ALLEY E	414'
ALLEY F	1,340'
ALLEY G	169'
ALLEY H	154'
ALLEY I	191'
ALLEY J	981'
ALLEY K	324'
ALLEY L	614'
ALLEY M	986'
ALLEY N	353'
ALLEY O	473'
ALLEY P	1,372'
ALLEY Q	486'
ALLEY R	1,477'
ALLEY S	165'
ALLEY T	163'
ALLEY U	788'
ALLEY V	1,104'
ALLEY W	127'
ALLEY X	543'
ALLEY Y	997'
ALLEY Z	111'
ALLEY AA	287'
ALLEY BB	108'
ALLEY CC	289'



KEY MAP

LEGEND:

PRIVATE ALLEY
R/W: 20'
WIDTH: 20' (BOC-BOC)
SPEED: 10 MPH

PUBLIC ALLEY
R/W: 32'
WIDTH: 18' (FOC-FOC)
SPEED: 10' MPH

LOCAL STREET
R/W: 54'
WIDTH: 28'-41' (FOC-FOC)*
SPEED: 20-25 MPH

MAIN STREET
R/W: 70'
WIDTH: 47' (BOC-BOC)
SPEED: 20-25 MPH

URBAN MAIN STREET (WIDE SIDEWALK)
R/W: 72'
WIDTH: 48' (BOC-BOC)*
SPEED: 20-25 MPH

AVENUE - 3 LANE DIVIDED (WIDEWATERS PKW)
R/W: 75' - 80'
WIDTH: VARIES (BOC-BOC)
SPEED: 30-35 MPH

CUL-DE-SAC
R/W: 61.5' RADIUS
WIDTH: 48' RADIUS (BOC-BOC)
LENGTH: 200' MAX

ROUNDABOUT
R/W: VARIES
SPEED: 20-25 MPH

*NOTE: ON STREET PARKING UTILIZED WHERE APPROPRIATE. SEE PLAN FOR LOCATIONS.

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LYNDON OAKS
Master Plan
Overall Signage & Marking Plan
Knightdale, North Carolina

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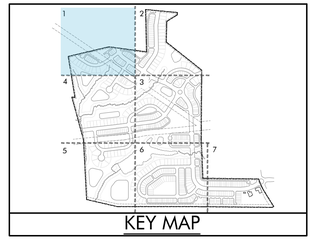
C-4.0

MATCHLINE - SHEET C-4.1

MATCHLINE - SHEET C-4.2



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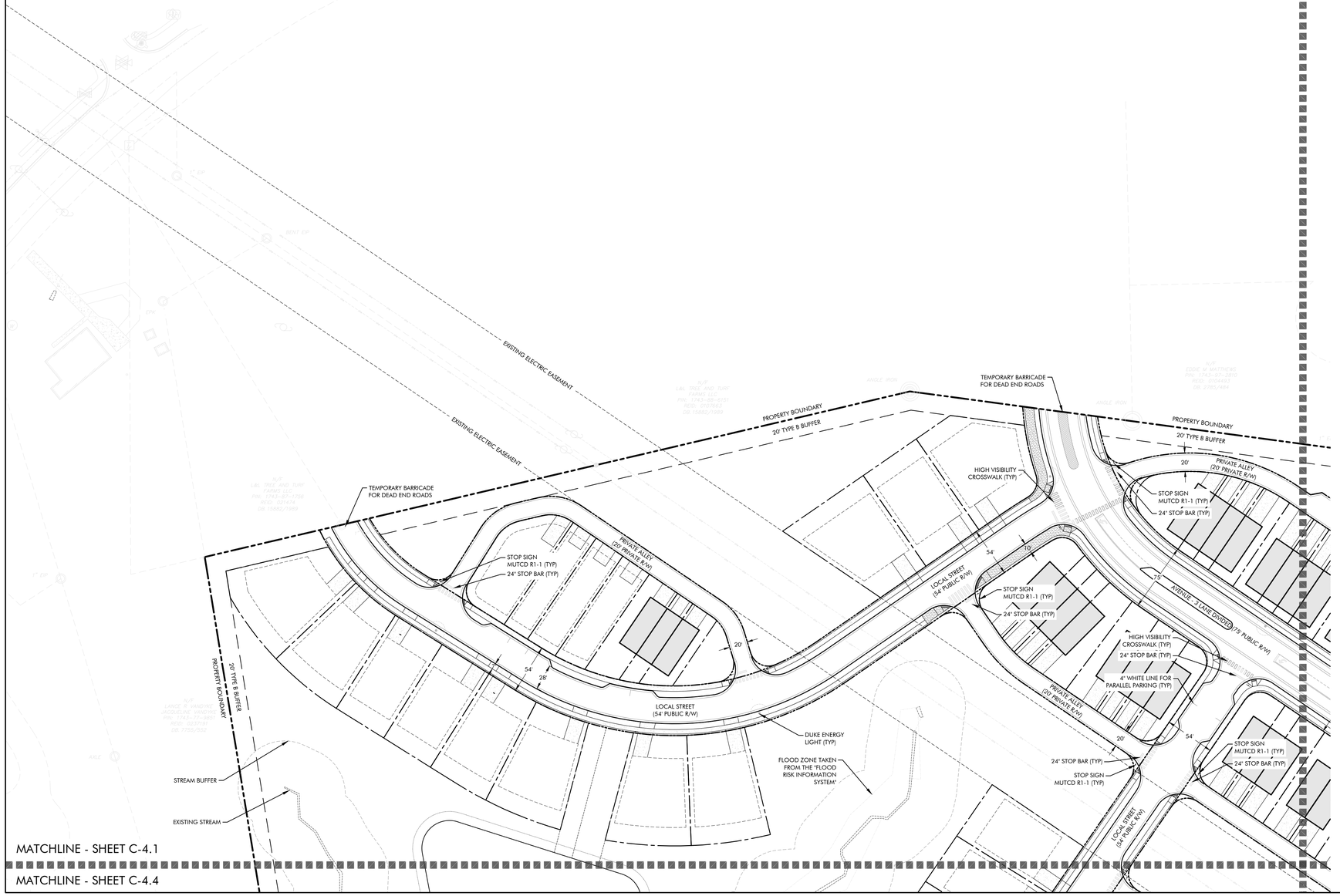

MATCHLINE - SHEET C-4.1

MATCHLINE - SHEET C-4.4

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LYNDON OAKS
Master Plan
Signage & Marking Plan Enlargement 1

Knightdale, North Carolina

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GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

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Project No: 22-RDU-083

Date: 07/05/2024

Sheet No:

C-4.1

MATCHLINE - SHEET C-4.1

MATCHLINE - SHEET C-4.2

110' ROW - NCDOT "2050 METROPOLITAN PLAN"

OLD FAISON ROAD

24' STOP BAR (TYP)

STOP SIGN
MUTCD R1-1 (TYP)

20'

72'

PRIVATE ALLEY
(20' PRIVATE R/W)

URBAN MAIN STREET
(72' PUBLIC R/W)

4" WHITE LINE FOR
PARALLEL PARKING (TYP)

STOP SIGN
MUTCD R1-1 (TYP)

24' STOP BAR (TYP)

PRIVATE ALLEY
(20' PRIVATE R/W)

24' STOP BAR (TYP)

STOP SIGN
MUTCD R1-1 (TYP)

4" WHITE LINE FOR
PARALLEL PARKING (TYP)

20'

PRIVATE ALLEY
(20' PRIVATE R/W)

24' STOP BAR (TYP)

STOP SIGN
MUTCD R1-1 (TYP)

STOP SIGN
MUTCD R1-1 (TYP)

24' STOP BAR (TYP)

URBAN MAIN STREET (72' PUBLIC R/W)

STOP SIGN
MUTCD R1-1 (TYP)

24' STOP BAR (TYP)

STOP SIGN
MUTCD R1-1 (TYP)

75'

AVENUE, 3 LANE DIVIDED (78' PUBLIC R/W)

72'

10'

HIGH VISIBILITY
CROSSWALK (TYP)

STOP SIGN
MUTCD R1-1 (TYP)

STAMPED CONCRETE

RRFB (TYP)

24' STOP BAR (TYP)

PRIVATE ALLEY (20' PRIVATE R/W)

EXISTING
POND

DUKE ENERGY LIGHT (TYP.)

WETLANDS

STREAM BUFFER

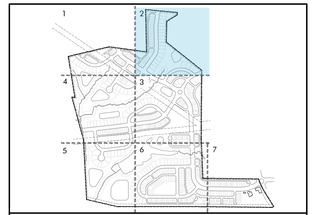
EXISTING STREAM

LOCAL STREET
(54' PUBLIC R/W)

4" WHITE LINE FOR
PARALLEL PARKING (TYP)

MATCHLINE - SHEET C-4.2

MATCHLINE - SHEET C-4.3



KEY MAP

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GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

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LYNDON OAKS
Master Plan
Signage & Marking Plan Enlargement 2

Knightdale, North Carolina

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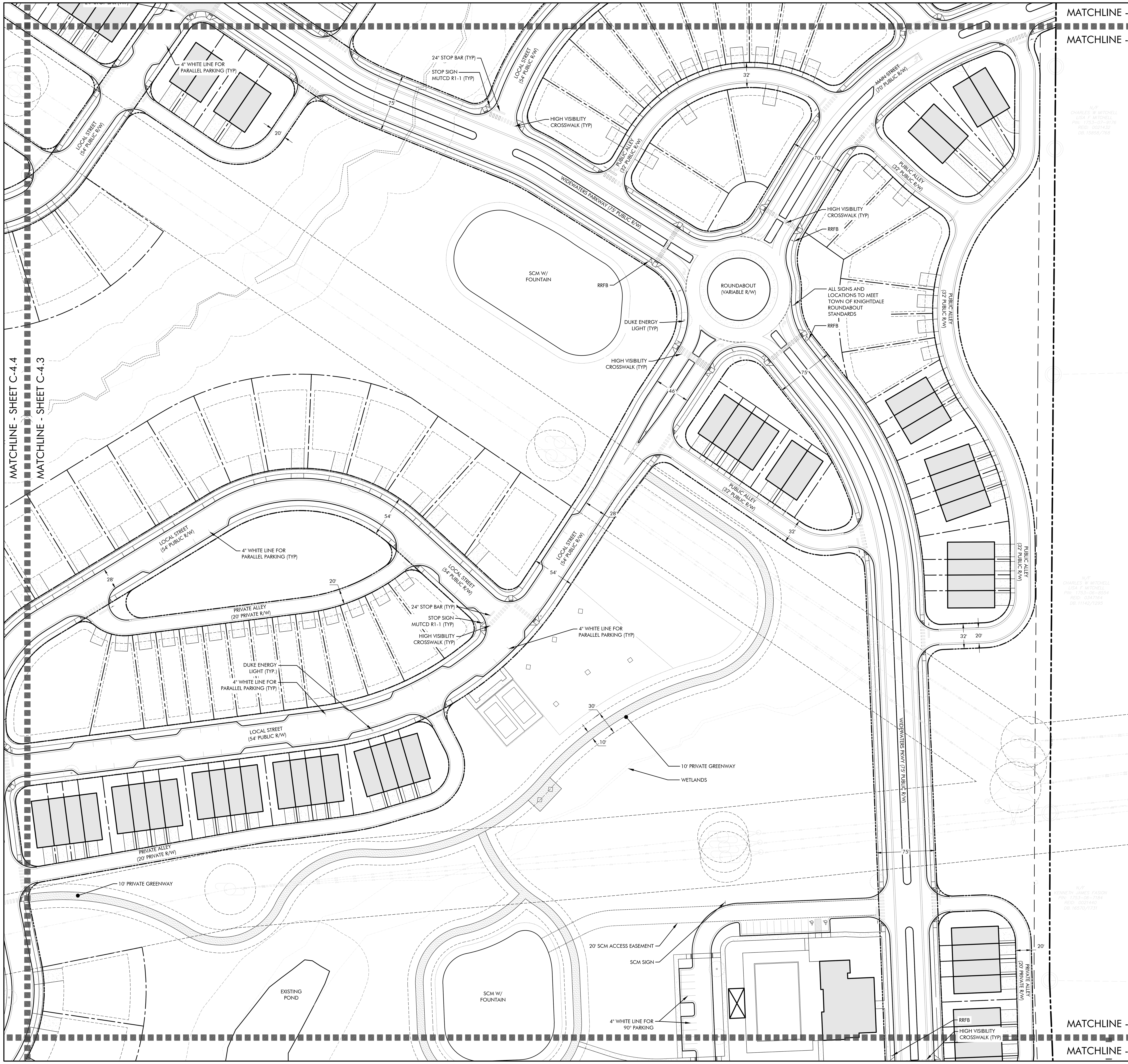
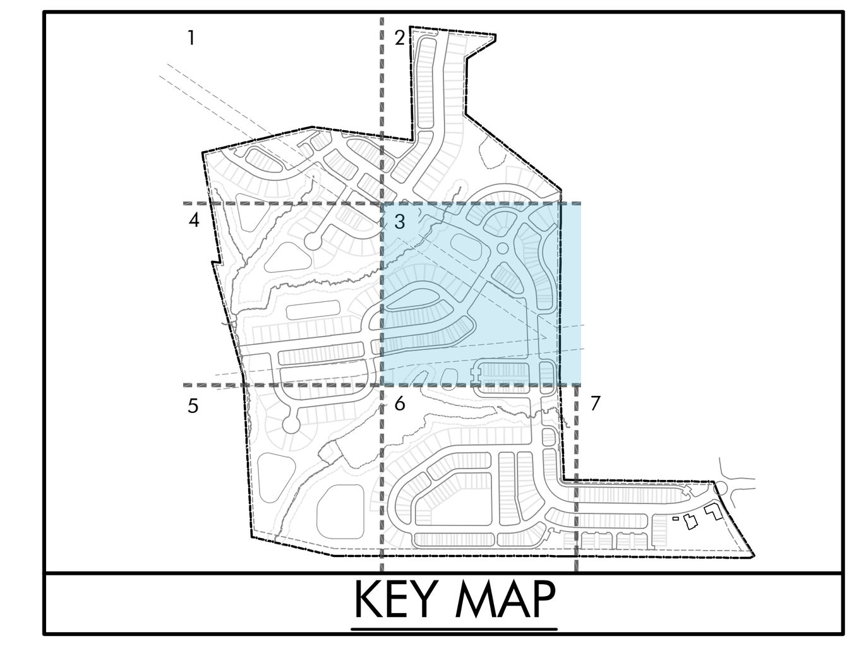
C-4.2


MATCHLINE - SHEET C-4.2
MATCHLINE - SHEET C-4.3
MATCHLINE - SHEET C-4.4
MATCHLINE - SHEET C-4.3
4" WHITE LINE FOR PARALLEL PARKING (TYP)
24" STOP BAR (TYP)
STOP SIGN MUTCD R1-1 (TYP)
LOCAL STREET (54' PUBLIC R/W)
HIGH VISIBILITY CROSSWALK (TYP)
PUBLIC ALLEY (32' PUBLIC R/W)
MAIN STREET (70' PUBLIC R/W)
WIDEWATERS PARKWAY (72' PUBLIC R/W)
SCM W/ FOUNTAIN
RRFB
ROUNDABOUT (VARIABLE R/W)
ALL SIGNS AND LOCATIONS TO MEET TOWN OF KNIGHTDALE ROUNDABOUT STANDARDS
DUKE ENERGY LIGHT (TYP)
PRIVATE ALLEY (20' PRIVATE R/W)
DUKE ENERGY LIGHT (TYP.)
10' PRIVATE GREENWAY
WETLANDS
WIDEWATERS PKWY (75' PUBLIC R/W)
20' SCM ACCESS EASEMENT
SCM SIGN
4" WHITE LINE FOR 90° PARKING
EXISTING POND
MATCHLINE - SHEET C-4.3
MATCHLINE - SHEET C-4.6



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LYNDON OAKS
Master Plan

Signage & Marking Plan Enlargement 3

Knightdale, North Carolina

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C-4.3

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GRAPHIC SCALE
0 40 60 120 240
(IN FEET)
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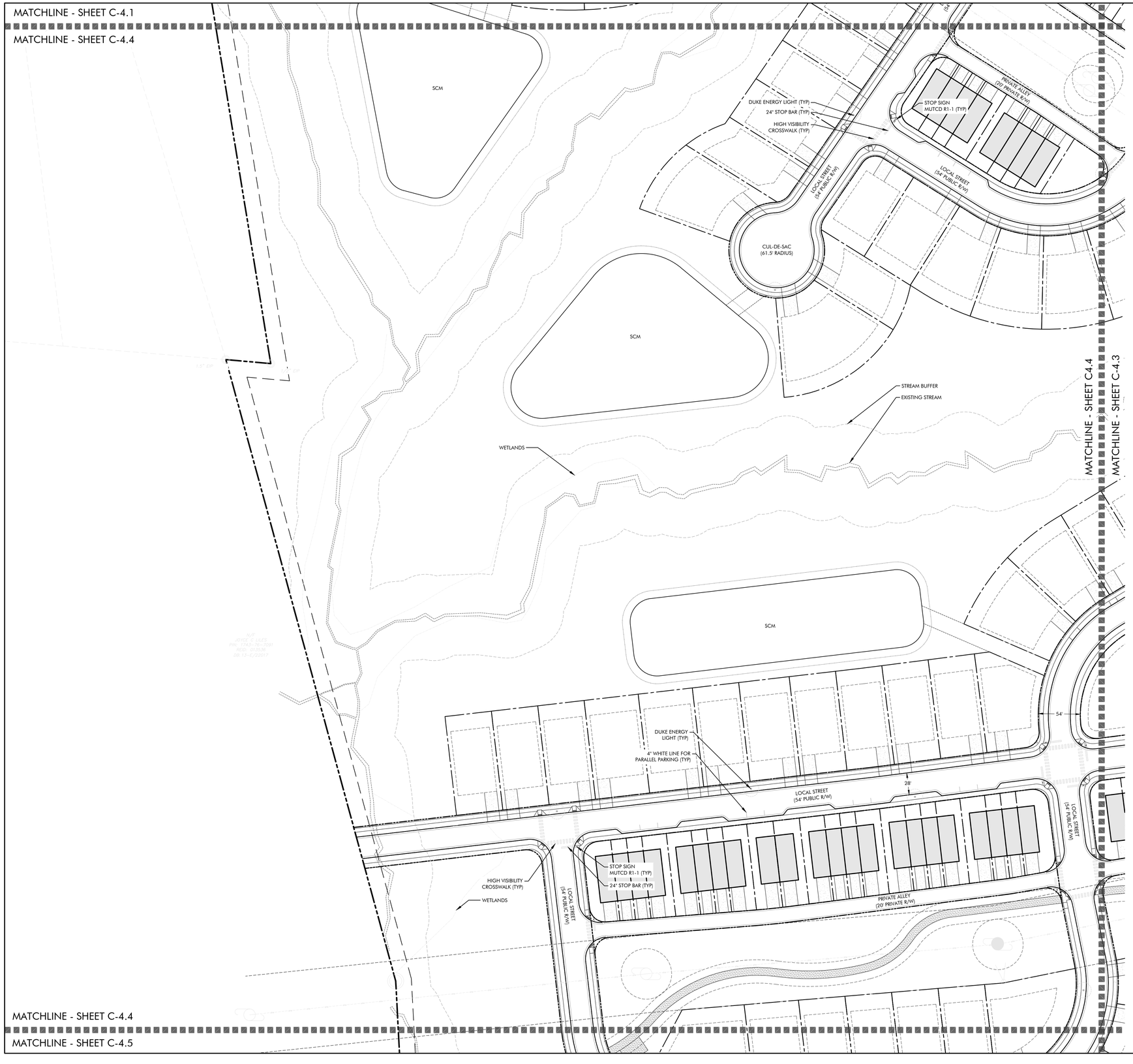
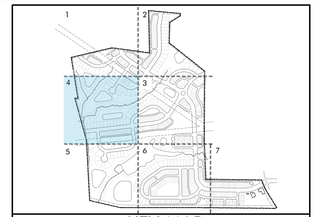
MATCHLINE - SHEET C-4.1

MATCHLINE - SHEET C-4.4



MATCHLINE - SHEET C-4.4

MATCHLINE - SHEET C-4.5



KEY MAP

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GRAPHIC SCALE

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LYNDON OAKS
Master Plan
Signage & Marking Plan Enlargement 4

Knightdale, North Carolina

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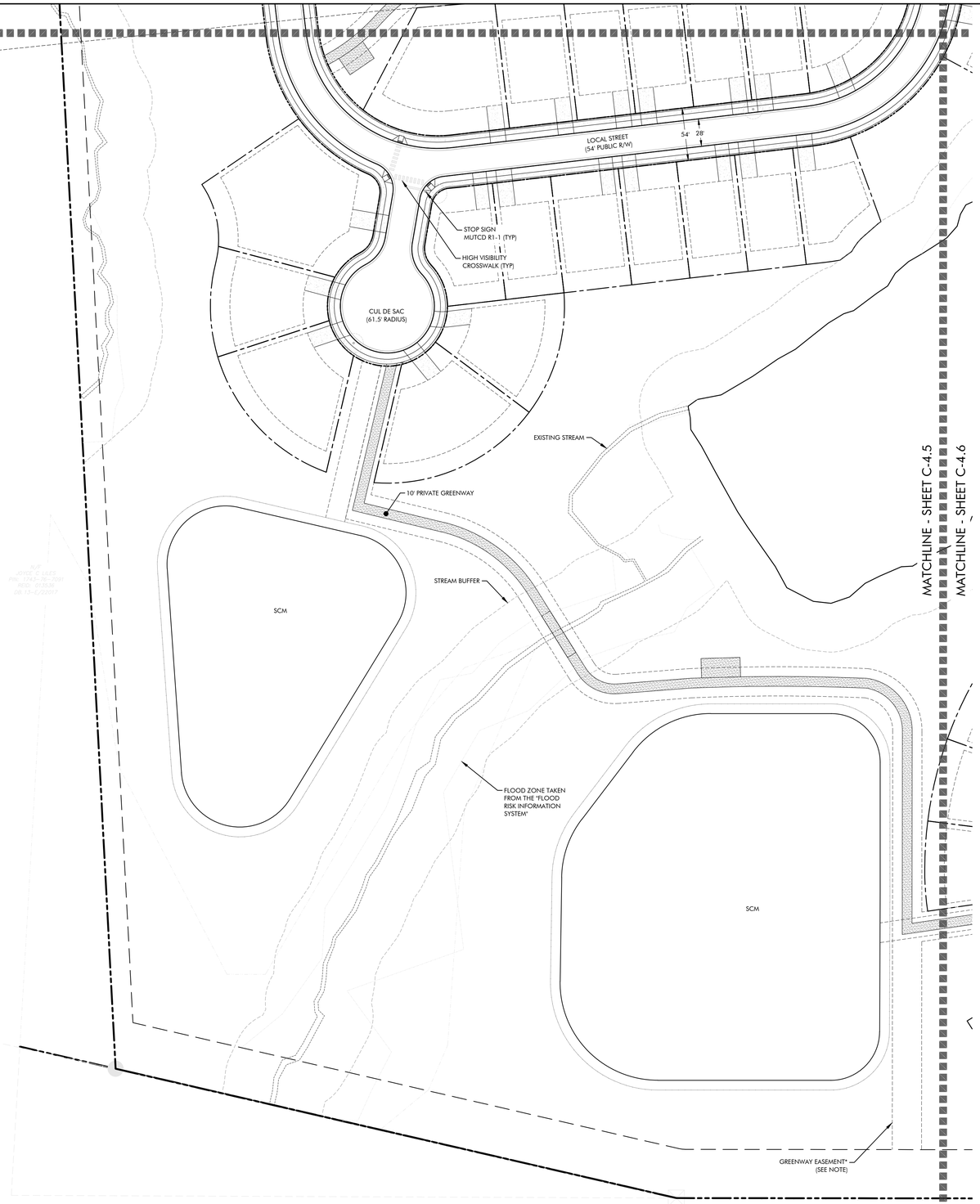
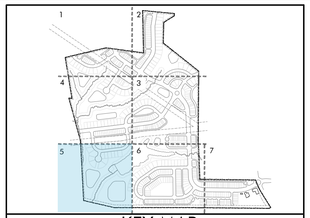
MATCHLINE - SHEET C-4.4

MATCHLINE - SHEET C-4.5





KEY MAP

NOTES:

PER ZMA-2-23 REGARDING EASEMENT FOR FUTURE PEDESTRIAN BRIDGE OVER I-87:

PRIOR TO APPROVAL OF CONSTRUCTION DRAWINGS FOR THE FIRST PHASE OF DEVELOPMENT, THE APPLICANT WILL OFFER A MINIMUM OF 100 SQUARE FEET OF SITE AREA AS A NON-EXCLUSIVE, PERMANENT EASEMENT AREA TO BE DEDICATED TO THE TOWN FOR CONSTRUCTION, MAINTENANCE, AND REPAIRE OF FOOTINGS FOR A FUTURE PEDESTRIAN BRIDGE OVER I-87, TOGETHER WITH SUCH TEMPORARY CONSTRUCTION EASEMENTS AS NECESSARY FOR COMPLETION OF SUCH WORK. IF ACCEPTED BY THE TOWN DEVELOPMENT SERVICES DIRECTOR, SUCH EASEMENT AREA SHALL BE SHOWN ON THE CONSTRUCTION DRAWINGS AND SUBDIVISION PLAT AND GRANTED TO THE TOWN PURSUANT TO A RECORDED DEED OF EASEMENT.

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LYNDON OAKS
Master Plan
Signage & Marking Plan Enlargement 5
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
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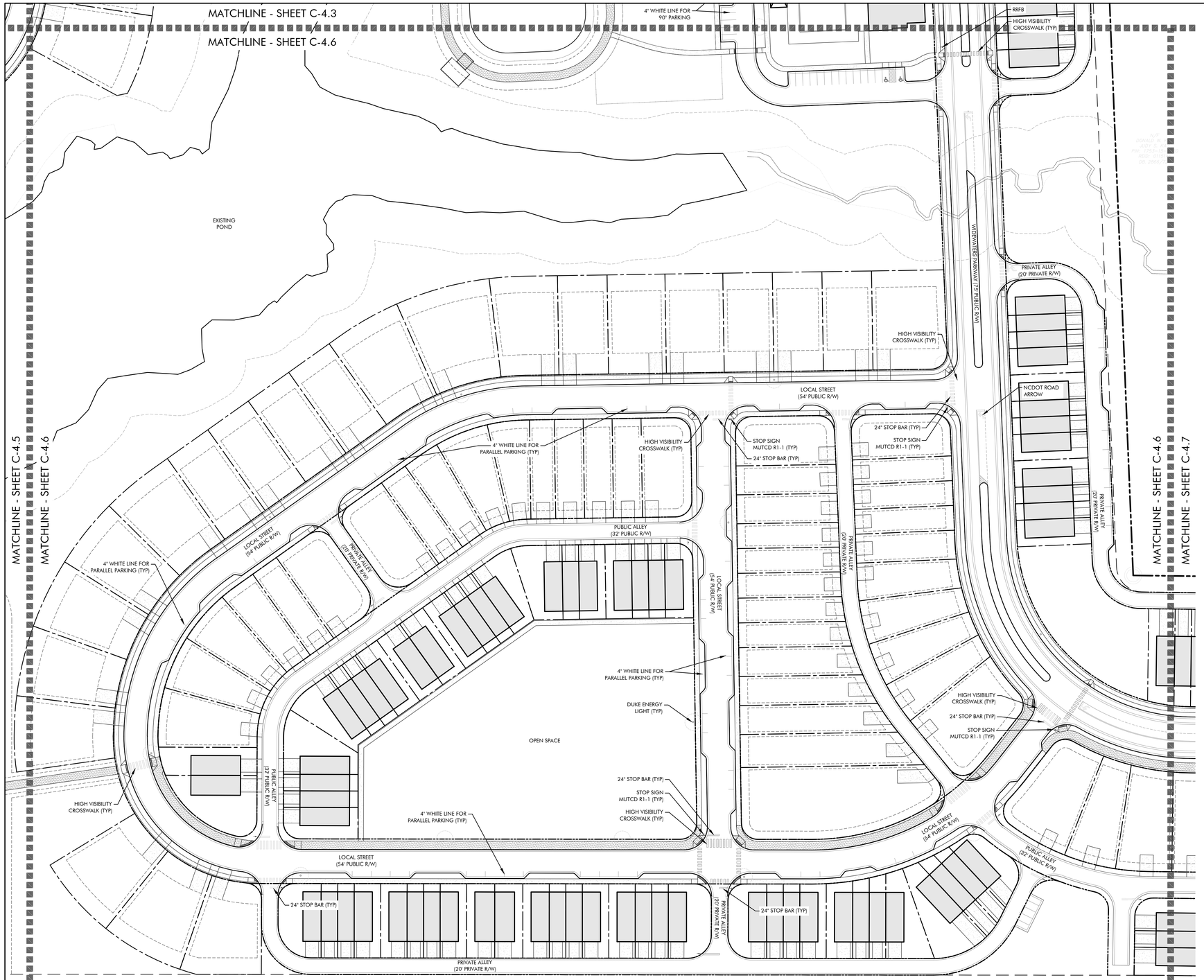
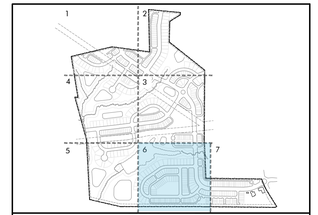
C-4.5





KEY MAP

BEFORE YOU DIG!
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IT'S THE LAW!

GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

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raleigh, nc 27601
p 919.275.5002
urbandesignpartners.com
nc firm no: P-2671 sc coa no: C-03044

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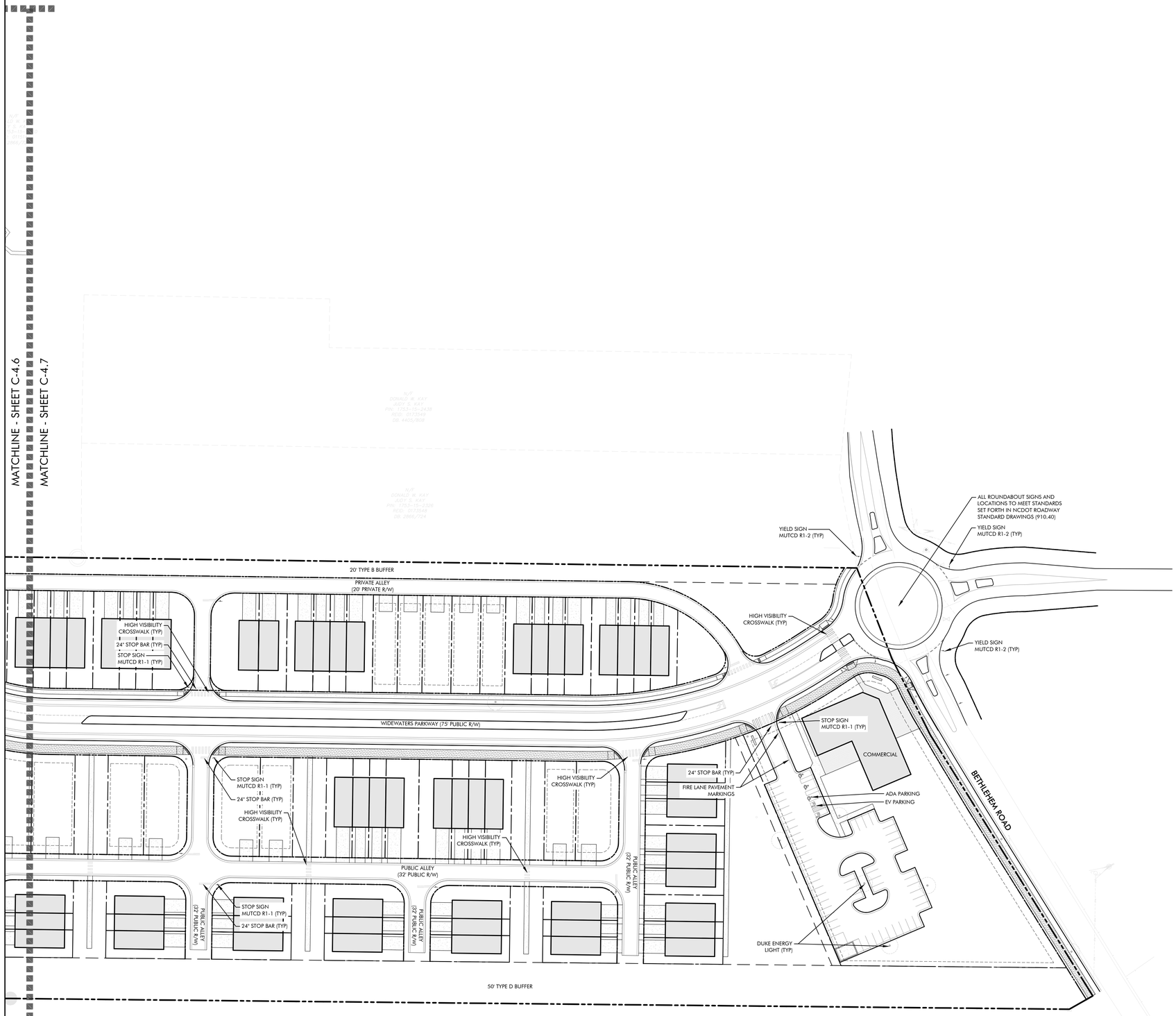
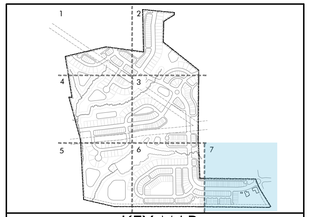
LYNDON OAKS
Master Plan
Signage & Marking Plan Enlargement 6
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-4.6





KEY MAP

NOTES:

1. ROUNDABOUT DESIGN TO BE FURTHER STUDIED AT TIME OF CONSTRUCTION DOCUMENTS.
2. ROUNDABOUT TO MEET ALL NCDOT AND TOWN OF KNIGHTDALE STANDARDS.

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GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

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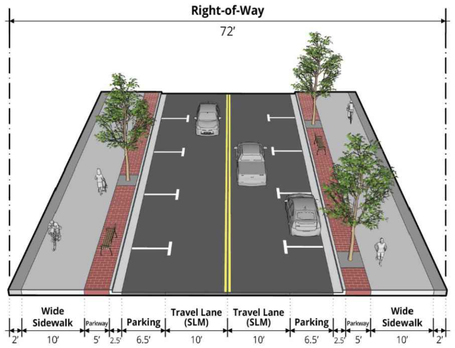
LYNDON OAKS
Master Plan
Signage & Marking Plan Enlargement 7
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/02/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

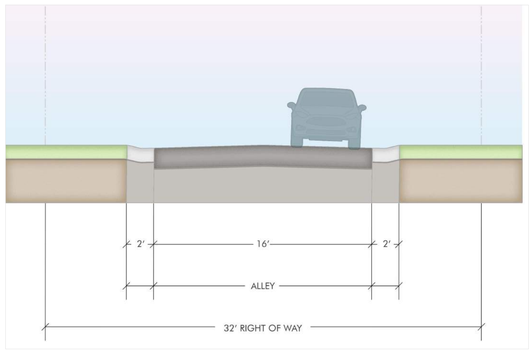
C-4.7



URBAN MAIN STREET - WIDE SIDEWALK

SECTION

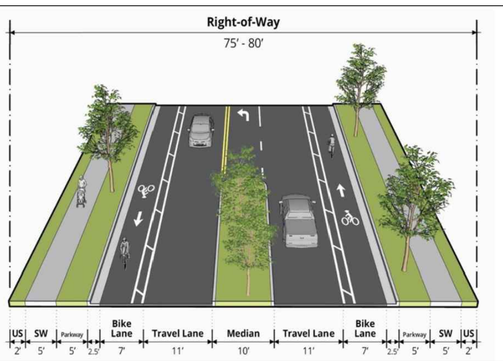
SCALE: NTS



32' PUBLIC ALLEY STREET SECTION

SECTION

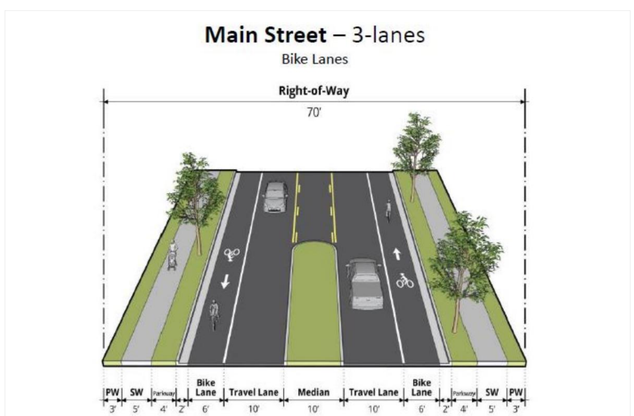
SCALE: NTS



AVENUE - BUFFERED BIKE LANES

SECTION

SCALE: NTS



70' MAIN STREET SECTION

SECTION

SCALE: NTS

TOWN OF KNIGHTDALE STANDARD DETAILS

REVISIONS	
DATE	DESCRIPTION

STREET FEATURES:

STREET WIDTH OF 12 FT. MINIMUM, 16 FT. DESIRABLE
REQUIRES 20 FT. OF RIGHT-OF-WAY
UTILITY LOCATION UNDERGROUND
TWO TO SIX BLOCKS LONG
AVERAGE SPEED OF 10 MPH

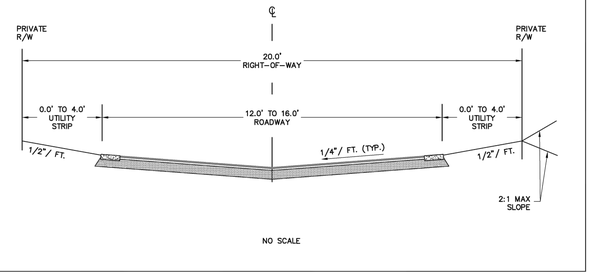
BUILDINGS & LAND USE:

RESIDENTIAL – PRIMARILY SINGLE FAMILY
COMMERCIAL

MINIMUM PAVEMENT DESIGN:

BITUMINOUS SURFACE COURSE: 2-½" S 9.5A
BASE COURSE: 8" ABC

ALLEY SECTION

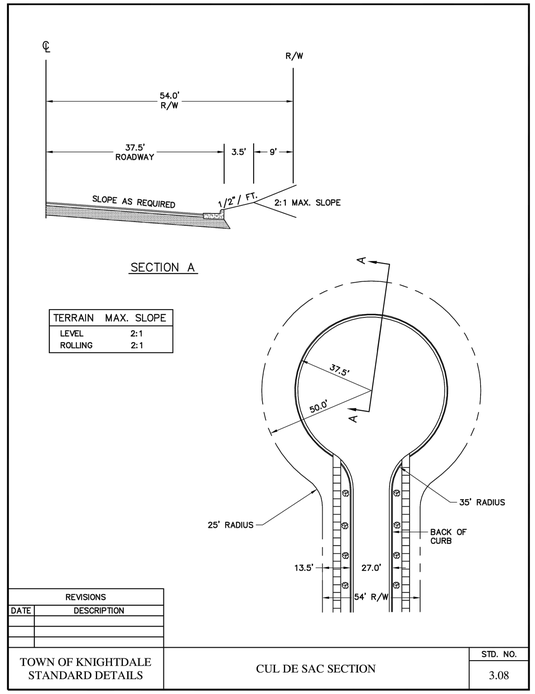


STD. NO. 3.01

20' PRIVATE ALLEY

SECTION

SCALE: NTS



REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS | CUL DE SAC SECTION | STD. NO. 3.08

CUL-DE-SAC

SECTION

SCALE: NTS

NOTE:

TOWN OF KNIGHTDALE IS CURRENTLY UPDATING THEIR STANDARD DETAILS AND THE STREET SECTIONS SHOWN ON TOWN OF KNIGHTDALE TITLEBLOCKS WILL BE UPDATED TO MEET NEW REQUIREMENTS PER THE UDO.

STREET SECTIONS USED IN PLAN REFLECT THE DIMENSIONS SET FORTH IN THE UDO.

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PRELIMINARY DRAWING FOR REVIEW PURPOSES ONLY

07/05/2024

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LYNDON OAKS Master Plan

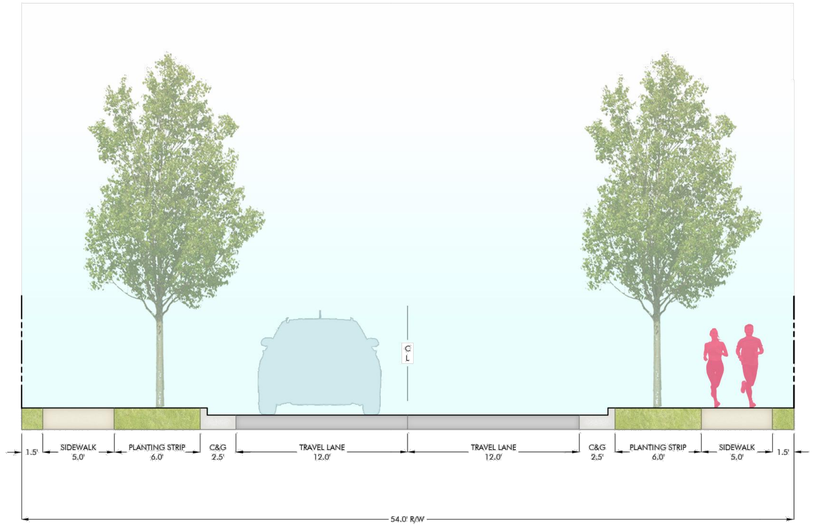
Street Sections

Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-4.8



LOCAL STREET PARKING - NO ON STREET PARKING

SECTION

SCALE: 1" = 5'-0"

LOCAL STREET PARKING - 1 SIDE ON STREET PARKING

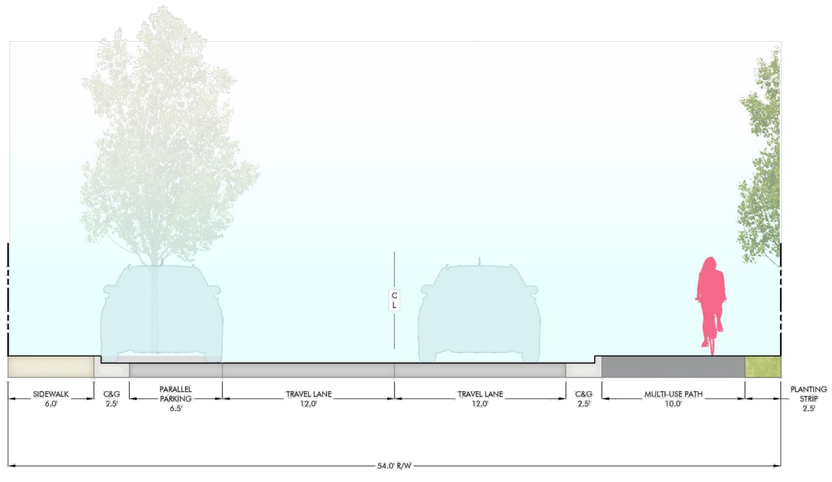
SECTION

SCALE: 1" = 5'-0"

LOCAL STREET PARKING - 2 SIDE ON STREET PARKING

SECTION

SCALE: 1" = 5'-0"



LOCAL STREET PARKING - GREENWAY CONNECTOR

SECTION

SCALE: 1" = 5'-0"

NOTE:

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LYNDON OAKS
Master Plan
Street Sections
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
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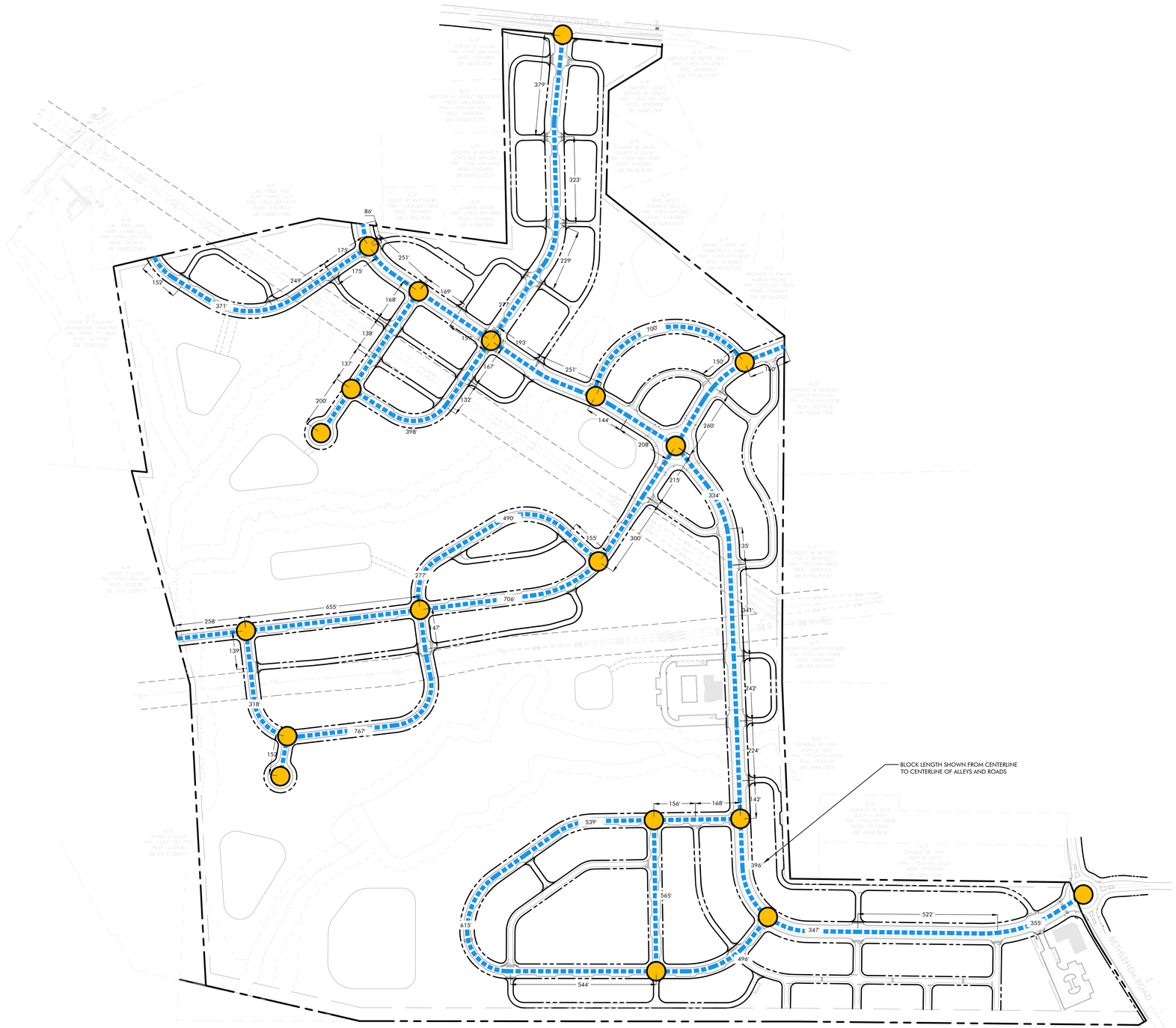
Project No: 22-RDU-083

Date: 07/05/2024

Sheet No:

C-4.81



CONNECTIVITY INDEX

LINKS: 28

NODES: 19

MINIMUM REQUIRED: 1.40
PROVIDED: 1.47*
$\frac{28}{19}$ = 1.47

* CONNECTIVITY INDEX IS CALCULATED ACCORDING TO TOWN OF KNIGHTDALE UDO SEC. 11.3.E.7

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GRAPHIC SCALE

0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

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LYNDON OAKS
Master Plan
Connectivity Index
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
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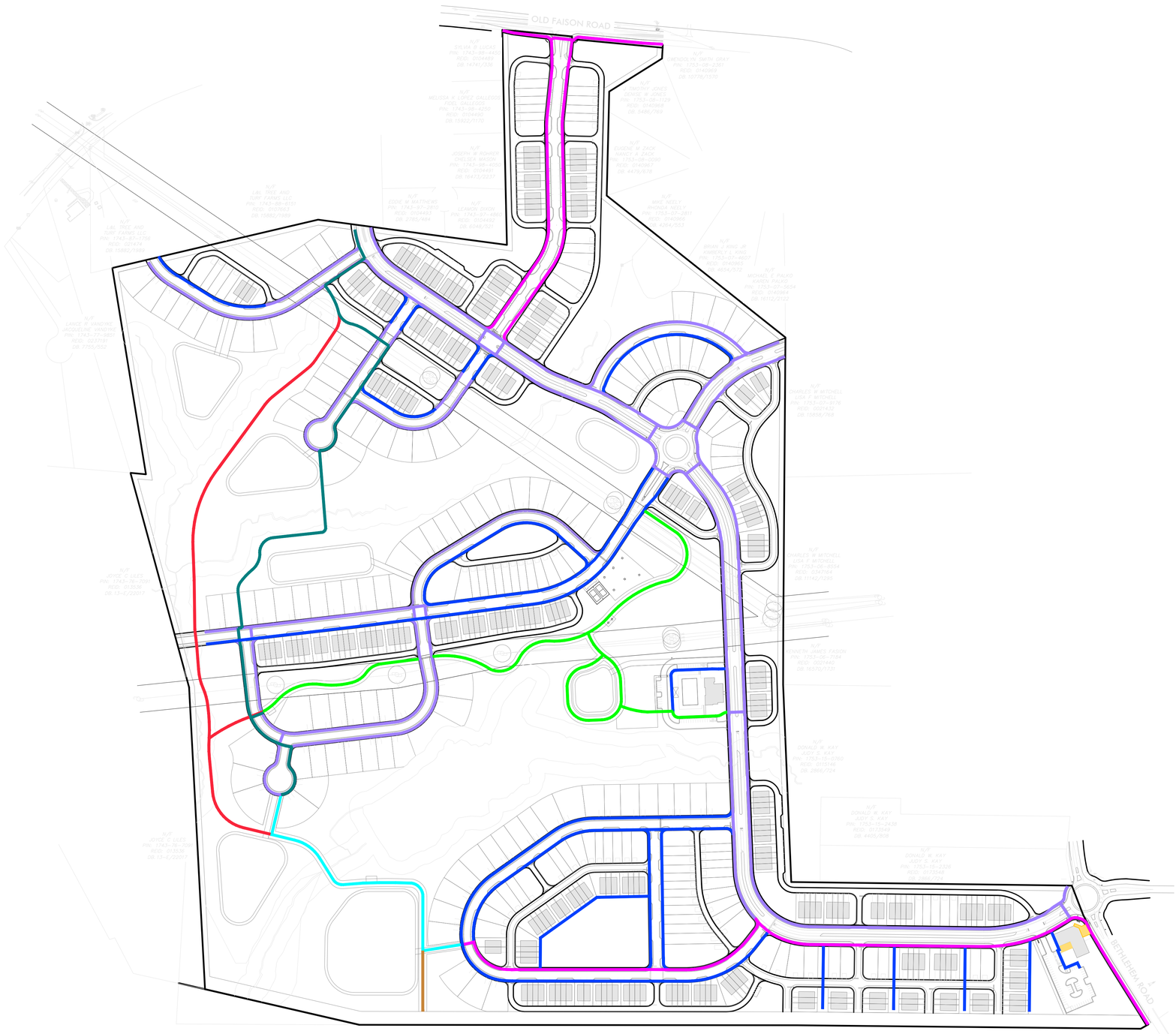
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-4.9



PEDESTRIAN CIRCULATION

- 10' ASPHALT SIDEPATH
- 5' CONCRETE SIDEWALK*
- 6' CONCRETE SIDEWALK*
- 10' PRIVATE TRAIL
- 10' PRIVATE TRAIL W/PUBLIC ACCESS
- 10' PUBLIC TRAIL OPTION A
- 10' PUBLIC TRAIL OPTION B
- TRAIL STUB FOR FUTURE CONNECTION
- PEDESTRIAN PLAZA

*NOTE: STREET SECTIONS CALL FOR 5' WIDE CONCRETE SIDEWALK, BUT WHERE SIDEWALK ABUTS CURB ADJACENT TO PARALLEL PARKING SPACES, SIDEWALK SHALL BE 6' WIDE.

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GRAPHIC SCALE

0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

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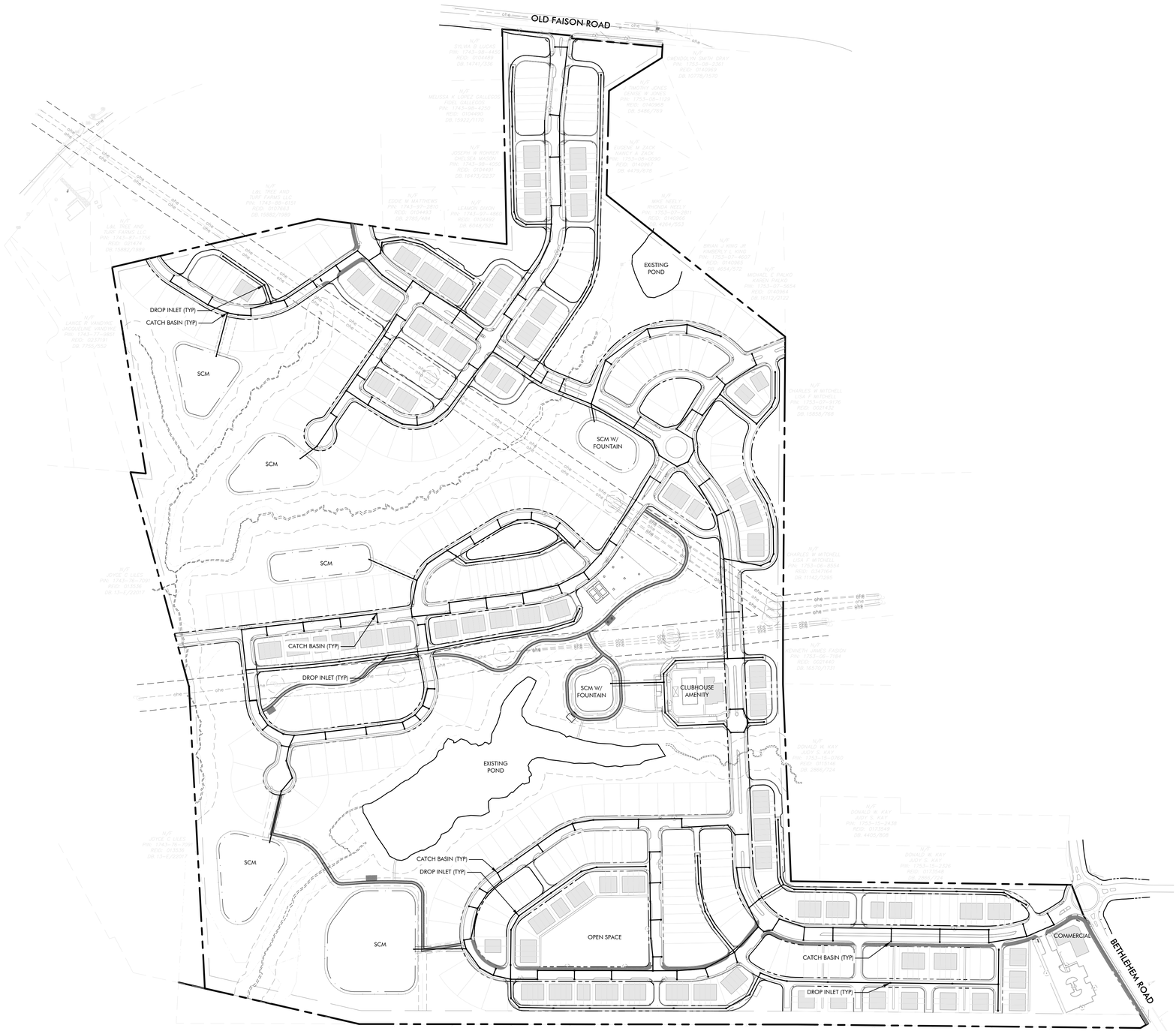
#3	03/28/2024		
#4	05/02/2024		
#5	05/31/2024		

LYNDON OAKS
Master Plan
Pedestrian Circulation
Knightdale, North Carolina

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-4.10



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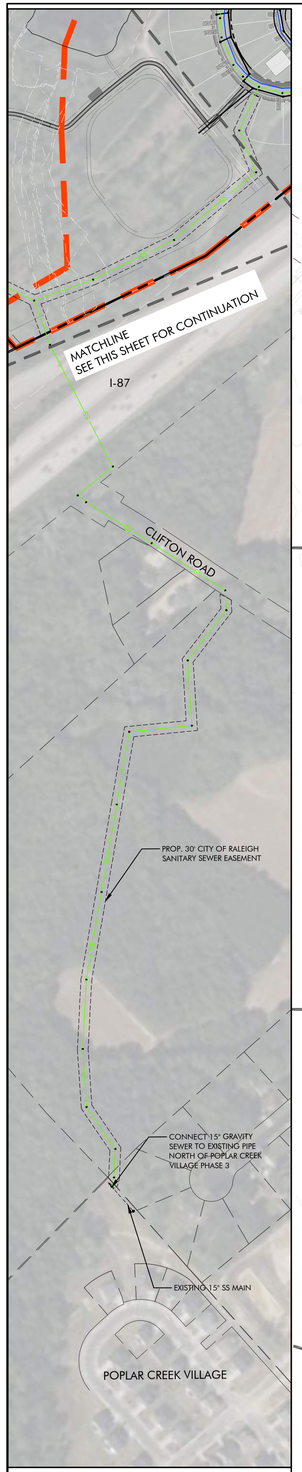
LYNDON OAKS
Master Plan
Overall Storm Drainage Plan
Knightdale, North Carolina

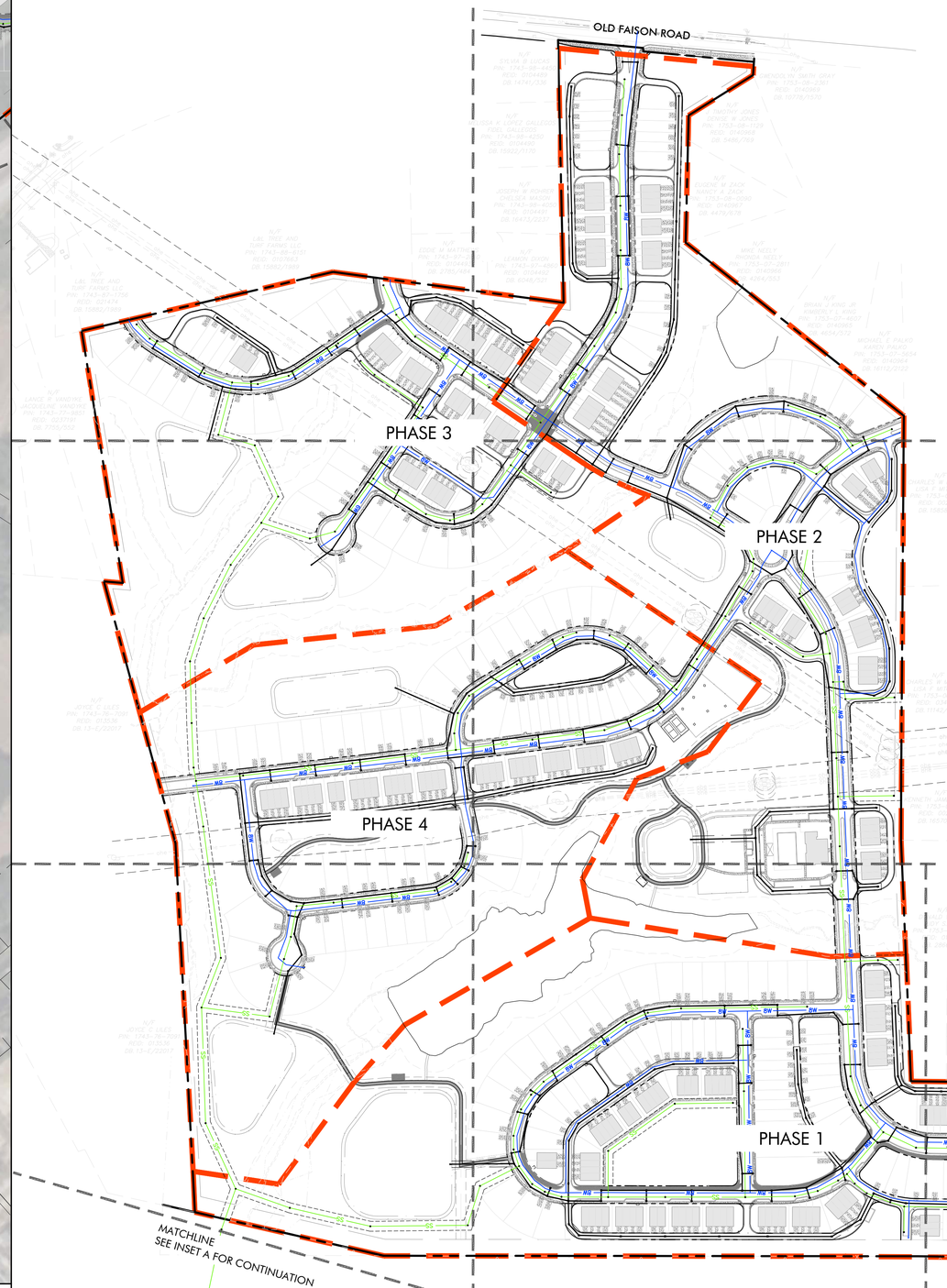
NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

C-5.0



INSET A: OFFSITE SANITARY SEWER EXTENSION
SCALE 1"=200'



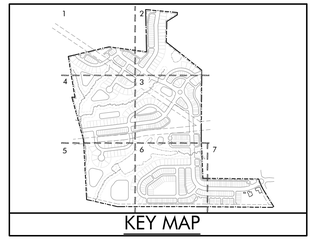
NOTES

SANITARY SEWER LINES WILL MAINTAIN AT LEAST 10' OF HORIZONTAL SEPARATION FROM WATER LINES

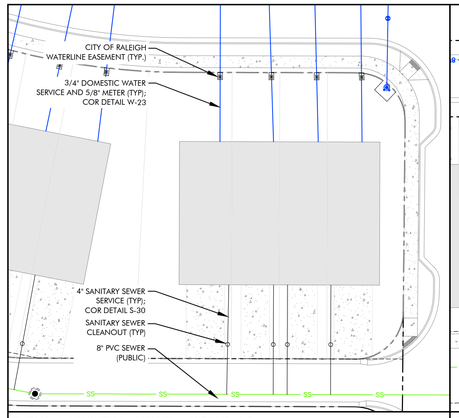
WATER LINES WILL MAINTAIN AT LEAST 5' OF HORIZONTAL SEPARATION FROM STORM LINES

STORM LINES WILL MAINTAIN AT LEAST 5' OF HORIZONTAL SEPARATION FROM SANITARY SEWER LINES

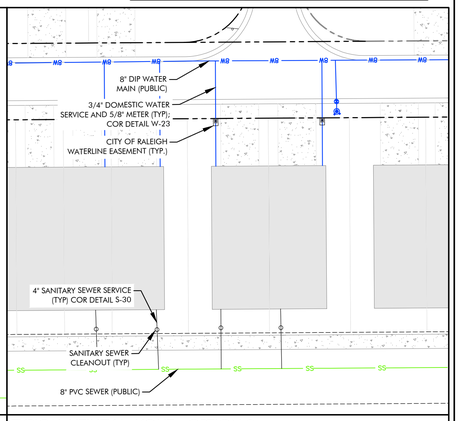
FIRE HYDRANTS AND ASSOCIATED CONNECTIONS WILL FOLLOW THE STANDARDS SET FORTH IN THE CITY OF RALEIGH PUBLIC UTILITIES HANDBOOK



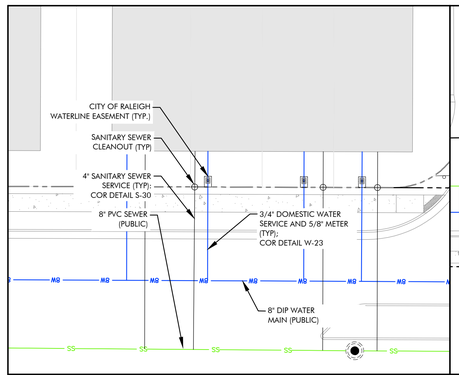
KEY MAP



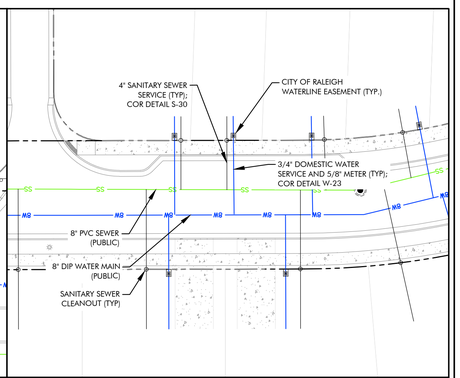
TYPICAL UTILITY LAYOUT: OPTION 1



TYPICAL UTILITY LAYOUT: OPTION 3



TYPICAL UTILITY LAYOUT: OPTION 2



TYPICAL UTILITY LAYOUT: OPTION 4

WATER ALLOCATION POLICY

MAJOR SUBDIVISION	
MAJOR SUBDIVISION BASE POINTS	15 pts.
CONSERVATION OF NATURAL HABITAT	7 pts.
CONSTRUCT A FOUNTAIN WITHIN THE BMP	4 pts.
ON-STREET PARKING	4 pts.
RESIDENTIAL ARCHITECTURAL STANDARDS	15 pts.
3,000' OR MORE OF A 6-FOOT WIDE PATH	3 pts.
RESORT STYLE POOL	2 pts.
DECK/PATIO (2,000 SF MIN.)	2 pts.
CLUBHOUSE (NO MEETING SPACE, BATHROOMS & CHANGING ROOMS ONLY)	3 pts.
IPEMA CERTIFIED PLAYGROUND EQUIPMENT	4 pts.
PICKLEBALL COURTS	5 pts.
OUTDOOR DISPLAY OF PUBLIC ART	4 pts.
TOTAL	**68 pts.**

SINGLE-USE RETAIL	
SINGLE USE RETAIL BASE POINTS	41 pts.
CONSTRUCTION OF GATEWAY LANDSCAPING	5 pts.
DECK/PATIO (2,000 SF MIN)	2 pts.
OUTDOOR DISPLAY OF PUBLIC ART	4 pts.
TOTAL	**52 pts.**

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GRAPHIC SCALE

0 100 200 400 800

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LYNDON OAKS
Master Plan
Overall Utility Plan
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
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Project No: 22-RDU-083
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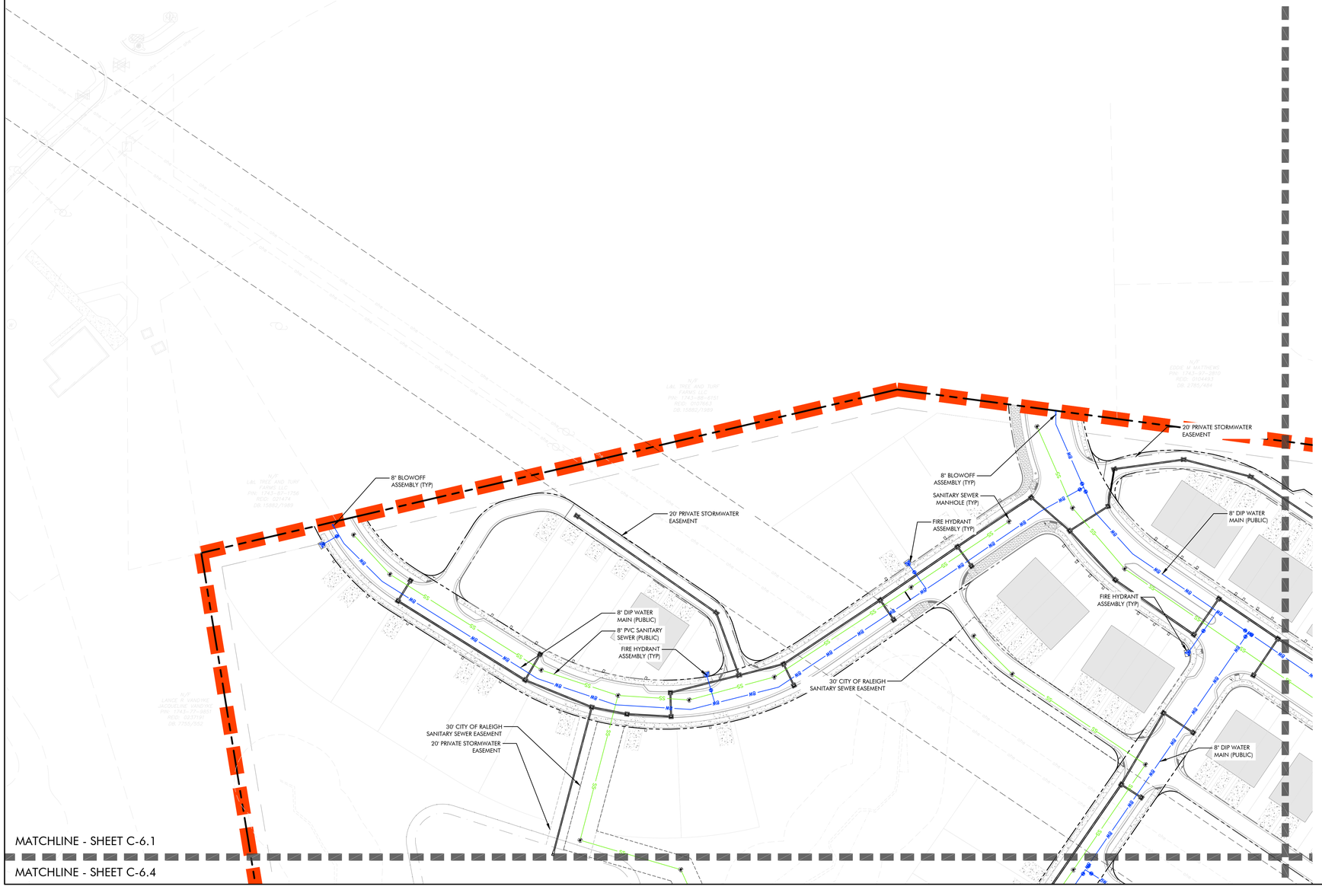
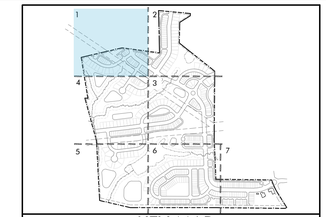
C-6.0





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 AND 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 WITH 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

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LYNDON OAKS
Master Plan
Utility Plan Enlargement 1
Knightdale, North Carolina

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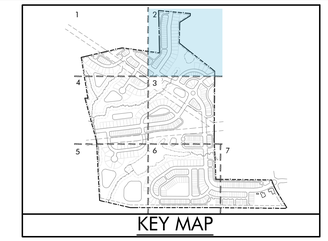

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Master Plan
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MATCHLINE - SHEET C-6.2

MATCHLINE - SHEET C-6.3

MATCHLINE - SHEET C-6.4

MATCHLINE - SHEET C-6.3

MATCHLINE - SHEET C-6.3

MATCHLINE - SHEET C-6.6

FIRE HYDRANT ASSEMBLY (TYP)

8" BLOWOFF ASSEMBLY (TYP)

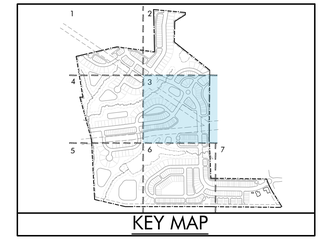
8" PVC SANITARY SEWER (PUBLIC)

8" DIP WATER MAIN (PUBLIC)

SANITARY SEWER MANHOLE (TYP)

20' PRIVATE STORMWATER EASEMENT

30' CITY OF RALEIGH SANITARY SEWER EASEMENT



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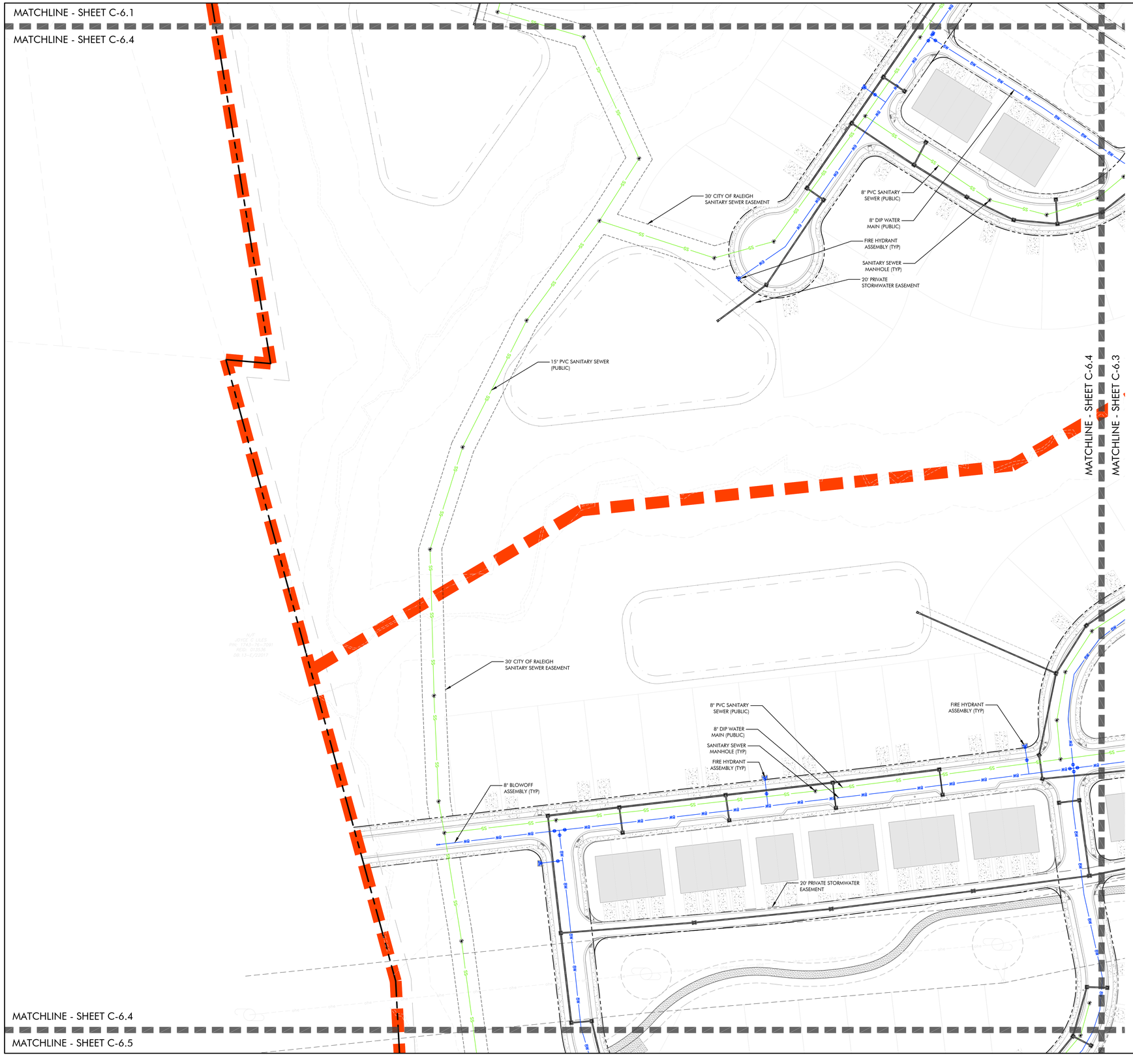

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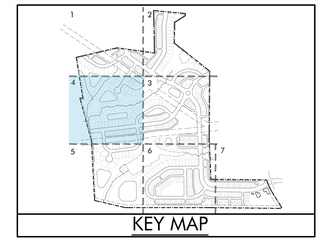

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LYNDON OAKS
Master Plan
Utility Plan Enlargement 4
Knightdale, North Carolina

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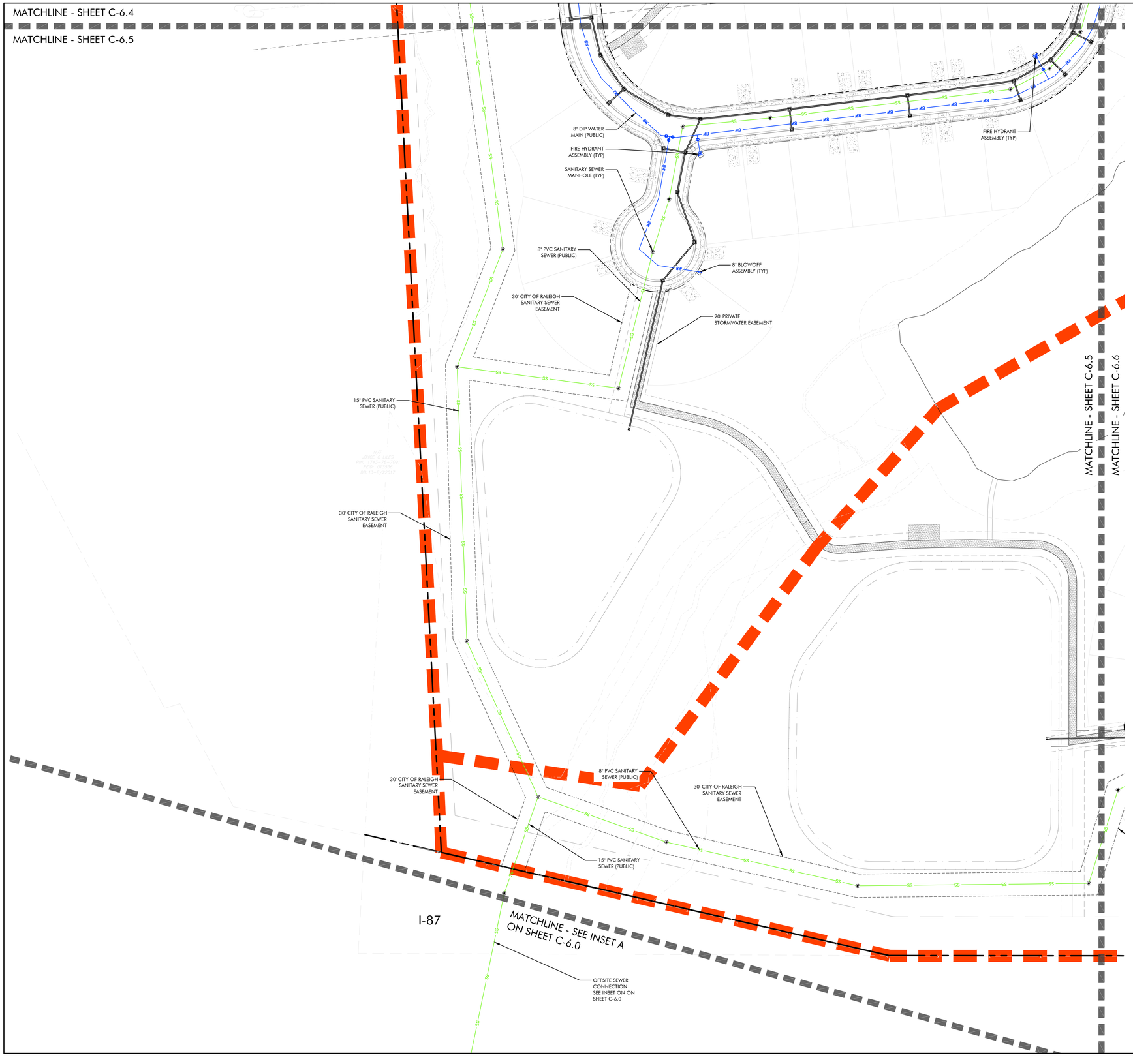
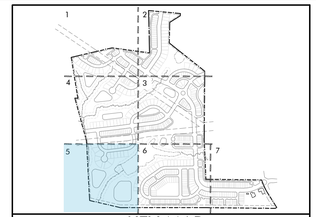
C-6.4

MATCHLINE - SHEET C-6.4

MATCHLINE - SHEET C-6.5





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MATCHLINE - SHEET C-6.3

MATCHLINE - SHEET C-6.6

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MATCHLINE - SHEET C-6.6

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MATCHLINE - SHEET C-6.7

20' PRIVATE STORMWATER EASEMENT

30' CITY OF RALEIGH SANITARY SEWER EASEMENT

DONAL PIN: 17 D.B. 002

FIRE HYDRANT ASSEMBLY (TYP)

20' PRIVATE STORMWATER EASEMENT

SANITARY SEWER MANHOLE (TYP)

8" DIP WATER MAIN (PUBLIC)

8" PVC SANITARY SEWER (PUBLIC)

FIRE HYDRANT ASSEMBLY (TYP)

20' PRIVATE STORMWATER EASEMENT

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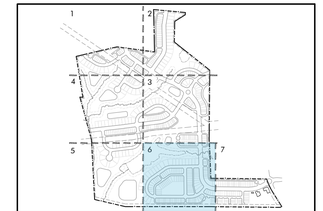

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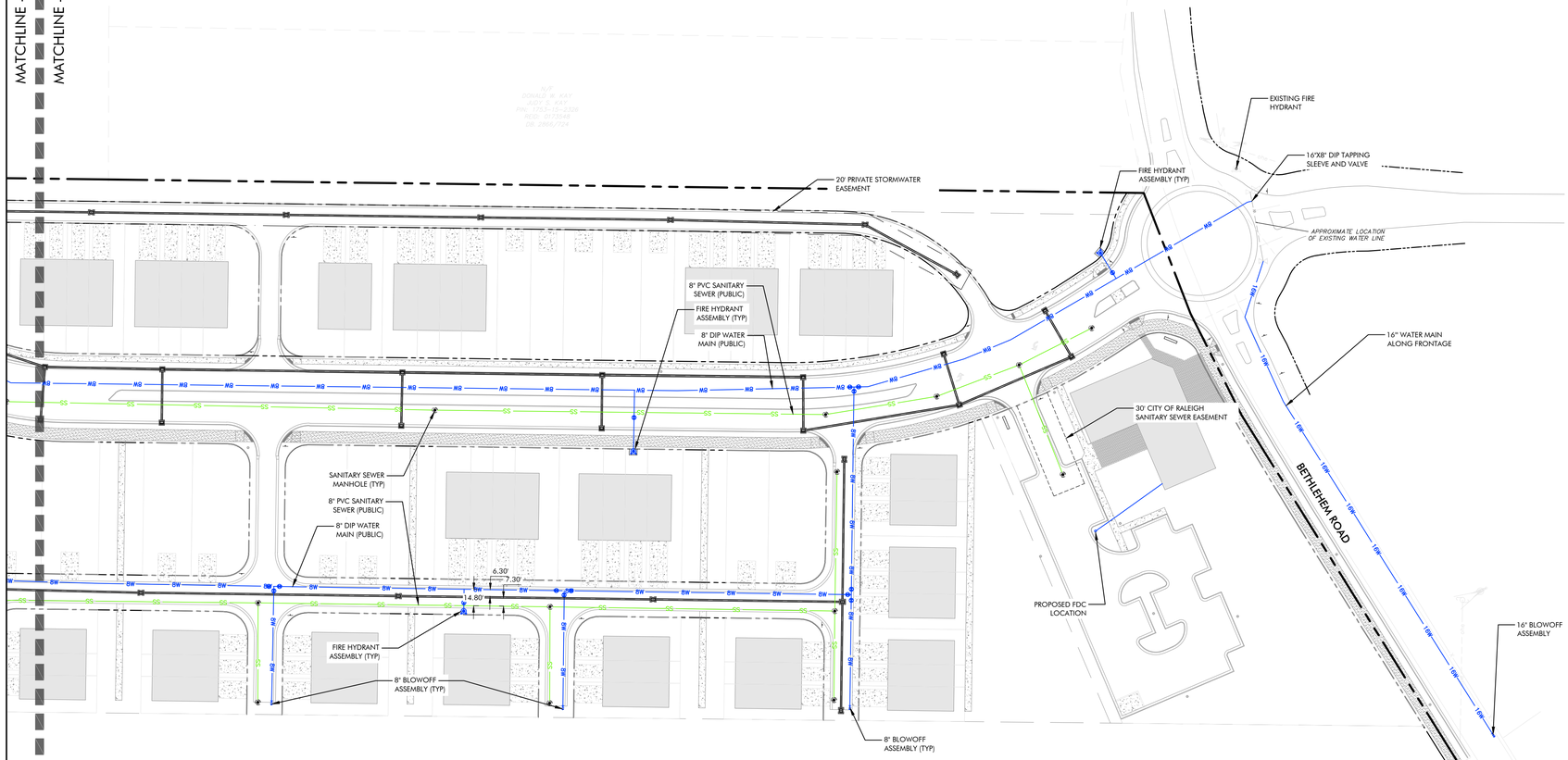
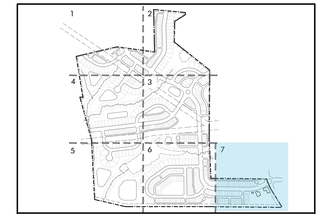
MATCHLINE - SHEET C-6.6

MATCHLINE - SHEET C-6.7

SINGLE-USE RETAIL	
SINGLE USE RETAIL BASE POINTS	41 pts.
CONSTRUCTION OF GATEWAY LANDSCAPING	5 pts.
DECK/PATIO (2,000 SF MIN)	2 pts.
OUTDOOR DISPLAY OF PUBLIC ART	4 pts.
TOTAL	**52 pts.**





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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 CORPUD FOG PROGRAM COORDINATOR PRIOR TO ISSUANCE OF A BUILDING PERMIT. CONTACT STEPHEN CALVERLEY AT (919) 996-2334 OR STEPHEN.CALVERLEY@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.

15. THE DEVICES SHALL MEET AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) STANDARDS OR BE ON THE UNIVERSITY OF SOUTHERN CALIFORNIA APPROVAL LIST.

16. THE DEVICE AND INSTALLATION SHALL MEET THE GUIDELINES OF APPENDIX A - GUIDELINES AND REQUIREMENTS FOR THE CROSS CONNECTION PROGRAM IN RALEIGH'S SERVICE AREA.

17. THE DEVICES SHALL BE INSTALLED AND TESTED (BOTH INITIAL AND PERIODIC TESTING THEREAFTER) IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS OR THE LOCAL CROSS-CONNECTION CONTROL PROGRAM, WHICHEVER IS MORE STRINGENT. CONTACT CROSS.CONNECTION@RALEIGHNC.GOV FOR MORE INFORMATION.

18. NOTICE FOR PROJECTS WITH REPLACE 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.

NOTES

SANITARY SEWER LINES WILL MAINTAIN AT LEAST 10' OF HORIZONTAL SEPARATION FROM WATER LINES

WATER LINES WILL MAINTAIN AT LEAST 5' OF HORIZONTAL SEPARATION FROM STORM LINES

STORM LINES WILL MAINTAIN AT LEAST 5' OF HORIZONTAL SEPARATION FROM SANITARY SEWER LINES

FIRE HYDRANTS AND ASSOCIATED CONNECTIONS WILL FOLLOW THE STANDARDS SET FORTH IN THE CITY OF RALEIGH PUBLIC UTILITIES HANDBOOK

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GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

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PRELIMINARY DRAWING
FOR REVIEW PURPOSES ONLY

07/05/2024

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LYNDON OAKS
Master Plan
Utility Plan Enlargement 7
Knightdale, North Carolina

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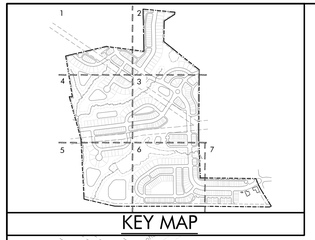
C-6.7



KEY MAP

PLANT SCHEDULE

SYMBOL	CODE	BOTANICAL / COMMON NAME	QTY	SITE PLANTING	STREET TREES	CONT	CAL	SIZE	MATURE HEIGHT
CANOPY TREES									
	AO	ACER RUBRUM 'OCTOBER GLORY' / OCTOBER GLORY RED MAPLE	63	47	16	B & B	2"CAL	8' HT	25 - 40ft. ht.
	AB	ACER SACCHARUM 'BONFIRE' / BONFIRE SUGAR MAPLE	170	10	160	B & B	2"CAL	8' HT	
	CA	CARPINUS CAROLINIANA / AMERICAN HORNBEAM	51	42	9	B & B	2"CAL	8' HT	15 - ' ht.
	GK	GYMNOCLADUS DIOICA / KENTUCKY COFFEETREE	15	15		B & B	2"CAL	8' HT	40 - ' ht.
	JB	JUNIPERUS VIRGINIANA 'BRODIE' / BRODIE EASTERN REDCEDAR	35	35		B & B	2"CAL	8' HT	25 - ' ht.
	LA	LIRIODENDRON TULIPIFERA 'ARNOLD' / ARNOLD TULIP POPLAR	24	10	14	B & B	2"CAL	8' HT	40 - 65ft. ht.
	MG	MAGNOLIA GRANDIFLORA / SOUTHERN MAGNOLIA	3	3		B & B	2"CAL	8' HT	> 65ft. ht.
	QA	QUERCUS ACUTISSIMA / SAWTOOTH OAK	129		129	B & B	2"CAL	8' HT	40 - 65ft. ht.
	UF	ULMUS PARVIFOLIA 'BOSQUE' TM / BOSQUE LACEBARK ELM	138	3	135	B & B	2"CAL	8' HT	
	ZG	ZELKOVA SERRATA 'GREEN VASE' / GREEN VASE JAPANESE ZELKOVA	164	14	150	B & B	2"CAL	8' HT	40 - 65ft. ht.
UNDERSTORY TREES									
	AS2	ACER BUERGERIANUM 'STREETWISE' / STREETWISE® TRIDENT MAPLE	43		43	B & B	1.25"CAL	6' HT	15 - ' ht.
	AS	AMELANCHIER LAEVIS 'SNOWCLOUD' / SNOWCLOUD ALLEGHENY SERVICEBERRY	11	6	5	B & B	1.25"CAL	6' HT	15 - ' ht.
	CT	CERCIS CANADENSIS 'NCI2016-2' / FLAME THROWER® EASTERN REDBUD	30	30		B & B	1.25"CAL	6' HT	15 - 25ft. ht.
	CS	CORNUS KOUSA 'SATOMI' / SATOMI RED KOUSA DOGWOOD	63	30	33	B & B	1.25"CAL	6' HT	15 - 25ft. ht.
	LW	LAGERSTROEMIA INDICA 'WHIT III' / PINK VELOUR® CRAPE MYRTLE	112	5	107	B & B	MULTI-STEM (3 STALKS MIN.)	8' HT	6 - ' ht.
	LY	LAGERSTROEMIA X 'YUMA' / YUMA CRAPE MYRTLE	35	6	29	B & B	MULTI-STEM (3 STALKS MIN.)	8' HT	15 - 25ft. ht.
	PV	PINUS VIRGINIANA / VIRGINIA PINE	7	7		B & B	2"CAL	6' HT	25 - 40ft. ht.

SYMBOL	CODE	BOTANICAL / COMMON NAME	QTY	SITE PLANTING	STREET TREES	SIZE	MINIMUM REQUIREMENTS		MATURE HEIGHT
SHRUBS									
	AT	ASCLEPIAS TUBEROSA / BUTTERFLY MILKWEED	41	38	3	3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 36in. ht.
	BG	BUXUS X 'GREEN GEM' / GREEN GEM BOXWOOD	192	149	43	3 GAL	18" HEIGHT & 12"-15" SPREAD		3 - 6ft. ht.
	CS2	CALAMAGROSTIS X ACUTIFLORA 'STRICTA' / KARL FOERSTER FEATHER REED GRASS	70	31	39	3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 6' ht.
	CA2	CALLICARPA AMERICANA / AMERICAN BEAUTYBERRY	36	36		3 GAL	18" HEIGHT & 12"-15" SPREAD		3 - 6ft. ht.
	FG	FOTHERGILLA GARDENII / DWARF FOTHERGILLA	18	18		3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 36in. ht.
	IG	ILEX CRENATA 'GREEN LUSTRE' / GREEN LUSTER JAPANESE HOLLY	59	59		3 GAL	18" HEIGHT & 12"-15" SPREAD		6 - ' ht.
	JM	JUNIPERUS CHINENSIS 'MINT JULEP' / MINT JULEP JUNIPER	17	17		3 GAL	18" HEIGHT & 12"-15" SPREAD		
	PR	PENNISETUM SETACEUM 'RUBRUM' / PURPLE FOUNTAIN GRASS	40	40		3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 6' ht.
	PG	PICEA PUNGENS 'GLOBOSA' / DWARF GLOBE BLUE SPRUCE	13	13		3 GAL	18" HEIGHT & 12"-15" SPREAD		3 - 6ft. ht.
	SG	SPIRAEA JAPONICA 'GOLDMOUND' / GOLDMOUND JAPANESE SPIREA	5	5		3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 36in. ht.
	SB	SPIRAEA PRUNIFOLIA 'BRIDALWREATH' / BRIDAL WREATH SPIREA	5	5		3 GAL	18" HEIGHT & 12"-15" SPREAD		

NOTES:

1. EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED TO MEET BUFFER OPACITY STANDARDS.
2. FINAL LOCATION OF SUPPLEMENTAL BUFFER PLANTINGS TO BE COORDINATED WHEN CONSTRUCTION DOCUMENTS ARE DEVELOPED. SEE SHEET LS-2.0 FOR TYPICAL BUFFER SECTIONS.
3. ANY REQUIRED SCREENING AREAS THAT OVERLAP WITH SIGHT DISTANCE TRIANGLES WILL WAIVE PLANTING REQUIREMENTS AND USE GROUNDCOVER PLANTINGS.
4. ALL SIDES OF PARKING LOTS FRONTING RIGHT-OF-WAYS WILL BE SCREENED WITH A TYPE B BUFFER YARD PER UDO.
5. IF GRAPHIC REPRESENTATION OF PLANTINGS ON PLANS DO NOT MATCH QUANTITIES IN PLANT SCHEDULE, GRAPHIC REPRESENTATION OF PLANTINGS WILL GOVERN.
6. TREES NOT IN A LANDSCAPE BED SHALL RECEIVE A 6' DIAMETER MULCH RING.
7. LIMITS OF IRRIGATION INCLUDE DENOTED LANDSCAPE BEDS, ALL SOD/SEED AREAS, AND TREES NOT LOCATED IN A LANDSCAPE BED.
8. FULL LANDSCAPE SCHEDULE ON SHEET LS-2.0
9. LANDSCAPE SPECIES, LOCATION, AND QUANTITY IS SUBJECT TO CHANGE AT TIME OF CONSTRUCTION DOCUMENTS.
10. EACH SINGLE-FAMILY OR DUPLEX LOT SHALL CONTAIN A MINIMUM OF ONE (1) CANOPY TREE FOR EVERY TWO THOUSAND (2,000) SQUARE FEET OF LOT AREA OR FRACTION THEREOF UP TO TWENTY-THOUSAND (20,000) SQUARE FEET IN LOT AREA. ANY PORTION OF THE RESIDENTIAL LOT OCCUPIED BY A RECORDED UTILITY EASEMENT SHALL NOT BE INCLUDED AS PART OF THE TOTAL LOT AREA. THE LOCATION OF PLANTING TO ACCOUNT FOR PHYSICAL CONDITIONS MAY BE ADJUSTED BY THE LAND USE ADMINISTRATOR.
11. THE USE OF EXISTING TREES MEETING THE FOLLOWING STANDARDS TO SATISFY THIS REQUIREMENT IS ENCOURAGED. EXISTING LARGE SHADE TREES MEASURING MORE THAN SIX (6) INCHES IN DBH MAY BE COUNTED TOWARDS FULFILLING THIS REQUIREMENT.
12. REQUIRED STREET TREES (UDO SECTION 7.4 (L)) MAY NOT BE COUNTED TOWARDS THE FULFILLMENT OF THE RESIDENTIAL LANDSCAPING REQUIREMENT. APART FROM REQUIRED STREET TREES, ALL OTHER TREES SHALL BE PLANTED WITHIN THE PRIVATE LOT.
13. FOUNDATION PLANTINGS CONSISTING OF EVERGREEN SHRUBS SHALL BE INSTALLED ALONG THE ENTIRE FOUNDATION WALL OF THE BUILDING. PLANT INSTALLATION SHALL BE A MINIMUM OF TWO (2) FEET IN HEIGHT PLANTED AT FOUR (4) FOOT INTERVALS.

LANDSCAPE REQUIREMENTS:

BUFFER YARD TYPE B (PERIMETER BUFFER)

- BUFFER TYPE:	B
- WIDTH REQ'D:	20' MIN.
- WIDTH PROV:	20'
- LENGTH:	± 12,730 LF TOTAL
- REQUIRED PLANTINGS:	
• CANOPY TREES:	3 TREES/100 LF
• UNDERSTORY TREES:	5 TREES/100 LF
• SHRUBS:	20 SHRUBS/100 LF
(12,730 LF/ 100 LF)(3) =	382 CANOPY TREES REQ'D
(12,730 LF/ 100 LF)(5) =	637 UNDERSTORY TREES REQ'D
(12,730 LF/ 100 LF)(20) =	2,546 SHRUBS REQ'D
- PROPOSED PLANTINGS:	EXISTING PLANT MATERIAL IN BUFFERS TO REMAIN AND BE SUPPLEMENTED TO MEET REQUIREMENTS AS STATED ABOVE

BUFFER YARD TYPE D (PERIMETER BUFFER)

- BUFFER TYPE:	D
- WIDTH REQ'D:	50' MIN.
- WIDTH PROV:	50'
- LENGTH:	± 3,486 LF
- MIN WALL HT & OPACITY:	A FULLY OPAQUE, MASONRY WALL WITH A MINIMUM HEIGHT OF SIX (6) FEET AND A MAXIMUM HEIGHT OF EIGHT (8) FEET SHALL BE PROVIDED.
- REQUIRED PLANTINGS:	
• CANOPY TREES:	5 TREES/100 LF
• UNDERSTORY TREES:	8 TREES/100 LF
• SHRUBS:	35 SHRUBS/100 LF
(3,486 LF/ 100 LF)(5) =	175 CANOPY TREES REQ'D
(3,486 LF/ 100 LF)(8) =	279 UNDERSTORY TREES REQ'D
(3,486 LF/ 100 LF)(35) =	1,221 SHRUBS REQ'D
- PROPOSED PLANTINGS:	EXISTING PLANT MATERIAL IN BUFFERS TO REMAIN AND BE SUPPLEMENTED TO MEET REQUIREMENTS AS STATED ABOVE

STREET TREES

- SPACING:	40' O.C. (CANOPY) 30' O.C. (UNDERSTORY)
- SPECIES:	SPECIES OF EVERY OTHER TREE ALONG THE STREET FRONTAGE SHALL ALTERNATE

OVERALL TREE CANOPY/TREE PRESERVATION (UDO SEC 7.4.M)

- REQUIRED:	A TREE COVER AREA EQUAL TO THE PERIMETER OF THE DEVELOPMENT IN FEET MULTIPLIED BY 20 SHALL BE MAINTAINED ON SITE.
(14,079 LF)(20) =	281,580 SF (6.46 AC) REQUIRED
6.46 AC / 171.88 AC =	3.7% OF SITE
- PROVIDED:	844,604 SF (19.39 AC) TREE PRESERVATION PROV.
• PERIMETER BUFFERS:	32,524 SF (0.75 AC) WITHIN PERIMETER BUFFERS*
• STREAM BUFFERS:	812,080 SF (18.64 AC) WITHIN STREAM BUFFERS

* SUPPLEMENTAL PERIMETER BUFFER TREES TO BE STUDIED AT TIME OF CDs

LEGEND:

TREE PRESERVATION

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GRAPHIC SCALE

0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

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PRELIMINARY DRAWING
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07/05/2024

D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
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LYNDON OAKS
Master Plan
Overall Landscape Plan
Knightdale, North Carolina

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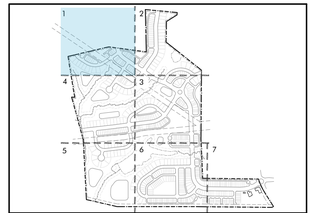
MATCHLINE - SHEET LS-1.1
MATCHLINE - SHEET LS-1.2



KEY MAP

LEGEND:

CANOPY TREES

	AO	61	ACER RUBRUM 'OCTOBER GLORY' / OCTOBER GLORY RED MAPLE
	AB	170	ACER SACCHARUM 'BONFIRE' / BONFIRE SUGAR MAPLE
	CA	51	CARPINUS CAROLINIANA / AMERICAN HORNBEAM
	GK	15	GYMNOCLADUS DIOICA / KENTUCKY COFFEETREE
	JB	35	JUNIPERUS VIRGINIANA 'BRODIE' / BRODIE EASTERN REDCEDAR
	LA	23	LIRIODENDRON TULIPIFERA 'ARNOLD' / ARNOLD TULIP POPLAR
	MG	3	MAGNOLIA GRANDIFLORA / SOUTHERN MAGNOLIA
	QA	129	QUERCUS ACUTISSIMA / SAWTOOTH OAK
	UF	138	ULMUS PARVIFOLIA 'BOSQUE' TM / BOSQUE LACEBARK ELM
	ZG	163	ZELKOVA SERRATA 'GREEN VASE' / GREEN VASE JAPANESE ZELKOVA

UNDERSTORY TREES

	AS2	43	ACER BUERGERIANUM 'STREETWISE' / STREETWISE® TRIDENT MAPLE
	AS	11	AMELANCHER LAEVIS 'SNOWCLOUD' / SNOWCLOUD ALLEGHENY SERVICEBERRY
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	CS	63	CORNUS KOUSA 'SATOMI' / SATOMI RED KOUSA DOGWOOD
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	LY	36	LAGERSTROEMIA X 'YUMA' / YUMA CRAPE MYRTLE
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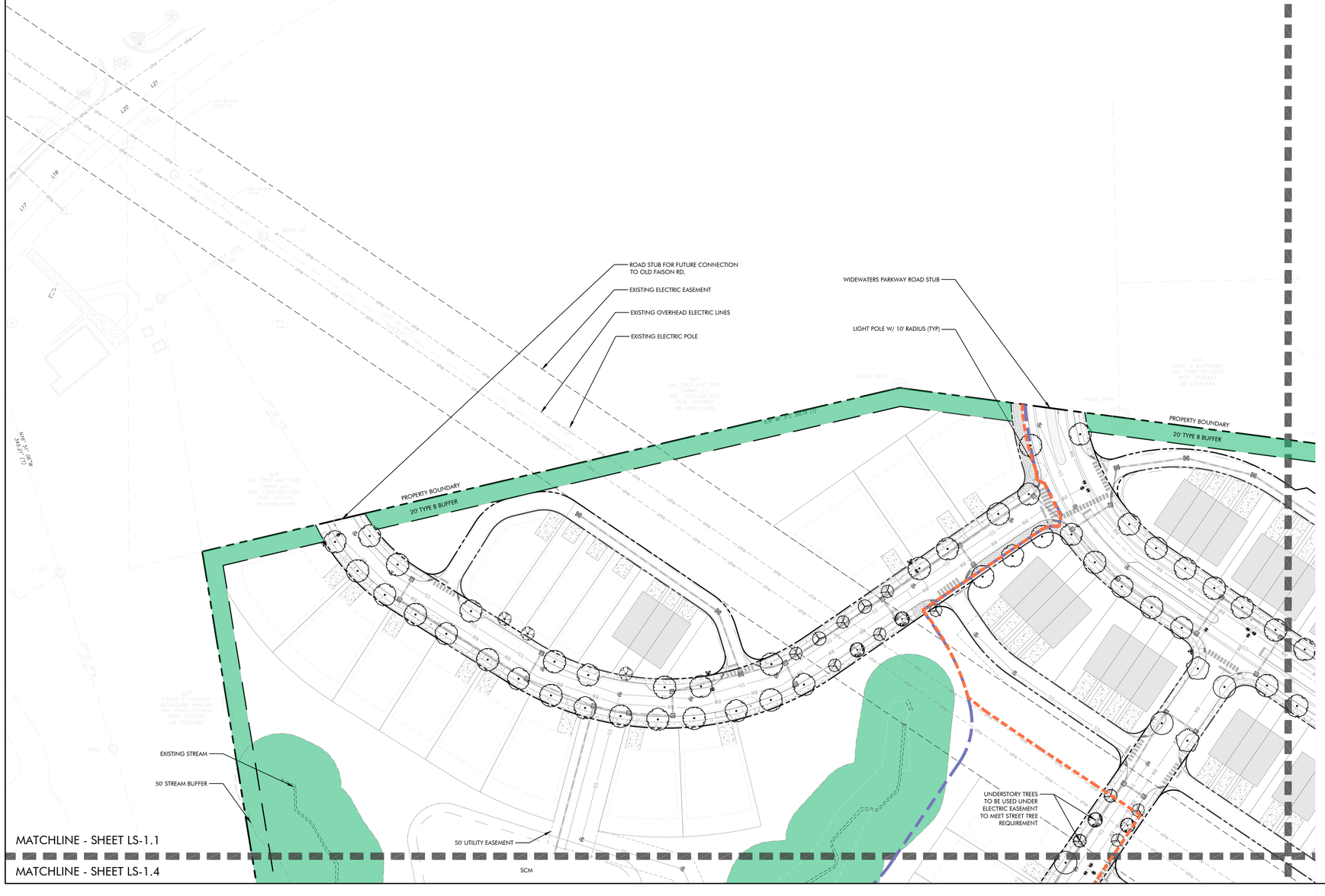

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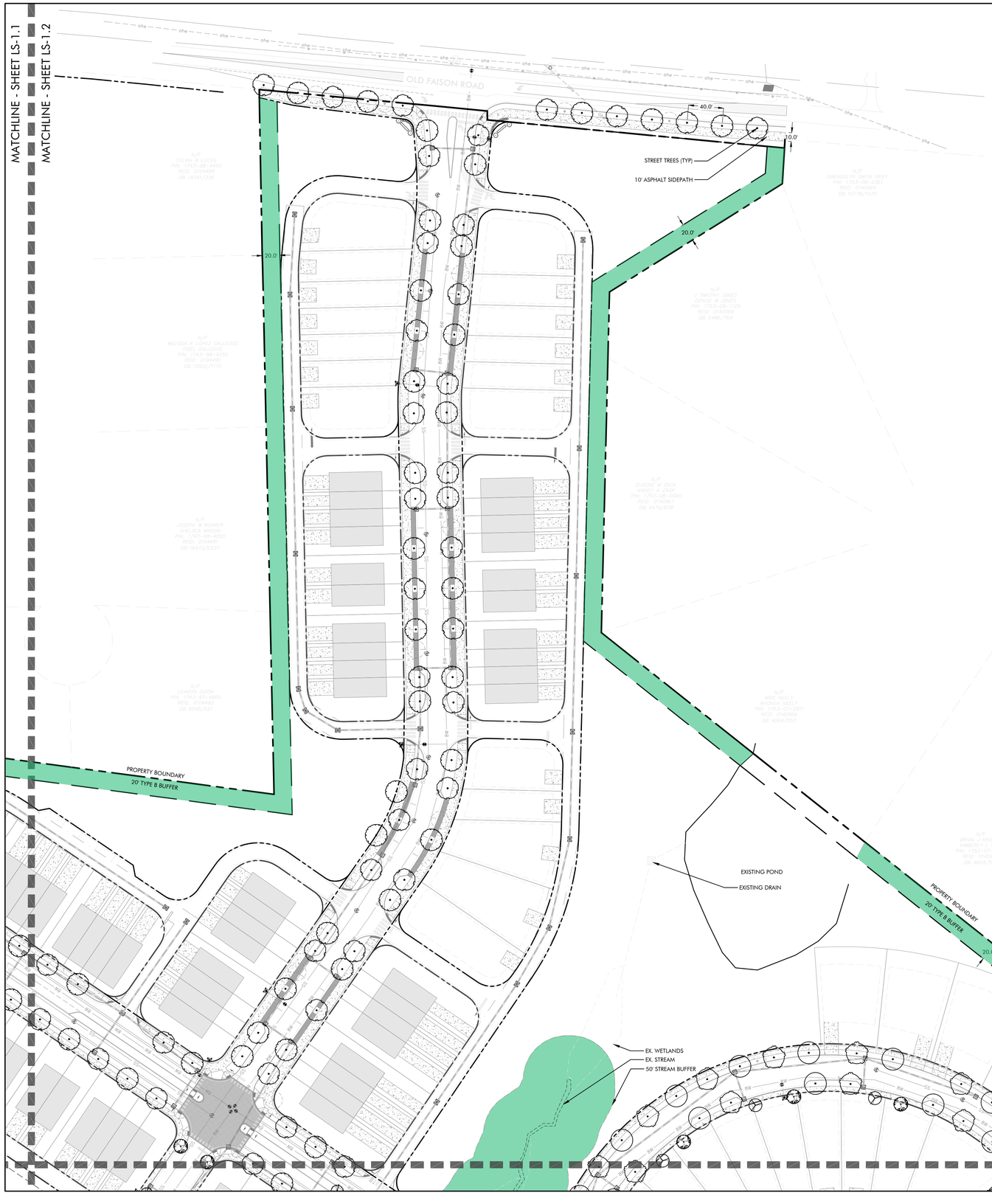

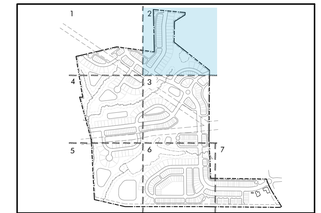

KEY MAP

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MG	3	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA
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UF	138	ULMUS PARVIFOLIA 'BOSQUE TM'	BOSQUE LACEBARK ELM
ZG	163	ZELKOVA SERRATA 'GREEN VASE'	GREEN VASE JAPANESE ZELKOVA

UNDERSTORY TREES

AS2	43	ACER BUERGERIANUM 'STREETWISE'	STREETWISE® TRIDENT MAPLE
AS	11	AMELANCHER LAEVIS 'SNOWCLOUD'	SNOWCLOUD ALLEGHENY SERVICEBERRY
CT	30	CERCIS CANADENSIS 'NC2016-2'	FLAME THROWER® EASTERN REDBUD
CS	63	CORNUS KOUSA 'SATOMI'	SATOMI RED KOUSA DOGWOOD
LW	112	LAGERSTROEMIA INDICA 'WHIT III'	PINK VELOUR® CRAPE MYRTLE
LY	36	LAGERSTROEMIA X 'YUMA'	YUMA CRAPE MYRTLE
PV	7	PINUS VIRGINIANA	VIRGINIA PINE

SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME
SHRUBS			
	AT	62	ASCLEPIAS TUBEROSA / BUTTERFLY MILKWEED
	BG	192	BUXUS X 'GREEN GEM' / GREEN GEM BOXWOOD
	CS2	70	CALAMAGROSTIS X ACUTIFLORA 'STRICTA' / KARL FOERSTER FEATHER REED GRASS
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07/05/2024

D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan
Landscape Plan Enlargement 2
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
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Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

LS-1.2

MATCHLINE - SHEET LS-1.2

MATCHLINE - SHEET LS-1.3

MATCHLINE - SHEET LS-1.4

MATCHLINE - SHEET LS-1.3

SCM

LANDSCAPE MEDIAN AT ROUNDABOUT

EXISTING STREAM

50' STREAM BUFFER

EXISTING ELECTRIC EASEMENT

EXISTING ELECTRIC EASEMENT

UNDERSTORY TREES TO BE USED UNDER ELECTRIC EASEMENT TO MEET STREET TREE REQUIREMENTS

PROPERTY BOUNDARY

20' TYPE B BUFFER

30.0'

EXISTING WETLANDS

GREENWAY TRAIL

EXISTING ELECTRIC POLES

EXISTING ELECTRIC EASEMENT

PLANTING BED (TYP)

TYPE A BUFFER AROUND PARKING

PARKING LOT TREE W/ 60' PARKING RAD

6' MULCH RING (TYP)

EXISTING ELECTRIC EASEMENT

AMENITY SITE WILL COMPLY WITH ALL LANDSCAPING REQUIREMENTS PER TOWN OF KNIGHTDALE UDO CH. 7

LANDSCAPE MEDIAN AT CENTRAL AMENITY LOCATION

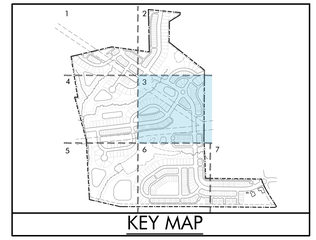
40'

SCM

EXISTING POND

MATCHLINE - SHEET LS-1.3

MATCHLINE - SHEET LS-1.6



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LYNDON OAKS
Master Plan
Landscape Plan Enlargement 3
Knightdale, North Carolina

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Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

LS-1.3

MATCHLINE - SHEET LS-1.1

MATCHLINE - SHEET LS-1.4

50' UTILITY EASEMENT

SCM

PROPERTY BOUNDARY

20' TYPE B BUFFER

SCM

SCM

MATCHLINE - SHEET LS-1.4

MATCHLINE - SHEET LS-1.3

TREE PRESERVATION

50' STREAM BUFFER

WETLANDS

STREAM

R/W STUB FOR FUTURE EXTENSION

WETLANDS

EXISTING ELECTRIC EASEMENT

EXISTING OVERHEAD ELECTRIC LINE

MATCHLINE - SHEET LS-1.4

MATCHLINE - SHEET LS-1.5

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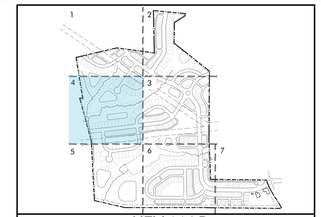

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07/05/2024

D.R. Horton

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Raleigh, NC 27615

LYNDON OAKS
Master Plan
Landscape Plan Enlargement 4
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
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Project No: 22-RDU-083

Date: 07/05/2024

Sheet No:

LS-1.4

MATCHLINE - SHEET LS-1.4

MATCHLINE - SHEET LS-1.5

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EXISTING CREEK

STREAM BUFFER

WETLANDS

EXISTING POND

SCM

MATCHLINE - SHEET LS-1.5

MATCHLINE - SHEET LS-1.6

WETLANDS

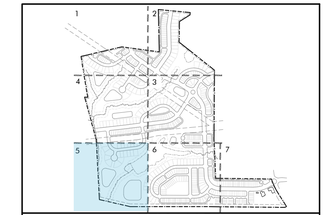
SHADE TREES ALONG GREENWAY TRAIL

TREE PRESERVATION IN STREAM BUFFER

SCM

50' TYPE D BUFFER

PROPERTY BOUNDARY



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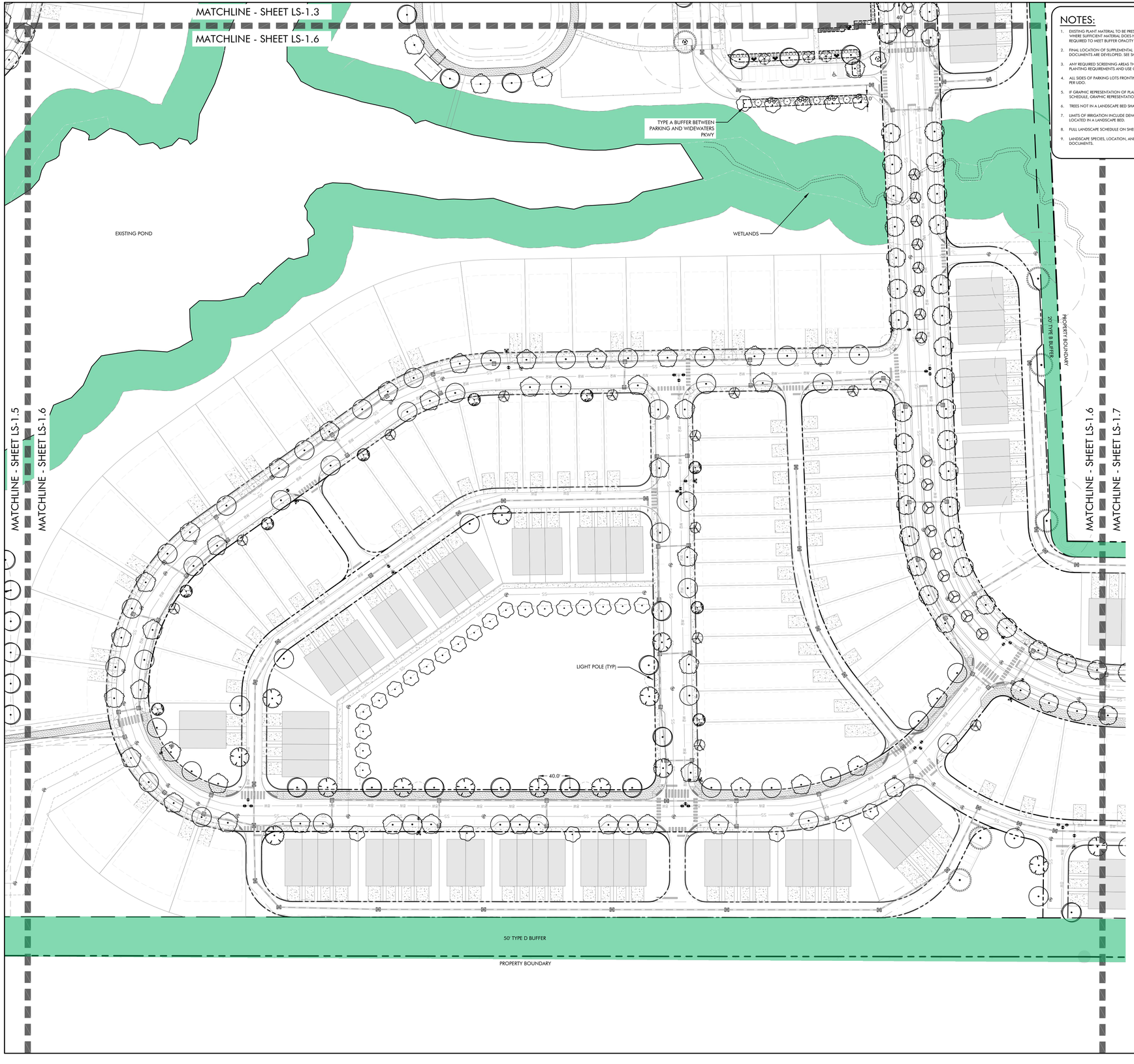
LS-1.5



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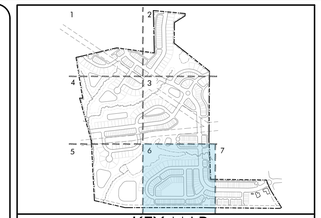

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	AS	11	AMELANCHIER LAEVIS 'SNOWCLOUD' / SNOWCLOUD ALLEGHENY SERVICEBERRY
	CT	30	CERCIS CANADENSIS 'NC2016-2' / FLAME THROWER® EASTERN REDBUD
	CS	63	CORNUS KOUSA 'SATOMI' / SATOMI RED KOUSA DOGWOOD
	LW	112	LAGERSTROEMIA INDICA 'WHIT III' / PINK VELOUR® CRAPE MYRTLE
	LY	36	LAGERSTROEMIA X 'YUMA' / YUMA CRAPE MYRTLE
	PV	7	PINUS VIRGINIANA / VIRGINIA PINE

SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME
SHRUBS			
	AT	62	ASCLEPIAS TUBEROSA / BUTTERFLY MILKWEED
	BG	192	BUXUS X 'GREEN GEM' / GREEN GEM BOXWOOD
	CS2	70	CALAMAGROSTIS X ACUTIFLORA 'STRICTA' / KARL FOERSTER FEATHER REED GRASS
	CA2	36	CALLICARPA AMERICANA / AMERICAN BEAUTYBERRY
	FG	18	FOTHERGILLA GARDENII / DWARF FOTHERGILLA
	IG	68	ILEX CRENATA 'GREEN LUSTRE' / GREEN LUSTER JAPANESE HOLLY
	JM	21	JUNIPERUS CHINENSIS 'MINT JULEP' / MINT JULEP JUNIPER
	PR	40	PENNISETUM SETACEUM 'RUBRUM' / PURPLE FOUNTAIN GRASS
	PG	13	PICEA PUNGENS 'GLOBOSA' / DWARF GLOBE BLUE SPRUCE
	SG	5	SPIRAEA JAPONICA 'GOLDMOUND' / GOLDMOUND JAPANESE SPIREA
	SB	5	SPIRAEA PRUNIFOLIA 'BRIDALWREATH' / BRIDAL WREATH SPIREA

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GRAPHIC SCALE

0 40 60 120 240

(IN FEET)
1 inch = 60 ft.

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PRELIMINARY DRAWING
FOR REVIEW PURPOSES ONLY

07/05/2024

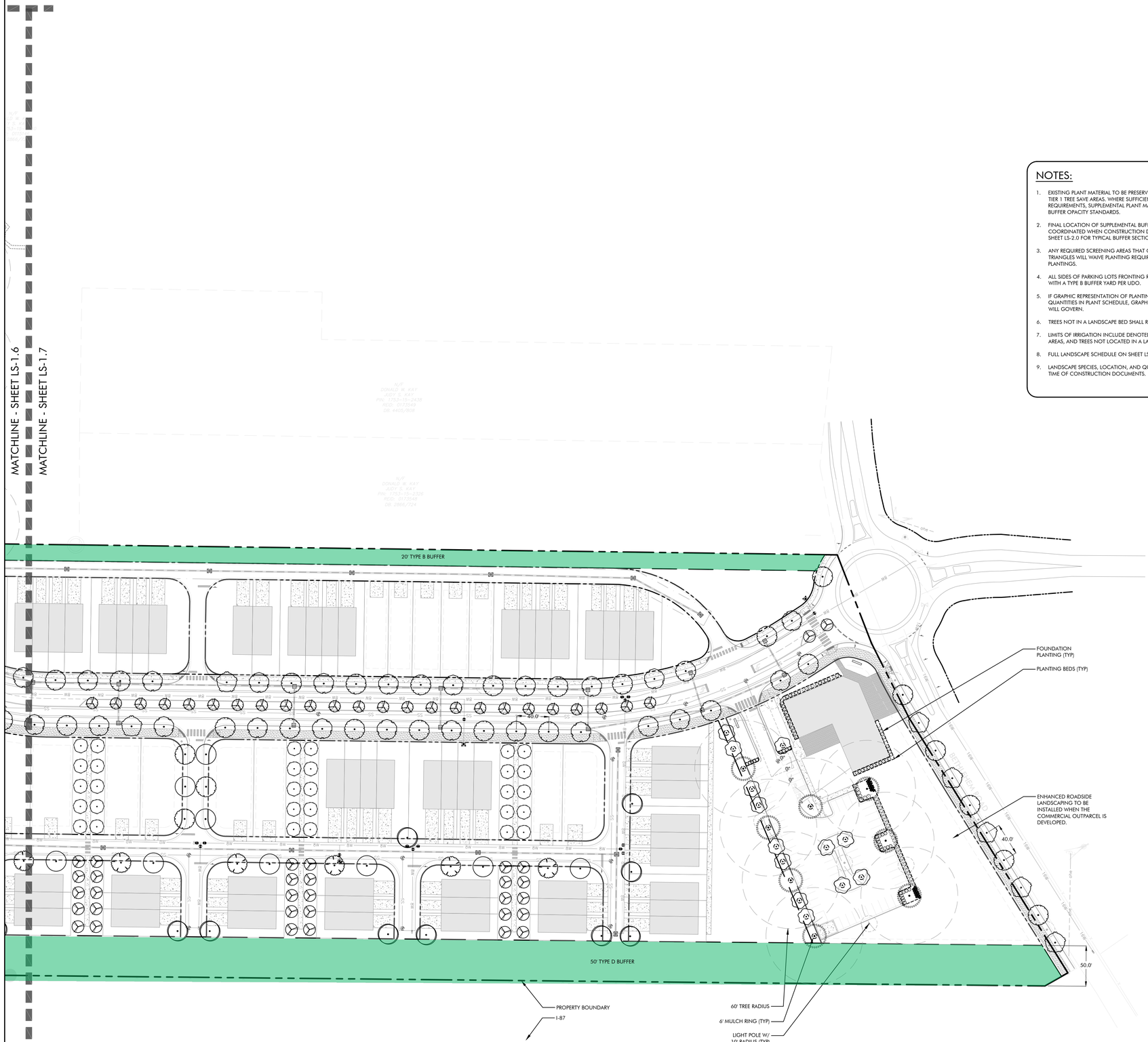
D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

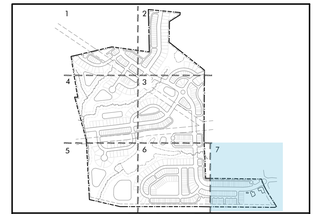
LYNDON OAKS
Master Plan
Landscape Plan Enlargement 6
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

LS-1.6





KEY MAP

NOTES:

1. EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED TO MEET BUFFER OPACITY STANDARDS.
2. FINAL LOCATION OF SUPPLEMENTAL BUFFER PLANTINGS TO BE COORDINATED WHEN CONSTRUCTION DOCUMENTS ARE DEVELOPED. SEE SHEET LS-2.0 FOR TYPICAL BUFFER SECTIONS.
3. ANY REQUIRED SCREENING AREAS THAT OVERLAP WITH SIGHT DISTANCE TRIANGLES WILL WAIVE PLANTING REQUIREMENTS AND USE GROUNDCOVER PLANTINGS.
4. ALL SIDES OF PARKING LOTS FRONTING RIGHT-OF-WAYS WILL BE SCREENED WITH A TYPE B BUFFER YARD PER UDO.
5. IF GRAPHIC REPRESENTATION OF PLANTINGS ON PLANS DO NOT MATCH QUANTITIES IN PLANT SCHEDULE, GRAPHIC REPRESENTATION OF PLANTINGS WILL GOVERN.
6. TREES NOT IN A LANDSCAPE BED SHALL RECEIVE A 6' DIAMETER MULCH RING.
7. LIMITS OF IRRIGATION INCLUDE DENOTED LANDSCAPE BEDS, ALL SOD/SEED AREAS, AND TREES NOT LOCATED IN A LANDSCAPE BED.
8. FULL LANDSCAPE SCHEDULE ON SHEET LS-2.0
9. LANDSCAPE SPECIES, LOCATION, AND QUANTITY IS SUBJECT TO CHANGE AT TIME OF CONSTRUCTION DOCUMENTS.

LEGEND:

CANOPY TREES

SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME
	AO	61	ACER RUBRUM 'OCTOBER GLORY' / OCTOBER GLORY RED MAPLE
	AB	170	ACER SACCHARUM 'BONFIRE' / BONFIRE SUGAR MAPLE
	CA	51	CARPINUS CAROLINIANA / AMERICAN HORNBEAM
	GK	15	GYMNOCLADUS DIOICA / KENTUCKY COFFEETREE
	JB	35	JUNIPERUS VIRGINIANA 'BRODIE' / BRODIE EASTERN REDCEDAR
	LA	23	LIRIODENDRON TULIPIFERA 'ARNOLD' / ARNOLD TULIP POPLAR
	MG	3	MAGNOLIA GRANDIFLORA / SOUTHERN MAGNOLIA
	QA	129	QUERCUS ACUTISSIMA / SAWTOOTH OAK
	UF	138	ULMUS PARVIFOLIA 'BOSQUE TM / BOSQUE LACEBARK ELM
	ZG	163	ZELKOVA SERRATA 'GREEN VASE' / GREEN VASE JAPANESE ZELKOVA

UNDERSTORY TREES

SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME
	AS2	43	ACER BUERGERIANUM 'STREETWISE' / STREETWISE® TRIDENT MAPLE
	AS	11	AMELANCHIER LAEVIS 'SNOWCLOUD' / SNOWCLOUD ALLEGHENY SERVICEBERRY
	CT	30	CERCIS CANADENSIS 'NC2016-2' / FLAME THROWER® EASTERN REDBUD
	CS	63	CORNUS KOUSA 'SATOMI' / SATOMI RED KOUSA DOGWOOD
	LW	112	LAGERSTROEMIA INDICA 'WHIT III' / PINK VELOUR® CRAPE MYRTLE
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FOR REVIEW PURPOSES ONLY

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LYNDON OAKS
Master Plan
Landscape Plan Enlargement 7
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Sheet No:

LS-1.7

GENERAL PLANTING NOTES

PLANT MATERIAL

1. REQUIRED PLANTINGS SHALL MEET ALL REQUIREMENTS SET FORTH IN THE TOWN OF KNIGHTDALE UDO.

2. ALL NEW TREES MUST HAVE STRAIGHT TRUNKS WITH STRONG CENTRAL LEADERS INTACT TO THE TOP OF THE CROWN UNLESS MULTI-STEM TREES ARE SPECIFIED. ALL REQUIRED TREES SHALL BE TYPICAL OF THEIR SPECIES AND VARIETY, HAVE NORMAL GROWTH HABITS, HAVE WELL-DEVELOPED BRANCHES, BE VIGOROUS AND HAVE FIBROUS ROOT SYSTEMS. TREES WITH MAJOR GIRDLING ROOTS WILL NOT BE ACCEPTED. TREES WITH CO-DOMINANT BRANCHING WILL NOT BE ACCEPTED. TREES THAT HAVE BEEN SHEARED, TOPPED OR CUT BACK TO MULTIPLY THE BRANCHING STRUCTURE WILL NOT BE ACCEPTED. TREES SHALL BE FREE OF ABRASIONS, DAMAGE, DISEASE, PESTS AND CRACKS. ALL PRUNING CUTS GREATER THAN ½ INCH DIAMETER SHALL HAVE CALLUS TISSUE FORMED PRIOR TO PLANTING. NO PRUNING CUT ON THE TRUNK SHALL BE MORE THAN ONE-HALF THE DIAMETER OF THE CENTRAL LEADER AT THE HEIGHT WHERE THE CUT WAS MADE. ROOT FLARES SHALL BE LOCATED AT GRADE. TREES WITH MORE THAN 2" OF SOIL COVERING THE ROOT BALL/FLARE FROM WILL NOT BE ACCEPTED.

3. SIZE OF REQUIRED PLANTS, SPREAD OF ROOTS AND SIZE OF BALLS SHALL BE IN ACCORDANCE WITH ANSI Z60.1 (LATEST EDITION) AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION, EXCEPT WHERE SPECIFIED/AUTHORIZED BY THE UDO.

4. ALL REQUIRED TREES OF A PARTICULAR SPECIES AND VARIETY SHALL BE UNIFORM IN SIZE AND CONFIGURATION.

5. A MINIMUM OF 50% OF NEW TREES MUST BE NATIVE SPECIES, AND SITES WITH MORE THAN 20 TREES REQUIRED WILL HAVE TO INSTALL MULTIPLE (3 OR MORE) SPECIES PURSUANT TO THE TREE ORDINANCE GUIDELINES.

6. 75% OF REQUIRED TREES MUST BE LARGE MATURE SPECIES EXCEPT IN SITUATIONS WITH OVERHEAD POWER LINE CONFLICTS.

7. ALL STRAPPING, AND TOP 1/3 OF WIRE BASKET AND BURLAP MUST BE CUT AWAY AND REMOVED FROM ROOT BALL WHEN PLANTING.

8. TREES PLANTED ON PUBLIC PROPERTY WILL NEED APPROVAL FROM THE TOWN ARBORIST AND/OR NCDOT.

TOWN OF KNIGHTDALE RESIDENTIAL LANDSCAPING & PLAT NOTES (UDO 7.4.K.)

1. EACH SINGLE FAMILY OR DUPLEX LOT SHALL CONTAIN A MINIMUM OF 1 CANOPY TREE FOR EVERY 2,000 SQUARE FEET OF LOT AREA OR FRACTION THEREOF UP TO 20,000 SF IN LOT AREA; ANY PORTION OF THE RESIDENTIAL LOT OCCUPIED BY A RECORDED UTILITY EASEMENT SHALL NOT BE INCLUDED AS PART OF THE TOTAL LOT AREA. THE LOCATION OF PLANTING TO ACCOUNT FOR PHYSICAL CONDITIONS MAY BE ADJUSTED BY THE LAND USE ADMINISTRATOR.

2. THE USE OF EXISTING TREES MEETING THE FOLLOWING STANDARDS TO SATISFY THIS REQUIREMENT IS ENCOURAGED. EXISTING LARGE SHADE TREES MEASURING MORE THAN 6 INCHES IN DBH MAY BE COUNTED TOWARDS FULFILLING THIS REQUIREMENT.

3. REQUIRED STREET TREES MAY NOT BE COUNTED TOWARDS THE FULFILLMENT OF THE RESIDENTIAL LANDSCAPING REQUIREMENT. APART FROM REQUIRED STREET TREES, ALL OTHER TREES REQUIRED UNDER THIS CHAPTER SHALL BE PLANTED WITHIN THE PRIVATE LOT.

4. FOUNDATION PLANTINGS CONSISTING OF EVERGREEN SHRUBS SHALL BE INSTALLED ALONG THE ENTIRE FOUNDATION WALL OF THE BUILDING. PLANT INSTALLATION SHALL BE A MINIMUM OF 2 FEET IN HEIGHT PLANTED AT 4 FOOT INTERVALS.

TOWN OF KNIGHTDALE INSTALLATION AND MAINTENANCE STANDARDS

1. LANDSCAPING SHOULD BE OF SUFFICIENT SIZE SO THAT MATURE APPEARANCE WILL BE ACHIEVED WITHIN THREE (3) YEARS OF INSTALLATION FOR SHRUBS AND WITHIN FIVE (5) YEARS OF INSTALLATION FOR TREES.

2. MINIMUM SIZE OF PLANTINGS AS FOLLOWING:

EVERGREEN TREES:	6' HEIGHT MIN. & 2" CAL. MIN.
MULTI-STEMMED TREES:	8' HEIGHT MIN. & 3 STALK MIN.
CANOPY TREES:	8' HEIGHT MIN. & 2" CAL. MIN.
UNDERSTORY TREES:	6' HEIGHT MIN. & 1.25" CAL. MIN.
SHRUBS:	18" HEIGHT MIN. & 12" SPREAD MIN. (3 GAL)
GROUNDCOVERS:	4" SPREAD MIN. (1.5"-2.5" POTS)

3. AT A MINIMUM, THE SPECIES OF EVERY OTHER TREE ALONG THE STREET FRONTAGE SHALL ALTERNATE IN ORDER TO MAXIMIZE DIVERSITY AS DEEMED APPROPRIATE BY THE LAND USE ADMINISTRATOR.

4. A MINIMUM OF 75% OF THE LANDSCAPE FEATURES UTILIZED ON A PARCEL THAT IS GREATER THAN 5 ACRES SHALL BE DROUGHT AND SALT TOLERANT NATIVE SPECIES.

5. TOTAL LANDSCAPE FEATURES, EXCLUDING TURF, SHALL NOT BE COMPRISED OF MORE THAN 20% OF ANY SINGLE SPECIES OR 25% OF ANY GENUS.

6. ALL NEW TREES SHALL BE PROPERLY GUYED AND STAKED AT THE TIME OF PLANTING.

UTILITY & EASEMENTS

1. WHERE A CANOPY TREE IS REQUIRED AND OVERHEAD UTILITY LINES EXIST, TWO (2) UNDERSTORY TREES SHALL BE SUBSTITUTED WITH THE APPROVAL OF THE LAND USE ADMINISTRATOR.

2. IF ANY UTILITY IS BEING INSTALLED IN OR NEAR ANY REQUIRED TREE(S) OR TREE SAVE AREA(S), CALL URBAN FORESTRY SPECIALIST TO RESOLVE PRIOR TO UTILITY INSTALLATION.

3. IF TREES CONFLICT WITH ANY UTILITIES OR SIGNS; CALL URBAN FORESTER TO RESOLVE BEFORE PLANTING.

4. ADJUST TREE PLANTING LOCATIONS TO AVOID EXISTING OR PROPOSED UNDERGROUND UTILITIES. CANOPY TREES SHALL BE PLACED AT LEAST 10 FEET FROM LIGHT POLES, AND 12 FEET FROM ELECTRICAL TRANSFORMERS IN ORDER TO ALLOW THESE UTILITIES TO BE SAFELY SERVICED. UNDERSTORY TREES MAY BE PLACED WITHIN 5 FEET OF SUCH DEVICES.

5. NOTHING SHALL BE PLANTED OR INSTALLED WITHIN AN UNDERGROUND OR OVERHEAD UTILITY EASEMENT WITHOUT CONSENT OF THE TOWN.

6. ALL UNDERGROUND UTILITIES SHALL BE LOCATED BEFORE DIGGING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ALL DAMAGE OF UNDERGROUND OR OVERHEAD UTILITY LINES.

TOPSOIL/PLANTING MIX - MINIMUM REQUIREMENTS:

1. WHERE PAVEMENT CUTOUTS ON RENOVATED SITES ARE REQUIRED AND/OR WHERE NEW PLANTING STRIPS OR ISLANDS ARE REQUIRED, ALL PAVEMENT, CONSTRUCTION DEBRIS AND GRAVEL SUB-BASE MUST BE REMOVED BEFORE PREPARING SOIL AND PLANTING TREES. EXISTING COMPACTED SOIL MUST BE REMOVED AND REPLACED WITH 24" OF TOPSOIL/PLANTING MIX -OR- EXISTING SOIL MAY BE UNCOMPACTED TO A DEPTH OF 24" AND AMENDED TO MEET TOPSOIL STANDARDS FOR THE ENTIRE PLANTING AREA.

2. SOIL IN ALL PLANTING STRIPS OR ISLANDS, WHETHER EXISTING OR NEW(ON NEW OR RENOVATED SITES), MUST MEET THE MINIMUM TOPSOIL/PLANTING MIX SPECIFICATIONS. SOIL AMENDMENTS OR FRESH TOPSOIL/PLANTING MIX ARE OFTEN NEEDED FOR PLANTING AREAS AT SITES WHERE ORIGINAL TOPSOIL IS OF POOR QUALITY, HEAVILY COMPACTED OR WHERE TOPSOIL HAS BEEN COMPLETELY REMOVED DURING GRADING.

3. TOPSOIL/PLANTING MIX SHOULD BE NATURAL, FERTILE, AGRICULTURAL SOIL CAPABLE OF SUSTAINING VIGOROUS PLANT GROWTH. IT SHOULD BE UNIFORM COMPOSITION THROUGHOUT, WITH ADMIXTURE OF SUBSOIL. IT SHOULD BE FREE OF STONES, LUMPS, LIVE PLANTS AND THEIR ROOTS, STICKS AND OTHER EXTRANEOUS MATTER. TOPSOIL SHOULD NOT BE USED WHILE IN A FROZEN OR MUDDY CONDITION.

4. TOPSOIL/PLANTING MIX SHALL HAVE AN ACIDITY RANGE OF PH 5.5-7.0 AND THE FOLLOWING COMPOSITION:
   - CLAY (RED CLAY, WELL PULVERIZED): MIN 10%; MAX 35%
   - COMPOST*/ORGANIC MIN 5%; MAX 10%
   - SILT MINIMUM 30%; MAX 50%
   - COARSE SAND (FREE OF ROCKS, 0.5 TO 1.0 MM F) MIN 30%; MAX 45%

   *ORGANIC MATERIAL SUCH AS SAWDUST OR LEAF MOLD THAT HAS COMPLETED THE DECOMPOSITION PROCESS.

5. ALL PLANTING AREAS SHOULD BE TESTED FOR PROPER DRAINAGE. DRAINAGE SHOULD BE CORRECTED AS NECESSARY TO INSURE PROPER TREE GROWTH AND SURVIVAL. THE FOLLOWING LEVEL OF NUTRIENT ELEMENTS IS RECOMMENDED FOR PROPER GROWTH:
   - CALCIUM 55 - 80%
   - MAGNESIUM 10 - 30%
   - POTASSIUM 5 - 8%

GENERAL PLANTING NOTES:

1. QUANTITIES NECESSARY TO COMPLETE THE WORK ON THE DRAWINGS SHALL BE FURNISHED BY THE CONTRACTOR. QUANTITY ESTIMATES HAVE BEEN MADE CAREFULLY, BUT EXTIMATES ARCHITECT ASSUMES NO LIABILITY FOR ERRORS OR OMISSIONS. HIS ESTIMATES ARE ONLY AN AID FOR CLARIFICATION OF UNITS AND A CHECK FOR THE CONTRACTOR TO COMPARE WITH HIS OWN ESTIMATES. DIFFERENCES SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT. NO EXTRA COMPENSATION SHALL BE ALLOWED FOR EXTRA QUANTITIES NECESSARY TO COMPLETE THE WORK.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF PLANT MATERIALS ACCORDING TO THE DRAWINGS AND PLANT SCHEDULE. CONTRACTOR SHALL PROVIDE SPECIFIC CULTIVARS AND/OR VARIETIES AS INDICATED ON THE PLANT SCHEDULE. ANY SUBSTITUTIONS INSTALLED WITHOUT PRIOR APPROVAL OF LANDSCAPE ARCHITECT WILL BE REJECTED AND SHALL BE REPLACED BY THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.

3. PLANTING PLANS INDICATE DIAGRAMMATIC LOCATIONS ONLY. SITE ADJUSTMENTS OF PLANTING DESIGN AND RELOCATION OF PLANT MATERIALS DUE TO ON SITE CONDITIONS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION. PLANTS INSTALLED PRIOR TO LANDSCAPE ARCHITECTS APPROVAL ARE SUBJECT TO RELOCATION BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

4. PLANTS SHALL BE SPECIMEN QUALITY AND SHALL BE SOUND, HEALTHY AND VIGOROUS, WELL-BRANCHED, AND DENSELY FOLIATED WHEN IN LEAF. PLANT MATERIAL SHALL BE FIRST QUALITY STOCK AND SHALL CONFORM TO THE CODE OF STANDARDS SET FORTH IN THE CURRENT EDITION OF THE AMERICAN STANDARDS FOR NURSERY STOCK SPONSORED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.

5. HEIGHT AND SPREAD DIMENSION SPECIFIED REFER TO THE MAIN BODY OF THE PLANT AND NOT FROM BRANCH TIP TO TIP. IF A RANGE OF SIZE IS GIVEN, NO PLANT SHALL BE LESS THAN THE MINIMUM SIZE AND NOT LESS THAN 50% OF THE PLANTS SHALL BE AS LARGE AS THE MAXIMUM SIZE SPECIFIED.

6. SHADE TREES SHALL HAVE A STRONG CENTRAL LEADER UNLESS OTHERWISE SPECIFIED.

7. LEAVES MUST BE OF MEDIUM FOLIAGE, ALL GOOD LEAVES, MAXIMUM OF 10% CHLOROSIS ALLOWED, WITH NO EXTREME SUCCULENCE PLACE PLANTS UPRIGHT AND TURNED SO THAT THE MOST ATTRACTIVE SIDE IS VIEWED.

8. ROOTS MUST BE STURDILY ESTABLISHED IN BALL THAT HAS BEEN TIGHTLY WRAPPED AND SECURELY TIED WITH TWINE OR WIRE, OR PINNED.

9. PROVIDE 4" THICKNESS MULCH AT ALL PLANTS AND PLANTING BEDS. MULCH SHALL BE SINGLE HAMMERED HARDWOOD MULCH (UNLESS NOTED OTHERWISE). IT SHALL BE CLEAN, FRESH, AND FREE OF STICKS, BRANCHES, SOIL OR OTHER FOREIGN MATERIAL.

10. BACKFILL PLANTING MIXTURE SHALL BE ONE PART APPROVED PLANTING SOIL MIXED WITH ONE PART NATIVE SOIL FROM THE TREE PIT OR SHRUB BED AREA. LANDSCAPE CONTRACTOR SHALL SUBMIT SAMPLES OF PLANTING SOIL TO BE USED TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO PLANTING.

11. PLANTS SHALL BE SUBJECT TO REVIEW BY LANDSCAPE ARCHITECT AT NURSERY OR ON SITE PRIOR TO PLANTING. LANDSCAPE ARCHITECT WILL BE THE SOLE JUDGE OF THE QUALITY AND ACCEPTABILITY OF MATERIALS AND PLACEMENT. CONTRACTOR SHALL SUBMIT PHOTOS OF ALL TREES WITH BID SUBMITTAL IF REQUESTED BY LANDSCAPE ARCHITECT OR OWNER.

12. THE LANDSCAPE CONTRACTOR SHALL TAKE SOIL SAMPLES FROM ALL PARTS OF THE SITE AND SHALL HAVE THEM TESTED BY THE LOCAL COUNTY AGENT. THE CONTRACTOR SHALL PROVIDE ONE COPY OF THE TEST RESULTS TO THE LANDSCAPE ARCHITECT PRIOR TO ORDERING PLANT MATERIALS OR MAKING ANY AMENDMENTS TO THE ON SITE SOIL. ANY SOIL AMENDMENTS REQUIRED AS INDICATED BY THE SOIL TEST SHALL BE PROVIDED BY THE LANDSCAPE CONTRACTOR. THE LANDSCAPE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT OF AMENDMENTS AND OBTAIN A WRITTEN APPROVAL FOR PROPOSED AMENDMENTS.

13. FERTILIZER SHALL BE A COMPLETE FERTILIZER; 50% OF NITROGEN OF WHICH IS DERIVED FROM NATURAL ORGANIC SOURCES OR UREAFORM. FERTILIZER SHALL BE DELIVERED TO THE SITE IN STANDARD SIZE UNOPENED CONTAINERS WHICH SHOW THE WEIGHT, CHEMICAL ANALYSIS, AND MANUFACTURER. IT SHALL BE STORED IN A DRY LOCATION UNTIL ITS USE. FERTILIZER FOR TREES, SHRUBS, AND GROUNDCOVER AREAS SHALL BE A SLOW RELEASE TYPE AND SHALL BE APPLIED AS FOLLOWS:

TREES AND SHRUBS

MARCH-MAY	10-10-10
JUNE-OCTOBER	6-10-10
NOVEMBER-FEBRUARY	6-12-12

SHRUBS: ½ LB / INCH HEIGHT
TREES: 1 LB / INCH OF CALIPER

14. LANDSCAPE CONTRACTOR SHALL PERFORM PERCOLATION TESTS IN ALL TREE PITS. IF PITS DO NOT DRAIN WITHIN 20 MINUTES, CONTACT LANDSCAPE ARCHITECT AND DO NOT PLANT THE TREE WITHOUT ON SITE INSPECTION OF DRAINAGE. LANDSCAPE ARCHITECT MAY REQUIRE ADDITIONAL SUBSURFACE DRAIN LINES FROM THE TREE PITS.

15. IF SURFACE DRAINAGE IS NOT SUFFICIENT (STANDING WATER) NOTIFY LANDSCAPE ARCHITECT IN WRITING BEFORE INSTALLING THE PLANTS, OTHERWISE CONTRACTOR SHALL BE TOTALLY REPONSIBLE FOR THE GUARANTEE AND LIVABILITY OF THE PLANTS.

16. CERTIFICATE OF INSPECTION AS MAY BE REQUIRED BY LAW FOR TRANSPORTATION OF PLANT MATERIALS SHALL ACCOMPANY EACH INVOICE FOR EACH SHIPMENT OF PLANTS. CERTIFICATES SHALL BE FILED WITH LANDSCAPE ARCHITECT PRIOR TO ACCEPTANCE OF MATERIAL. INSPECTION BY STATE OR FEDERAL AUTHORITIES AT THE PLACE OF GROWTH DOES NOT PRECLUDE REJECTION OF THE MATERIAL BY THE LANDSCAPE ARCHITECT.

17. ALL PLANT MATERIALS AND INSTALLED LANDSCAPE SUPPLIES SHALL BE WARRANTED FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE OF THIS PROJECT.

18. CONTRACTOR'S PRICES SHALL INCLUDE ALL LABOR AND MATERIALS NECESSARY TO COMPLETE THE WORK (i.e. MULCH, PLANTING, SOIL MIX, WOOD AND WIRE STAKING MATERIAL, ETC.).

19. THE COMPLETION OF THE CONTRACT WILL BE ACCEPTED AND NOTICE OF COMPLETION RECORDED ONLY WHEN THE ENTIRE CONTRACT IS COMPLETED TO THE SATISFACTION OF THE LANDSCAPE ARCHITECT, OWNER, AND THE OWNER'S CONSTRUCTION REPRESENTATIVE. WITHIN TEN DAYS NOTICE BY THE CONTRACTOR OF SUBSTANTIAL COMPLETION THE LANDSCAPE ARCHITECT WILL INSPECT THE PROPERTY. HE WILL EITHER APPROVE THE WORK FOR THE OWNER'S ACCEPTANCE OR WILL ISSUE A "PUNCH LIST" OF ITEMS TO BE COMPLETED OR CORRECTED. IF A PUNCH LIST IS ISSUED, FINAL ACCEPTANCE WILL BE DONE AS SOON AS THE CONTRACTOR COMPLETES ALL PUNCH LIST ITEMS.

20. AMENDED SOIL MEDIA REQUIREMENTS*: A PLANTING MIX MAY BE DEVELOPED THAT WILL BE AN ACCEPTABLE PLANTING MEDIA BY AMENDING THE EXISTING SOIL OR BY REMOVING THE EXISTING SOIL AND REPLACING IT WITH NEW PLANTING MIX. THE PLANTING MIX SHALL HAVE UNIFORM COMPOSITION THROUGHOUT, WITH A MIXTURE OF SUBSOIL. IT SHALL BE FREE OF STONES, LUMPS, LIVE PLANTS AND THEIR ROOTS, STICKS, AND OTHER EXTRANEOUS MATTER. IT SHALL CONTAIN NO MANMADE MATERIALS UNLESS OTHERWISE SPECIFIED. PLANTING MIX SHALL NOT BE USED WHILE IN A FROZEN OR MUDDY CONDITION.

*NOTE: CONTRACTOR TO PROVIDE TEST SAMPLES OF AMENDED SOIL WITH TESTING DATA FOR ALL BED AREAS AMENDED ON SITE. TEST SAMPLES SHALL FALL WITHIN TOLERANCES SHOWN ABOVE. PLANTING SHALL NOT BEGIN UNTIL SOIL HAS BEEN AMENDED AND SOIL TEST SAMPLES HAVE BEEN REVIEWED AND APPROVED BY OWNER AND LANDSCAPE ARCHITECT.

PLANT SCHEDULE

SYMBOL	CODE	BOTANICAL / COMMON NAME	QTY	SITE PLANTING	STREET TREES	CONT	CAL	SIZE	MATURE HEIGHT
CANOPY TREES									
	AO	ACER RUBRUM 'OCTOBER GLORY' / OCTOBER GLORY RED MAPLE	63	47	16	B & B	2"CAL	8' HT	25 - 40ft. ht.
	AB	ACER SACCHARUM 'BONFIRE' / BONFIRE SUGAR MAPLE	170	10	160	B & B	2"CAL	8' HT	
	CA	CARPINUS CAROLINIANA / AMERICAN HORNBEAM	51	42	9	B & B	2"CAL	8' HT	15 - ' ht.
	GK	GYMNOCLADUS DIOICA / KENTUCKY COFFEETREE	15	15		B & B	2"CAL	8' HT	40 - ' ht.
	JB	JUNIPERUS VIRGINIANA 'BRODIE' / BRODIE EASTERN REDCEDAR	35	35		B & B	2"CAL	8' HT	25 - ' ht.
	LA	LIRIODENDRON TULIPIFERA 'ARNOLD' / ARNOLD TULIP POPLAR	24	10	14	B & B	2"CAL	8' HT	40 - 65ft. ht.
	MG	MAGNOLIA GRANDIFLORA / SOUTHERN MAGNOLIA	3	3		B & B	2"CAL	8' HT	> 65ft. ht.
	QA	QUERCUS ACUTISSIMA / SAWTOOTH OAK	129		129	B & B	2"CAL	8' HT	40 - 65ft. ht.
	UF	ULMUS PARVIFOLIA 'BOSQUE' TM / BOSQUE LACEBARK ELM	138	3	135	B & B	2"CAL	8' HT	
	ZG	ZELKOVA SERRATA 'GREEN VASE' / GREEN VASE JAPANESE ZELKOVA	164	14	150	B & B	2"CAL	8' HT	40 - 65ft. ht.
UNDERSTORY TREES									
	AS2	ACER BUERGERIANUM 'STREETWISE' / STREETWISE® TRIDENT MAPLE	43		43	B & B	1.25"CAL	6' HT	15 - ' ht.
	AS	AMELANCHIER LAEVIS 'SNOWCLOUD' / SNOWCLOUD ALLEGHENY SERVICEBERRY	11	6	5	B & B	1.25"CAL	6' HT	15 - ' ht.
	CT	CERCIS CANADENSIS 'NCI2016-2' / FLAME THROWER® EASTERN REDBUD	30	30		B & B	1.25"CAL	6' HT	15 - 25ft. ht.
	CS	CORNUS KOUSA 'SATOMI' / SATOMI RED KOUSA DOGWOOD	63	30	33	B & B	1.25"CAL	6' HT	15 - 25ft. ht.
	LW	LAGERSTROEMIA INDICA 'WHIT III' / PINK VELOUR® CRAPE MYRTLE	112	5	107	B & B	MULTI-STEM (3 STALKS MIN.)	8' HT	6 - ' ht.
	LY	LAGERSTROEMIA X 'YUMA' / YUMA CRAPE MYRTLE	35	6	29	B & B	MULTI-STEM (3 STALKS MIN.)	8' HT	15 - 25ft. ht.
	PV	PINUS VIRGINIANA / VIRGINIA PINE	7	7		B & B	2"CAL	6' HT	25 - 40ft. ht.

SYMBOL	CODE	BOTANICAL / COMMON NAME	QTY	SITE PLANTING	STREET TREES	SIZE	MINIMUM REQUIREMENTS		MATURE HEIGHT
SHRUBS									
	AT	ASCLEPIAS TUBEROSA / BUTTERFLY MILKWEED	41	38	3	3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 36in. ht.
	BG	BUXUS X 'GREEN GEM' / GREEN GEM BOXWOOD	192	149	43	3 GAL	18" HEIGHT & 12"-15" SPREAD		3 - 6ft. ht.
	CS2	CALAMAGROSTIS X ACUTIFLORA 'STRICTA' / KARL FOERSTER FEATHER REED GRASS	70	31	39	3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 6' ht.
	CA2	CALLICARPA AMERICANA / AMERICAN BEAUTYBERRY	36	36		3 GAL	18" HEIGHT & 12"-15" SPREAD		3 - 6ft. ht.
	FG	FOTHERGILLA GARDENII / DWARF FOTHERGILLA	18	18		3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 36in. ht.
	IG	ILEX CRENATA 'GREEN LUSTRE' / GREEN LUSTER JAPANESE HOLLY	59	59		3 GAL	18" HEIGHT & 12"-15" SPREAD		6 - ' ht.
	JM	JUNIPERUS CHINENSIS 'MINT JULEP' / MINT JULEP JUNIPER	17	17		3 GAL	18" HEIGHT & 12"-15" SPREAD		
	PR	PENNISETUM SETACEUM 'RUBRUM' / PURPLE FOUNTAIN GRASS	40	40		3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 6' ht.
	PG	PICEA PUNGENS 'GLOBOSA' / DWARF GLOBE BLUE SPRUCE	13	13		3 GAL	18" HEIGHT & 12"-15" SPREAD		3 - 6ft. ht.
	SG	SPIRAEA JAPONICA 'GOLDMOUND' / GOLDMOUND JAPANESE SPIREA	5	5		3 GAL	18" HEIGHT & 12"-15" SPREAD		18 - 36in. ht.
	SB	SPIRAEA PRUNIFOLIA 'BRIDALWREATH' / BRIDAL WREATH SPIREA	5	5		3 GAL	18" HEIGHT & 12"-15" SPREAD		

BUFFER INFORMATION

BUFFER NOTES:

1. EXISTING PLANT MATERIAL TO BE PRESERVED IN ALL BUFFER AREAS AS PRIORITY TIER 1 TREE SAVE AREAS. WHERE SUFFICIENT MATERIAL DOES NOT MEET REQUIREMENTS, SUPPLEMENTAL PLANT MATERIAL WILL BE REQUIRED TO MEET BUFFER OPACITY STANDARDS.

2. FINAL LOCATION OF SUPPLEMENTAL BUFFER PLANTINGS TO BE COORDINATED WHEN CONSTRUCTION DOCUMENTS ARE DEVELOPED.

3. ALL SIDES OF PARKING LOTS FRONTING RIGHT-OF-WAYS WILL BE SCREENED WITH A TYPE B BUFFER YARD PER UDO.

4. TYPICAL SECTIONS SHOWN BELOW ARE GRAPHIC IN NATURE AND SUBJECT TO CHANGE AT THE TIME OF CONSTRUCTION DOCUMENTS. PLANT LAYOUT AND QUANTITIES WILL BE DETERMINED WHEN CONSTRUCTION DOCUMENTS ARE DEVELOPED.

EVERGREEN VS. DECIDUOUS BUFFER REQUIREMENTS

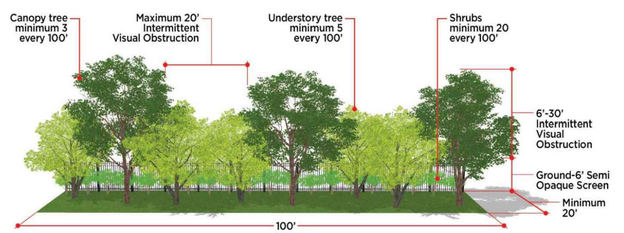
- CANOPY TREES:	40% MIN. - 60% MAX. MUST BE EVERGREEN
- UNDERSTORY TREES:	40% MIN. - 60% MAX. MUST BE EVERGREEN
- SHRUBS:	80% MIN. MUST BE EVERGREEN

TYPE B BUFFER YARD STANDARDS (UDO SEC. 7.4.I.2)

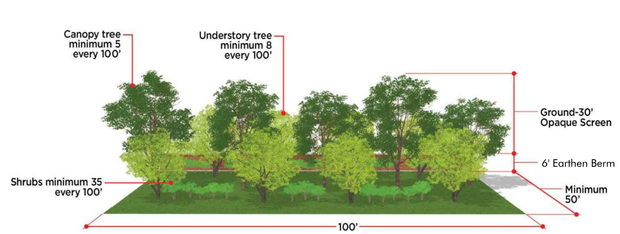
•WIDTH:	20' MIN.
•HEIGHT/OPACITY:	
→GROUND TO 6'	SEMI-OPAQUE SCREEN
→6'-30'	INTERMITTENT VISUAL OBSTRUCTION
•REQUIRED PLANTINGS:	
→CANOPY TREES:	3 TREES/100 LF
→UNDERSTORY TREES:	5 TREES/100 LF
→REQUIRED SHRUBS:	20 SHRUBS/100 LF

TYPE D BUFFER YARD STANDARDS (UDO SEC. 7.4.I.2)

•WIDTH:	50' MIN.
•HEIGHT/OPACITY:	
→GROUND TO 30'	OPAQUE SCREEN
→GROUND TO 6'	EARTHEN BERM W/ LANDSCAPING
•REQUIRED PLANTINGS:	
→CANOPY TREES:	5 TREES/100 LF
→UNDERSTORY TREES:	8 TREES/100 LF
→REQUIRED SHRUBS:	35 SHRUBS/100 LF



1 TYPE B BUFFER (TYP) SECTION
SCALE: NTS



2 TYPE D BUFFER (TYP) SECTION
SCALE: NTS

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raleigh, nc 27601
p 919.275.5002
urbandesignpartners.com
nc firm no: P-2671 sc coa no: C-03044

PRELIMINARY DRAWING FOR REVIEW PURPOSES ONLY

07/05/2024

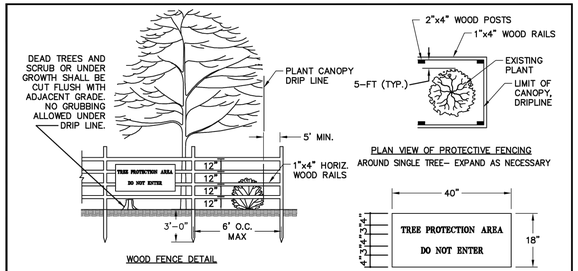
D.R. Horton
7208 Falls of Neuse Rd. Ste. 201
Raleigh, NC 27615

LYNDON OAKS
Master Plan
Landscape Details
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
#1	11/27/2023		
#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
#5	05/31/2024		

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

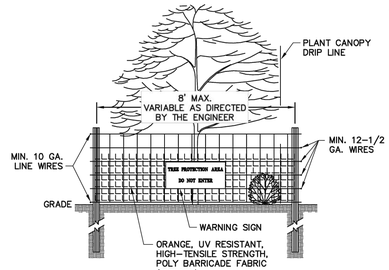
LS-2.0



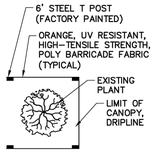
WOOD FENCE DETAIL

PLAN VIEW OF PROTECTIVE FENCING
AROUND SINGLE TREE- EXPAND AS NECESSARY

WARNING SIGN DETAIL



PERFORATED PLASTIC FENCE DETAIL

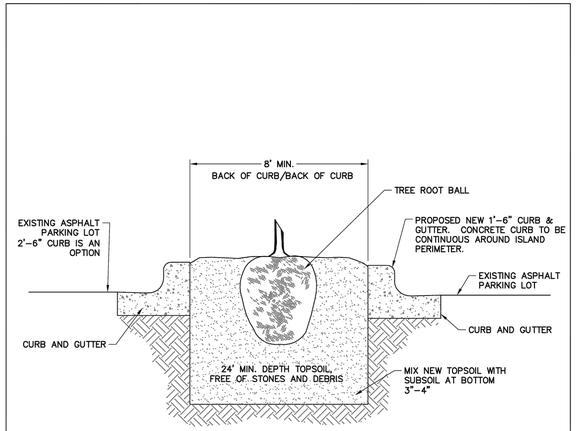


PLAN VIEW OF PROTECTIVE FENCING
AROUND SINGLE TREE- EXPAND AS NECESSARY

NOTES:
1. REMOVE ALL BARRIERS UPON COMPLETION OF PROJECT.
2. LANDSCAPING PLANS SHALL SHOW LOCATIONS OF ALL TREE PROTECTION FENCES.
3. ALL PLANTS TO BE SAVED SHALL BE PROTECTED BY FENCING AS SHOWN IN THIS DETAIL.
4. CONTRACTOR SHALL INSTALL FENCING PRIOR TO BEGINNING ANY CONSTRUCTION OR GRADING ACTIVITY.
5. CONTRACTOR SHALL CALL FOR INSPECTION AND APPROVAL OF PROTECTIVE FENCING PRIOR TO BEGINNING ANY CONSTRUCTION OR GRADING.
6. PROTECTIVE FENCING SHALL BE LOCATED 5' OUTSIDE DRIPLINE OF TREES AND 1' MINIMUM OUTSIDE SHRUBS OR OTHER PLANTS.

REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS	PLANT PROTECTIVE FENCING	STD. NO. 2.10

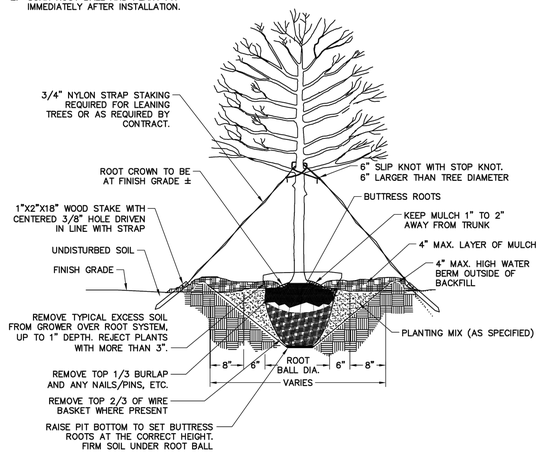


NOTES:
1. 300 SF MIN. TOTAL REQUIRED AREA PER TREE.
2. FOR NEW PLANTING AREAS, REMOVE ALL PAVEMENT, GRAVEL SUB-BASE AND CONSTRUCTION DEBRIS BEFORE PREPARING SOIL AND PLANTING TREES.
3. REMOVE COMPACTED SOIL AND ADD 24" NEW OR TOPSOIL/PLANTING MIX OR UNCOMPACT AND AMEND TOP 24" OF EXISTING SOIL TO MEET TOPSOIL/PLANTING MIX STANDARDS FOR TREES.

REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS	TREE PLANTING ISLAND IN PARKING LOTS	STD. NO. 3.23

NOTES:
1. REMOVE WIRE OR NYLON TWINE FROM BALL.
2. SOAK ROOT BALL AND PLANT PIT IMMEDIATELY AFTER INSTALLATION.

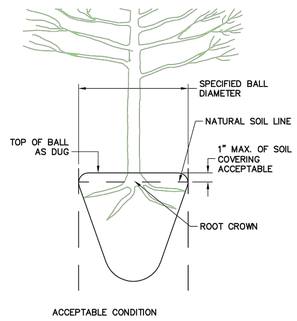


ALL TREES SHALL MEET AMERICAN STANDARD FOR NURSERY STOCK
(AMSI, 1990, PART 1, "SHADE AND FLOWERING TREES")

FOR EXAMPLE:	CALIPER	HEIGHT (RANGE)	MAX. HEIGHT	MIN. ROOT BALL DIA.	MIN. ROOT BALL DEPTH
	2"	12-14'	16'	24"	16"
	3"	14-16'	18'	32"	21"

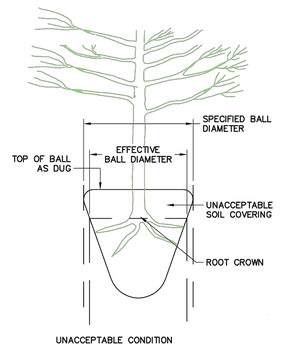
REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS	TREE PLANTING (FOR SINGLE AND MULTI-STEM TREES)	STD. NO. 3.25



ACCEPTABLE CONDITION

NOTE:
A ROOT COLLAR EXCAVATION FOR ALL TREES SPECIFIED WILL BE DONE BY THE TOWN TO ENSURE THAT TREES WERE NOT PLANTED/GROWN TOO DEEPLY AT SOURCE (NURSERY). LANDSCAPE CONTRACTOR SHALL HAVE SUPPLIER MARK GROUND LEVEL LINE ABOVE ROOT BALL. IF TOWN DETERMINES THAT THERE IS EXCESSIVE SOIL OVER THE ROOT CROWN, THESE TREES WILL BE REJECTED.



UNACCEPTABLE CONDITION

REVISIONS	
DATE	DESCRIPTION

TOWN OF KNIGHTDALE STANDARD DETAILS	ROOT CROWN DEPTHS	STD. NO. 3.21

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PRELIMINARY DRAWING
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07/05/2024

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LYNDON OAKS
Master Plan
Landscape Details
Knightdale, North Carolina

NO.	DATE:	BY: REVISIONS:
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#3	03/28/2024	
#4	05/03/2024	
#5	05/31/2024	

Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

LS-2.1

LIGHTING LEGEND

LIGHT POLE

* LIGHTING PLAN IS CONCEPTUAL IN NATURE & SUBJECT TO CHANGE AT THE TIME OF CONSTRUCTION DOCUMENTS.

Outdoor Lighting

SHOEBOX LED

SHOEBOX LED

LED (Light-emitting diode)	150/220/420/530 watts
Mounting height	25' – 35'
Color	Black Bronze Gray (Special conditions)
Pole	Wood Style A

IESNA cutoff classification: Full-cutoff

Color temperature: 3,000K Primary
4,000K Available

FIXTURE	WATTS	LUMENS	PATTERN	BUG RATING
Shoebox	150	19,007	III	B2-U0-G3
		18,460	IV	B3-U0-G4
		19,580	V	B5-U0-G3
Shoebox	220	23,744	III	B3-U0-G4
		23,061	IV	B3-U0-G4
		24,461	V	B5-U0-G3
Shoebox	420	41,379	IV	B3-U0-G5
		45,868	V	B5-U0-G5
Shoebox	530	51,429	IV	B3-U0-G5
		57,009	V	B5-U0-G5

LIGHT DISTRIBUTION PATTERNS

light distribution patterns

POLE AVAILABLE	MOUNTING HEIGHT	FOUNDATION
Style A	25', 30', 35'	Direct Bury, Anchor Base
Wood	25', 30', 35'	Direct Bury

For additional information, contact us at **OOLCarolinas@duke-energy.com.**

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GRAPHIC SCALE

0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

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nc firm no: P-2671 sc coa no: C-03044

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LYNDON OAKS
Master Plan
Lighting Plan
Knightdale, North Carolina

NO.	DATE:	BY: REVISIONS:
#1	11/27/2023	
#2	02/05/2024	
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Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:

LS-3.0

SINGLE FAMILY DETACHED
SCALE: NTS

ELEVATION

TOWNHOMES
SCALE: NTS

ELEVATION

NOTES:

ELEVATIONS SHOWN ARE CONCEPTUAL IN NATURE AND SUBJECT TO CHANGE.

SEE ZMA-2-23 FOR LIST OF ARCHITECTURAL STANDARDS.

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nc firm no: P-2671 sc coa no: C-03044

PRELIMINARY DRAWING
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07/05/2024

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LYNDON OAKS
Master Plan
Architectural Elevations
Knightdale, North Carolina

NO.	DATE:	BY:	REVISIONS:
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#2	02/05/2024		
#3	03/28/2024		
#4	05/03/2024		
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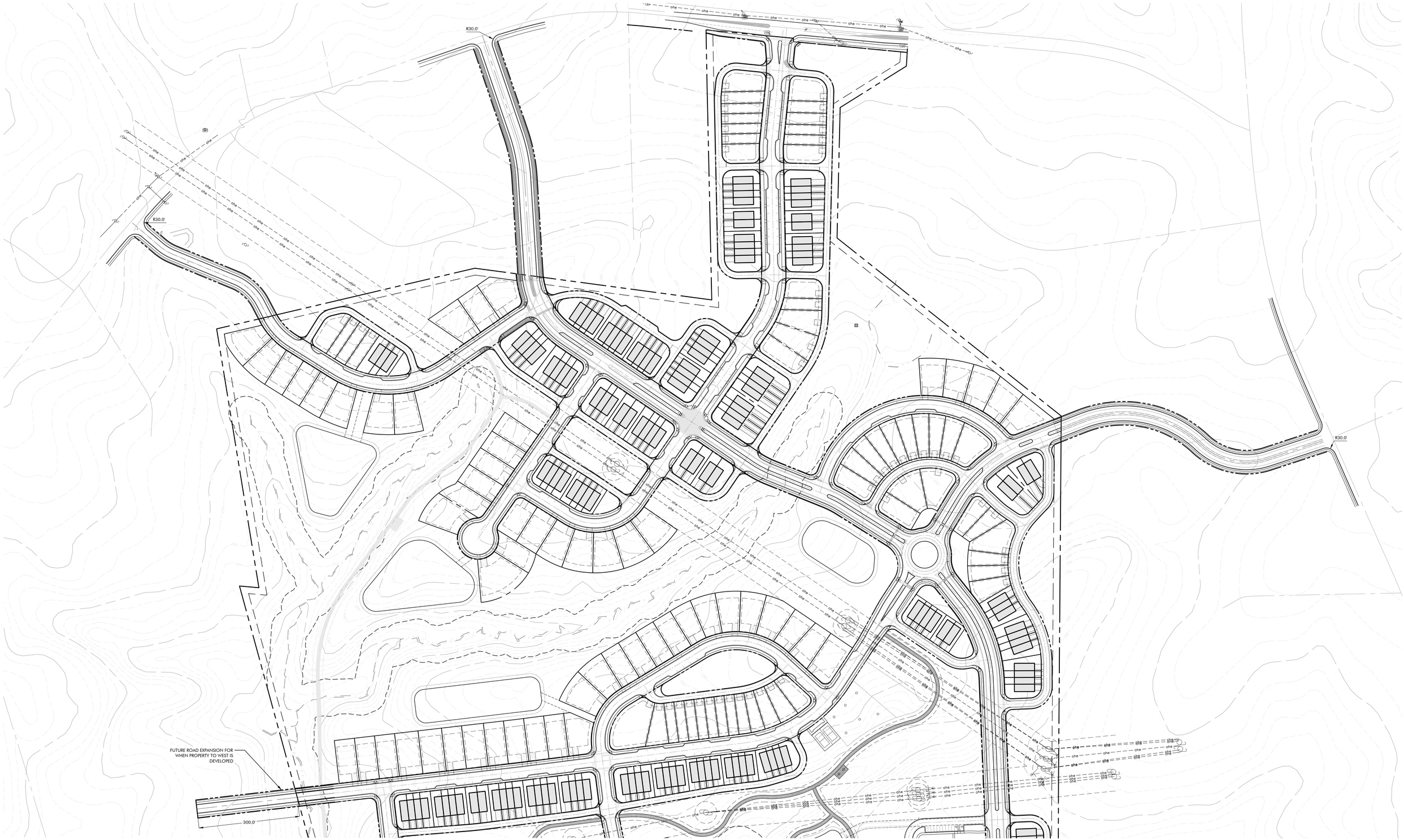
Project No: 22-RDU-083
Date: 07/05/2024
Sheet No:
A-1.0



LYNDON OAKS | FUTURE ROAD CONNECTION EXHIBIT

KNIGHTDALE, NC

GRAPHIC SCALE

0 60 120 240 480

(IN FEET)

1 inch = 120 ft.

1" = 120'
JUNE 28, 2024
22-RDU-083

URBAN DESIGN PARTNERS
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urbandesignpartners.com
919.275.5002

LYNDON OAKS

RMX PLANNED UNIT DEVELOPMENT

The Town of Knightdale
Case Number: ZMA-2-23
July 5, 2024

URBAN
DESIGN
PARTNERS

LANDSCAPE ARCHITECTURE + CIVIL ENGINEERING

LYNDON OAKS

RMX PLANNED UNIT DEVELOPMENT

PREPARED FOR
The Town of Knightdale

DEVELOPER
DR Horton
7208 Falls of Neuse Road
Suite 201
Raleigh, NC 27615

PROJECT TEAM
Urban Design Partners
Planning | Landscape Architecture | Civil Engineering
150 Fayetteville Street
Suite 1310
Raleigh, NC 27601

Parker Poe
Land Use Attorney

Ramey Kemp & Associates
Traffic Engineers

Bateman Civil Survey Company
Surveyors

Sage Ecological Services, Inc.
Environmental Consultant

SUBMITTAL DATE
July 5, 2024

URBAN DESIGN PARTNERS

Table of Contents

01

VISION + INTENT

Community Vision

Lyndon Oaks is envisioned as a place of community. The development team believes that through **quality placemaking**, a **mix of uses**, and a **variety of housing options**, will arise a place of creativity and diversity that will reveal a vibrant and active community. Lyndon Oaks will be a community that both embraces and engages nature by providing a network of trails and open space that encourages social interactions and physical activity.

Community Intent

Section 2.4.C. of the Town of Knightdale Unified Development Ordinance states that, "the Planned Unit Development Overlay District process **encourages creativity and innovation** in the design of developments through a master planning process that allows for flexibility from underlying zoning as approved by the Town Council." These developments bring "**tangible benefits**" to the Town, including "exceptional amenities, outstanding environmental, landscape, architectural, or site design, or conservation of special man-made or natural features of the site."

Lyndon Oaks meets the intent of the **Planned Unit Development Overlay District** requirements per Town of Knightdale UDO Section 12.2.G.3.g.ii.a. through the following findings:

» Comprehensive Plan

- Lyndon Oaks conforms to the planning policies of the Town as laid out in the KnightdaleNext2035 Comprehensive Plan. The site is designated as a Mixed-Density Neighborhood place type, in a Target Investment Area, and the planned variety of residential densities and neighborhood-serving commercial meet the Town's future planned growth. In addition, Lyndon Oaks is a neighborhood that exemplifies many of the Guiding Principles for growth and development in Knightdale (Guiding Principles found on page 9).

» Public Welfare

- Lyndon Oaks is maintaining the riparian buffer that bisects the site and large existing pond to allow for maximized preservation of natural features that will be not only preserved, but amenitized through walking trails and greenways to be enjoyed by residents and the surrounding community on public greenways and sidepaths. The supply of light and air to adjacent properties will not be negatively impacted due to the tree preservation, preserved open space, and buffer plantings around the perimeter of the site. There will be no increased danger of fire to current or future residents in the area, and the public health, safety, and welfare will not only be protected but will increase through the new pedestrian and vehicular connectivity, intersection design and improvements that prioritize safety, ample behind-the-curb multi-use paths for cyclists, fountains in the SCMs to keep water aerated, and new public utilities being brought to the area.

» Impact on Other Property

- Lyndon Oaks is primarily a mixed-density residential community. The adjacent land uses consist of existing single family residences and vacant wooded lots. Lyndon Oaks consists of like uses and helps to provide increased connectivity and access to amenities like the greenway trail and a future neighborhood-serving commercial amenity on Bethlehem Road.

» Impact on Public Facilities & Resources

- Lyndon Oaks will provide adequate utilities, road access, drainage, and other necessary facilities to properly serve residents of the site. The project will dedicate a large section of the planned Widewaters Parkway extension to the Town, and plans to provide the greenway connectivity as well.

» Archaeological, Historical, or Cultural Impact

- Lyndon Oaks is maintaining the riparian buffer that bisects the site and large existing pond to allow for preservation of natural features on the property. No archaeological, historical, or cultural resources will be adversely impacted in the development. Lyndon Oaks will preserve and enhance existing natural resources on site for the benefit of the residents and surrounding community that utilizes the greenway.

» Parking & Traffic

- Lyndon Oaks is a pedestrian friendly community. The mix of housing types and rear-loaded units minimizes pedestrian-vehicular conflicts and creates a safer, more appealing streetscape. Proper sight distance triangles are also used at intersections to prevent conflicts when turning a vehicle. All street radii are adequate for emergency vehicle access. There is ample guest parking through the use of on-street parking. Traffic impacts from Lyndon Oaks have been studied and will be mitigated through TIA recommended improvements that will benefit the entire area and alleviate some existing congestion issues. Furthermore, the public roads running through the site will create additional connectivity and routes on local, multimodal streets to existing roads in the area. The public and private trails also provide a safe public pedestrian connection throughout Lyndon Oaks.

» Appropriate Buffering

- A 20' Type B Buffer is proposed along the perimeter of Lyndon Oaks to provide visual and acoustical privacy between Lyndon Oaks and the surrounding neighbors. A Type B Buffer is also provided between the parking lot at the commercial parcel and Bethlehem Rd. per requirements set forth in the UDO.
- A 50' Type D Buffer with a 6' earthen berm and dense plantings is proposed along I-87 to provide visual and acoustical privacy between Lyndon Oaks and the adjacent interstate. The maintained riparian buffers in the center of the site will also create a buffer within the community itself to allow for a greater sense of privacy between houses and a sense of place, such that each section of the neighborhood, each home, is a stone's throw from the natural environment and open space.

» Performance

- D.R. Horton is America's largest homebuilder, and the local team that have proposed this project have a proven track record of building successful residential neighborhoods in surrounding communities, as well as in Knightdale, most recently with the Haywood Glen community. The D.R. Horton team is excited to bring a new neighborhood to the Town that reflects the Town's plans and aligns with the Town's and D.R. Horton's shared vision for great neighborhoods.

02

KNIGHTDALENEXT 2035

Comprehensive Plan Consistency

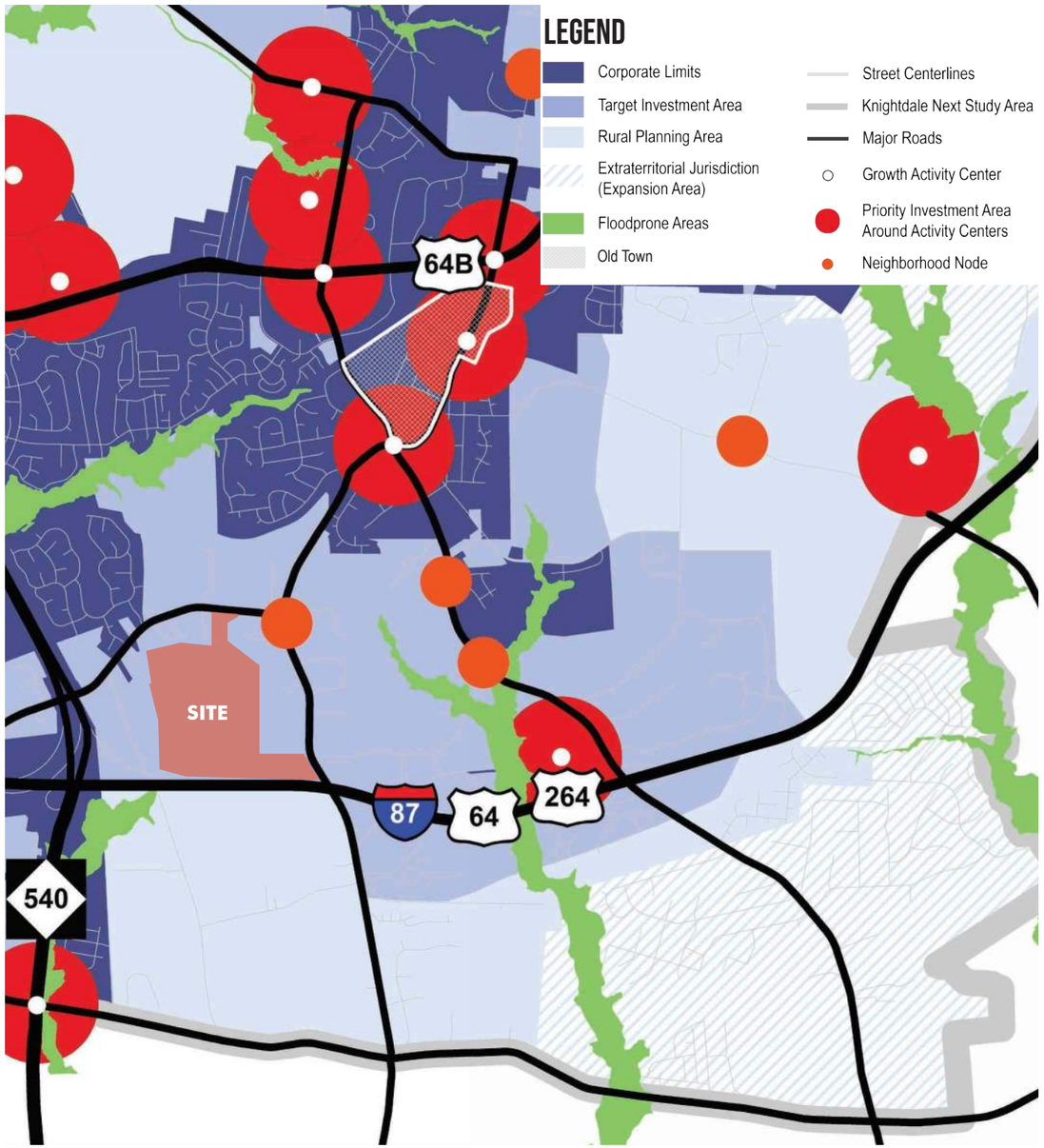


Figure 1: Growth Framework Map from KnightdaleNext2035 Comprehensive Plan

Growth Framework

This PUD request is proposing a **rezoning from RT to RMX-PUD** to better meet the desired outcome laid out in the KnightdaleNext2035 Comprehensive Plan.

On the Growth Framework Map, Lyndon Oaks is located near a Neighborhood Node at the intersection of Old Faison and Bethlehem Roads, and the site is within a Target Investment Area as identified in the Growth Framework Plan. Target Investment Areas are areas with existing or relatively easy potential access to water and sewer, where growth is supported, and the development will bring additional water and gravity sewer lines to this area to support continued growth and development. The plan says growth in these areas should encourage active living with a complete and comprehensive network of walkable streets in a general grid pattern. It also says that growth in these areas should be guided into more compact and efficient development patterns to justify infrastructure investments. Thus, Lyndon Oaks, which proposes compact residential growth at less than 3 units per acre and neighborhood-oriented commercial uses, in an area that will only continue to feel more growth pressure with the forthcoming I-540 extension, is supported by the Growth Framework Map.

Lyndon Oaks aligns with Knightdale's vision of neighborhoods throughout the Town feeling a sense of connection. A public greenway trail will be added throughout the site. This aligns with the Sidepaths & Greenways Plan plan found in UDO Appendix B and incorporated into the comprehensive plan. Sidewalks and greenway trails promote pedestrian walkability and connection for the community.

The proposed plan for Lyndon Oaks provides a mix of housing types to promote a diverse and walkable community. The mixed-use community will act as a transition for residential neighborhoods while providing a community-serving commercial outparcel

Comprehensive Plan Consistency

Comprehensive Plan - Guiding Principles

1. **Natural Environment:** Lyndon Oaks promotes and expands opportunities for community residents to enjoy Knightdale's greenways and activates the site's many streams, wetlands, and natural features by preserving them and giving residents access to enjoy those resources.

2. **Parks and Recreation:** Lyndon Oaks will provide the Town's planned pedestrian and cyclist public greenway connectivity from Old Faison Road to Bethlehem Road.

3. **Transportation:** Lyndon Oaks will provide a significant portion of the planned Widewaters Parkway extension, which will eventually provide an important connection from US-64 Business to Bethlehem Road and Crosscut Place. In addition, all of the streets in the neighborhood have been designed with multiple modes of transportation in mind—the project will provide ample bicycle and pedestrian facilities for destination - and recreation- focused trips.

4. **Compact Development Patterns:** The proposed community provides appropriate residential density and neighborhood-serving commercial in a Target Investment Area, near I-87 and I-540, which will become an even more convenient regional access route when the I-540 extension is built.

5. **Community Design:** Lyndon Oaks is a significant private investment that incorporates the distinctive elements of Knightdale. Roundabouts at intersections, strict architectural standards and commitments to beautiful and quality homes, pedestrian prioritization, preservation of open space and unique public and private recreational amenities dominate the community design.

6. **Great Neighborhoods and Expanded Home Choices:** Lyndon Oaks offers a wide variety of housing choices and lot sizes, mixed throughout the neighborhood, and not segregated to certain portions. This will provide opportunities for people and families at all ages and stages, with many different housing price-points, to find a place in this beautiful, heavily-amenitized community.

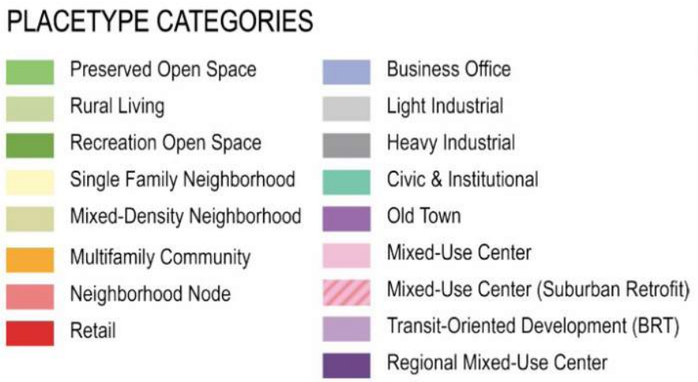
Comprehensive Plan Consistency

Growth and Conservation Map

On the Growth and Conservation Map, Lyndon Oaks is designated as a **"Mixed-Density Neighborhood."** These are described as "subdivisions or communities with a mix of housing types and densities." These Neighborhoods should "incorporate a comprehensive network of open space throughout to accommodate small parks, gathering places and community gardens; preserve tree stands; and help reduce stormwater runoff."

Lyndon Oaks is consistent with this vision. The community will have a variety of housing options and price points, with six different lot sizes for single-family detached homes, both front and rear loaded, as well as three lot sizes for rear-loaded townhomes. These housing types are not segregated to their own distinct sections of the neighborhood; rather, they have been mixed in throughout the design. Beautiful gathering spaces and amenities will be programmed throughout the community, and the most sensitive natural areas will be preserved and activated.

It is also close to and will help support the planned desired land uses around the subject site. The retail and commercial amenities desired at the **"Neighborhood Node"** located at the intersection of Bethlehem and Old Faison Road will be much more viable with a new residential community so close, and the road improvements that will come with the project will help support desired development patterns in this area as well.



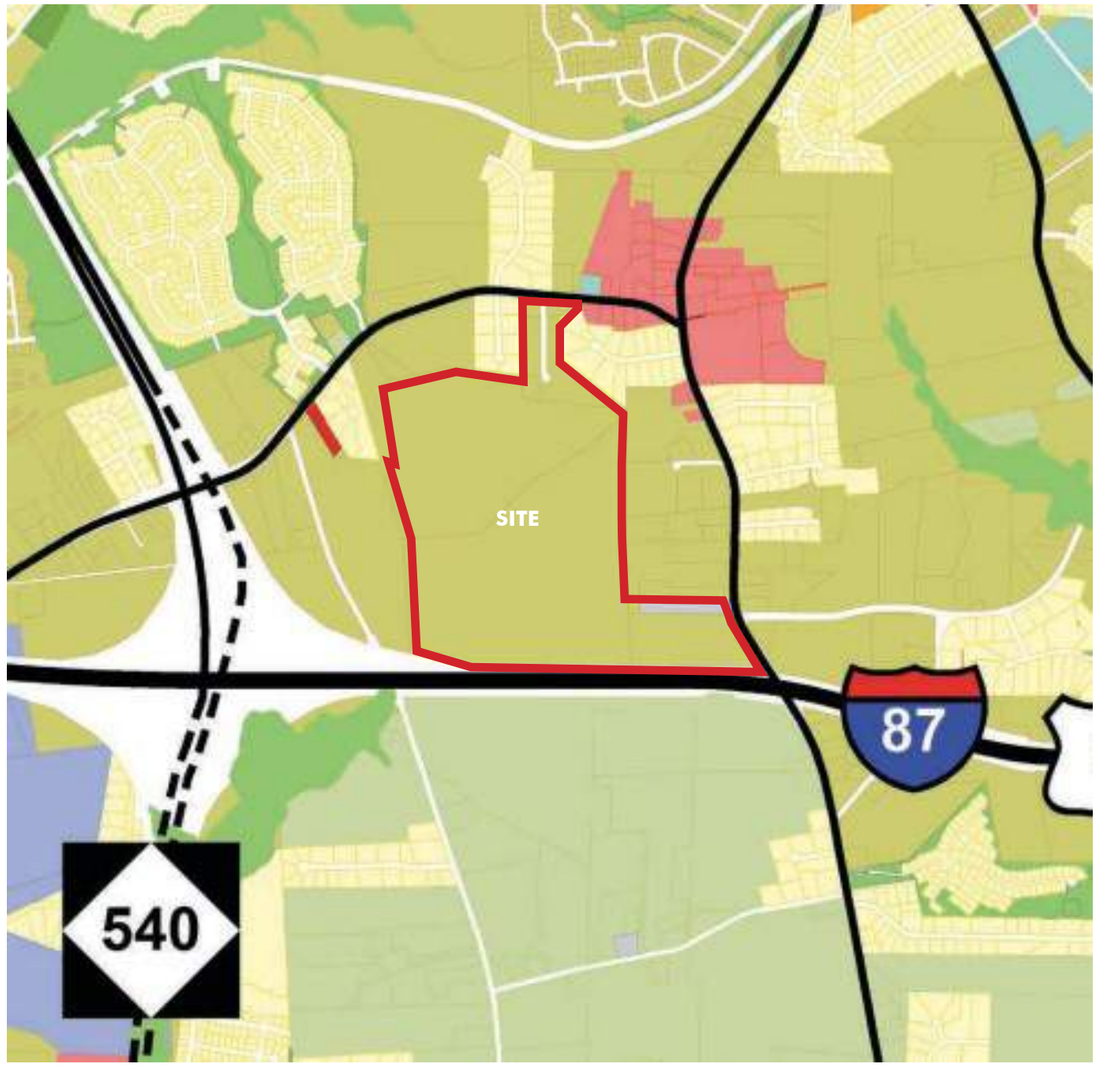


Figure 2: Growth and Conservation Map from KnightdaleNext2035 Comprehensive Plan

Transportation

Lyndon Oaks furthers the goals of **Knightdale's Comprehensive Transportation Plan (CTP)** in several ways.

First, with this project, an additional road connection will be made between Old Faison Road (at Tart Farm Road) and Bethlehem Road (at Crosscut Place), creating instant additional connectivity in the area. Additional road connections create more routes for drivers and ease congestion at nearby intersections, and create local streets that are safer for walking and biking, making these more viable forms of transportation. These are just a few of the reasons the CTP encourages additional local connector streets like those planned in Lyndon Oaks.

Second, Lyndon Oaks will construct ±0.8 miles of the planned Widewaters Parkway extension through the project area, which is a key part of a larger planned connection of Widewaters Parkway to Cross Cut Place on the Roadway Network Plan. When completed across Old Faison Road to the north, this road will make it much easier for residents traveling to and from US 64. The Master Plan has placed the Widewaters Parkway stub in a location that will make it easy to angle in a way that will sync with the alignment of the extension to the north.

Lyndon Oaks also supports the CTP goal of making new streets multimodal and accessible for pedestrians and cyclists. Sidewalks will line both sides of every planned street to enhance pedestrian safety and connectivity in the neighborhood, many of them wider 6' and 10' sidewalks. Buffered bike lanes will line both sides of Widewaters Parkway and additional pedestrian safety infrastructure will be provided at pedestrian crossings across Widewaters Parkway. Lyndon Oaks will also make pedestrian crossings on Widewaters Parkway safer by providing Rectangular Rapid Flash Beacons (RRFBs) at the private trail crossing and the entrance road (Tart Farm Road) intersection.

Finally, Lyndon Oaks has studied the projected transportation impact of the development on numerous roads and intersections, and will implement recommended improvements to mitigate those impacts and improve area roads, consistent with the CTP policy of "account[ing] for broader impacts of development on the surrounding mobility networks." See TIA summary in the Infrastructure section of this document.

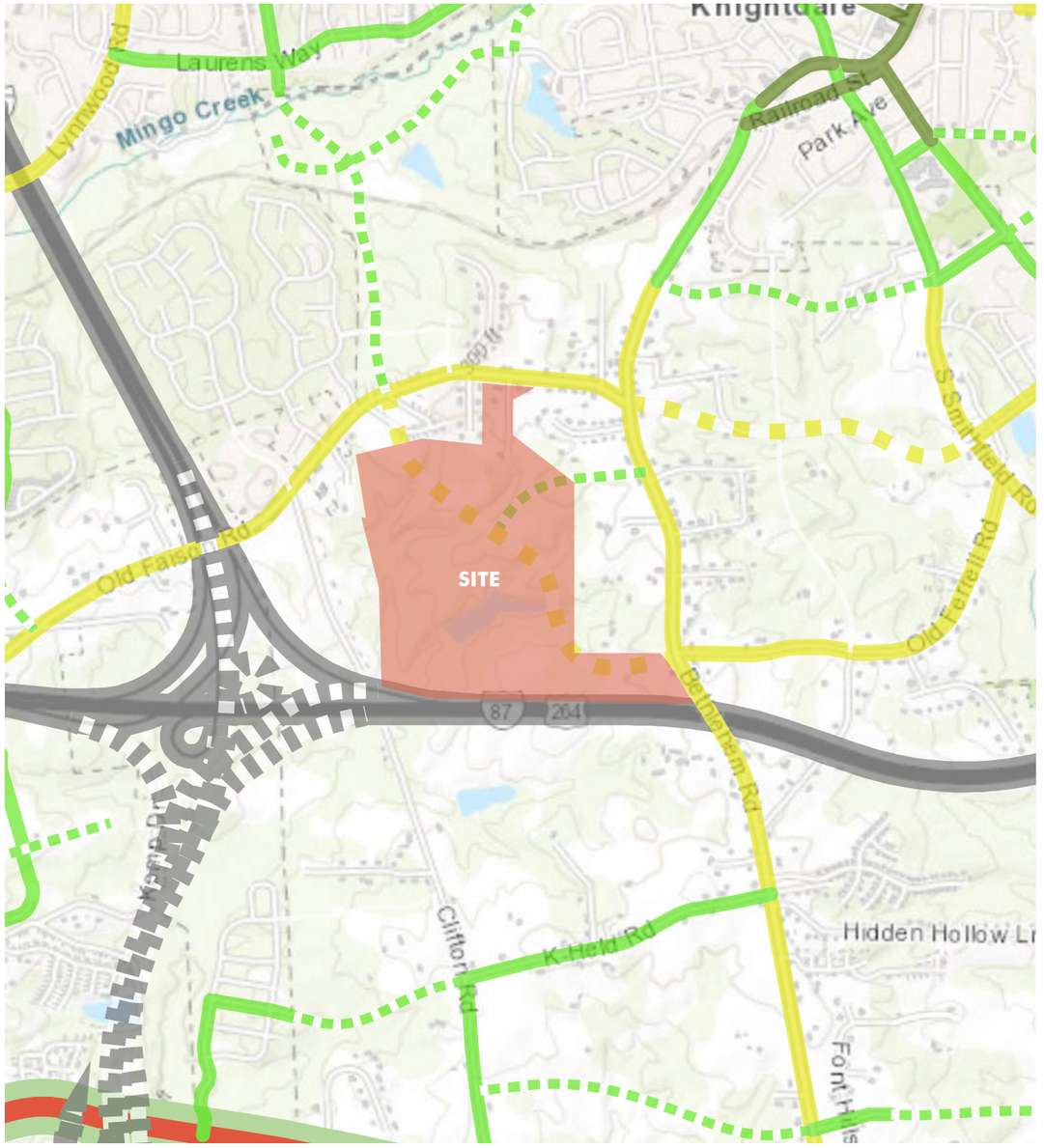


Figure 3: Roadway Network Plan from the Knightdale UDO

Legend

- Comprehensive Transportation Plan Planning Area

Street Type & Status:

- Freeway, Existing
- Freeway, Proposed
- Boulevard, Existing
- Boulevard, Proposed
- Urban Avenue, Existing
- Urban Avenue, Proposed
- Avenue, Existing
- Avenue, Proposed
- Urban Main Street, Existing
- Urban Main Street, Proposed
- Main Street, Existing
- Main Street, Proposed

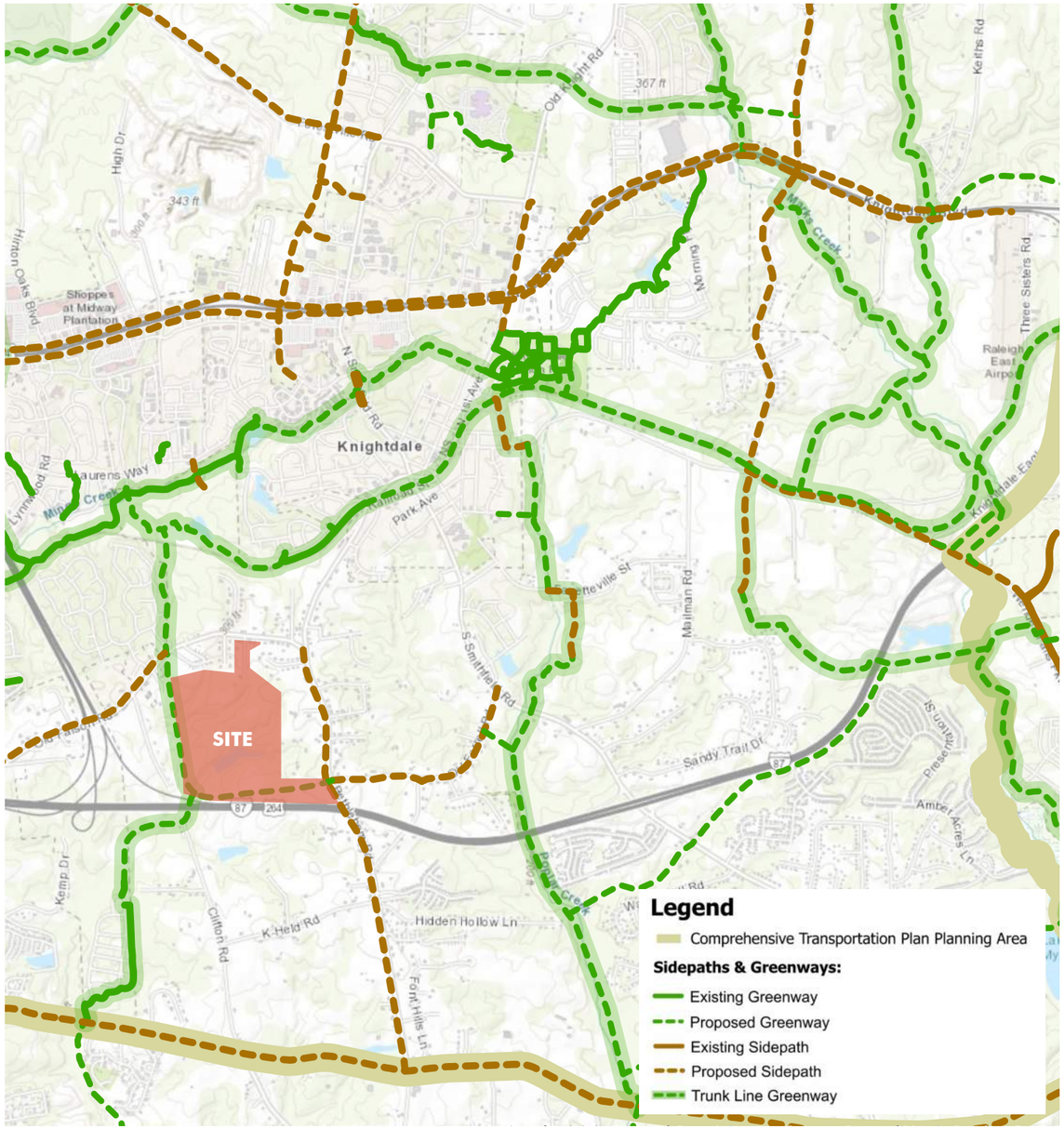


Figure 4: Sidepaths & Greenways Plan from the Knightdale UDO

Trails & Greenways

Lyndon Oaks will provide a network of public greenways and private trails in its open space, as well as recreational amenities while maintaining existing natural features. The plan also provides safe and convenient pedestrian and bicycle access for nearby residents through the use of sidewalks, buffered bike lanes on both sides of Widewaters Parkway, and 10' sidewalks on Tart Farm Road as well, and public and private trails in the natural areas to connect the neighborhood's residential sections.

Pet waste stations and benches will be provided along public greenways and private greenways with public access easements every 2,000 linear feet. Signage shall be provided where the public greenway intersects with other greenways. Signage, bench design, and pet waste station design shall adhere to applicable Town Standard Specifications.

Environmental Impacts and Permitting: The Town of Knightdale has planned substantial street and public greenway improvements on a site with many environmentally-sensitive streams and wetlands that will require extensive permitting through state and federal agencies at the next stage of development, and developer will provide the Town's desired public improvements to enhance vehicular and pedestrian connectivity in this area. Developer will provide and will facilitate environmental permitting for the stream and wetlands impacts of the planned Widewaters Parkway extension. Developer will also pursue environmental permitting for a greenway alignment that is substantially similar to the "Option A" alignment of the greenway shown on the Master Plan. If the US Army Corps of Engineers (USACE) defines the "project" in such a way that the project will cause a cumulative stream and wetland impact of 0.5 acres or more, the developer may adjust plans to reduce stream and wetlands impacts by the following:

- Providing the greenway alignment shown in Option B
- Providing boardwalks instead of paved bridges over streams and wetlands
- Removing the turn lane and narrowing the Widewaters Parkway section in the areas where it crosses streams and wetlands
- Providing the planned public greenway connection from Old Faison Road to Bethlehem Road as a side path on Widewaters Parkway, with private natural trails in the natural areas that connect residential areas of the neighborhood
- Any other minor plan adjustments approved by Town staff that do not include impacts to planned residential lots.

Comprehensive Plan Consistency

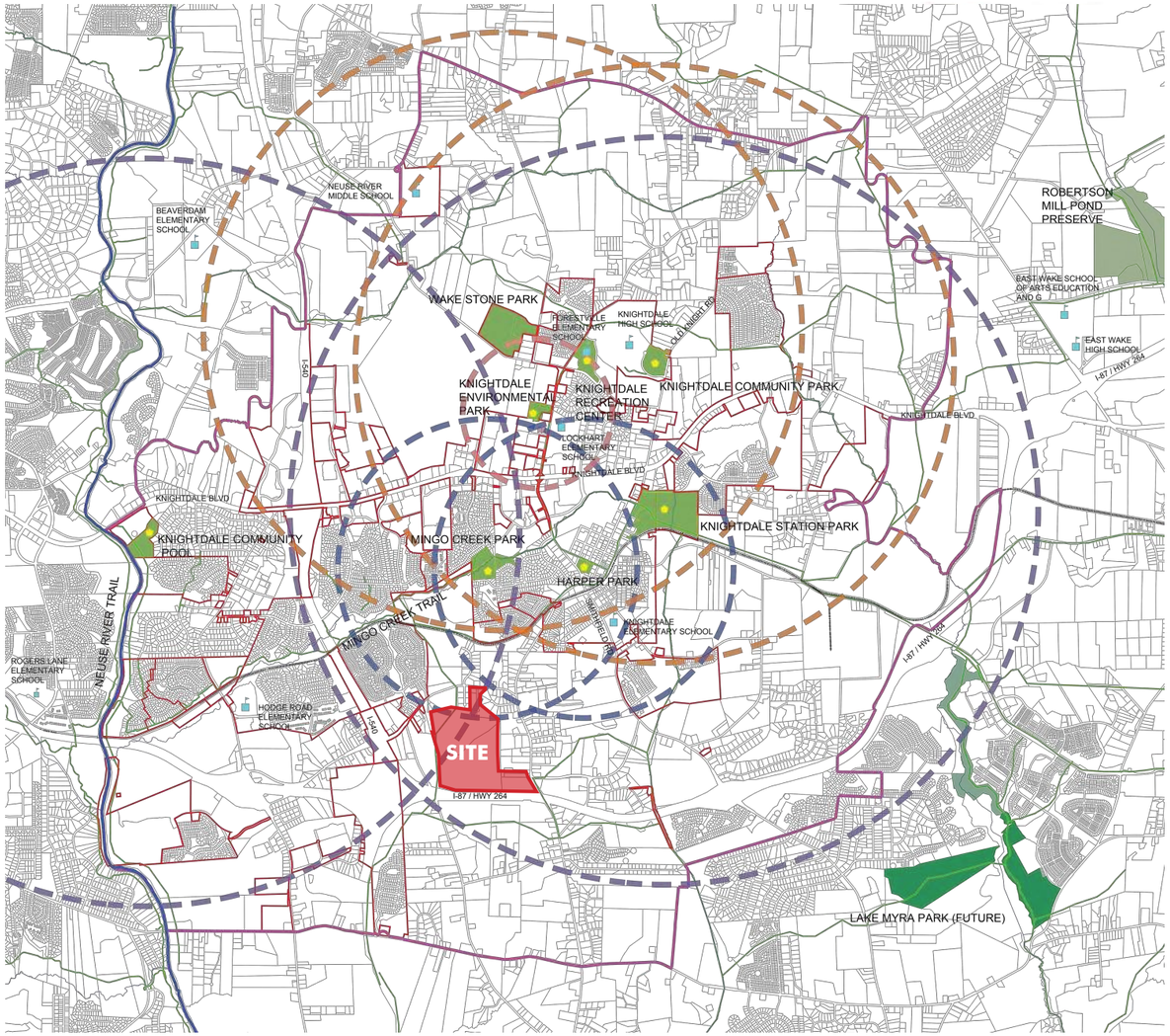
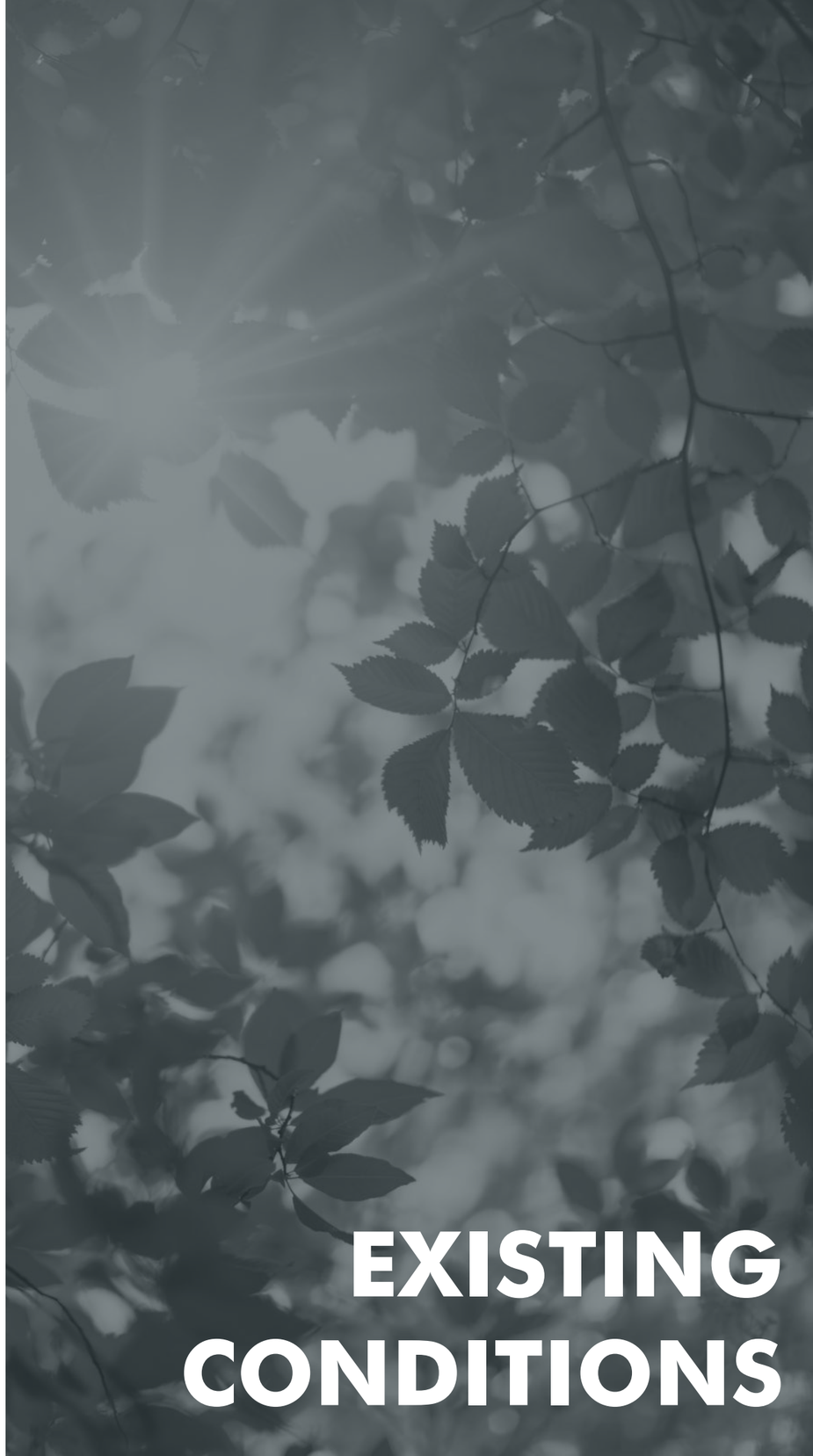


Figure 5: 2021 Town of Knightdale Comprehensive Parks and Rec. Master Plan

Parks and Recreation

Consistent with the **Comprehensive Parks and Recreation Master Plan**, Lyndon Oaks is within the two-and-a-half mile service area of Knightdale Station Park, and part of the neighborhood will be in the one-mile service area of Mingo Creek Park. When the Widewaters Parkway extension is completed to the north, Lyndon Oaks residents will be able to easily walk or bike to this park. The ample amenities, open space, and approximately ± 6.5 miles of trails and sidewalks within the planned community will also provide recreational opportunities for residents.

03



EXISTING CONDITIONS

Vicinity Map

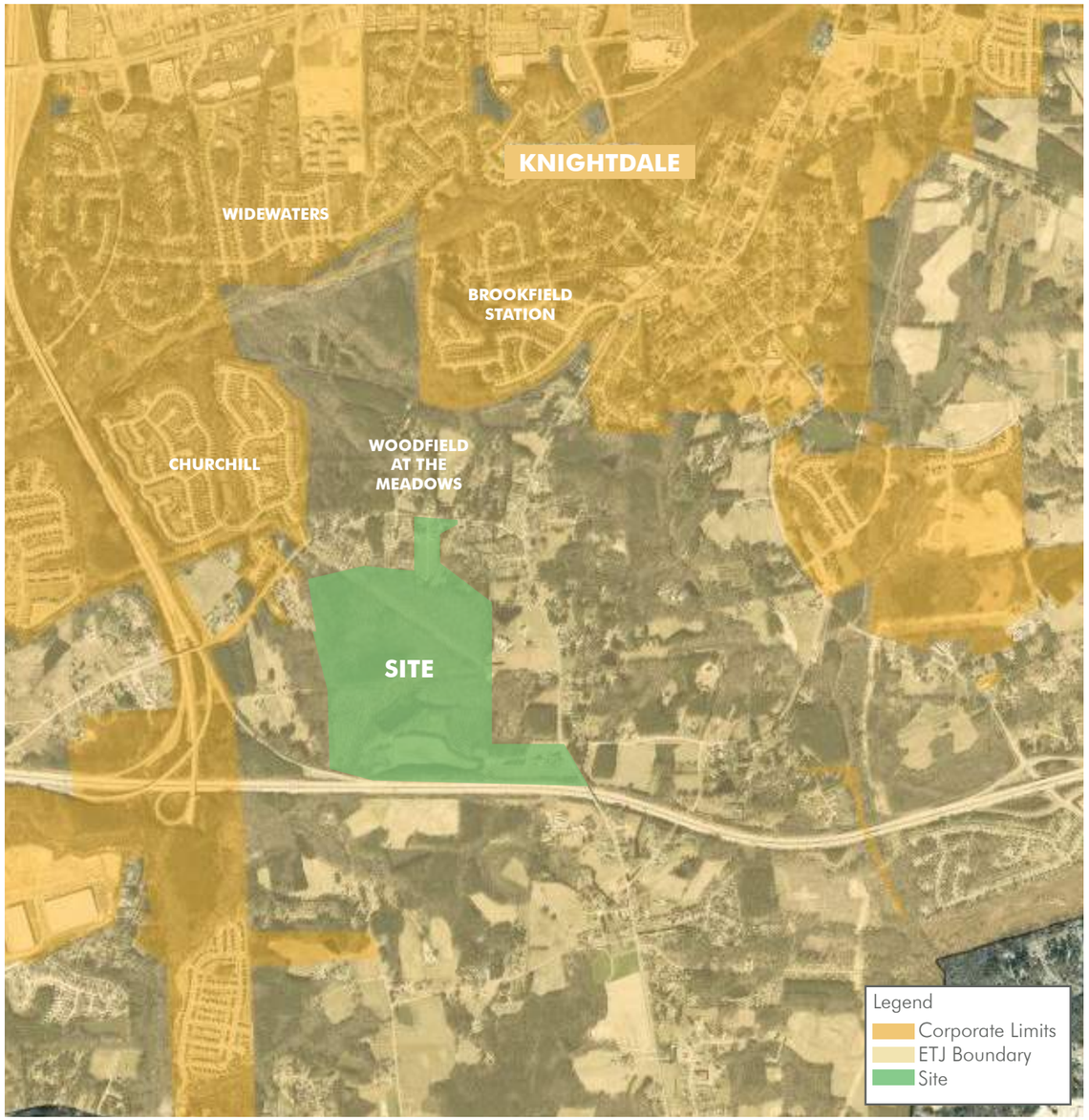


Figure 6: Vicinity Map (Not to Scale)

Vicinity Map

The site is within Knightale's ETJ, and approximately 150 feet from the primary corporate limits at the northwest corner. Most of the site is undeveloped, except for a few larger homes on the portions of the site that front Old Faison Road and Bethlehem Road. The largest portion of the property is bisected by multiple streams and wetlands, and features a large natural pond. Two overhead utility easements also run from east to west through the property.

Uses in the vicinity are almost exclusively residential, as is the current Knightdale ETJ zoning. Residential uses vary in size and housing type. Immediately to the north on Bethlehem Road is a mobile home park. Very large residential lots lie to the to the east, and the parcel immediately to the west on Clifton Road is vacant. Churchill, an established Knightdale neighborhood, is located to the northwest of the site across Old Faison Road, and it is zoned GR8.

Current Zoning Map

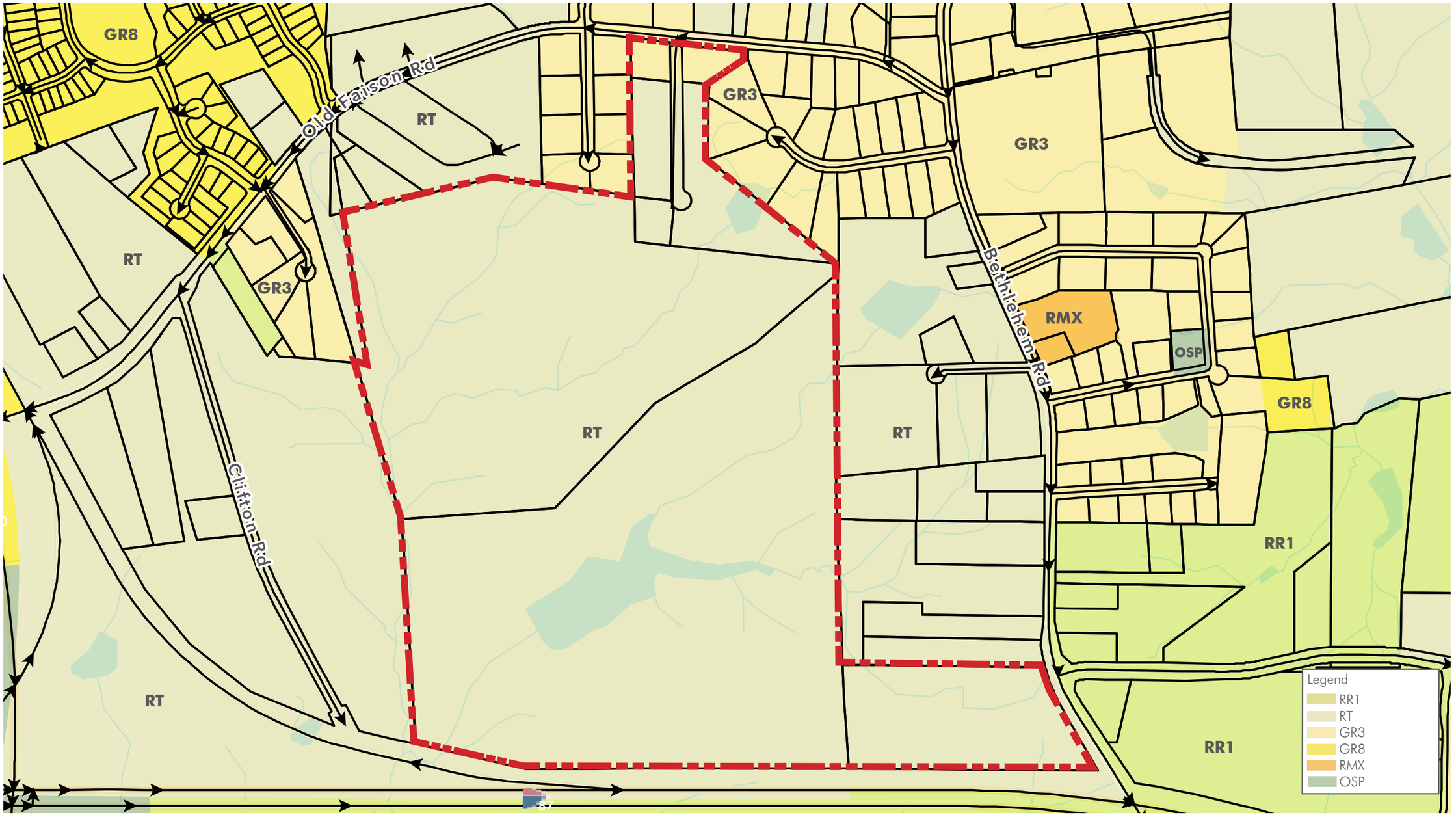


Figure 7: Current Zoning Map

Current Uses

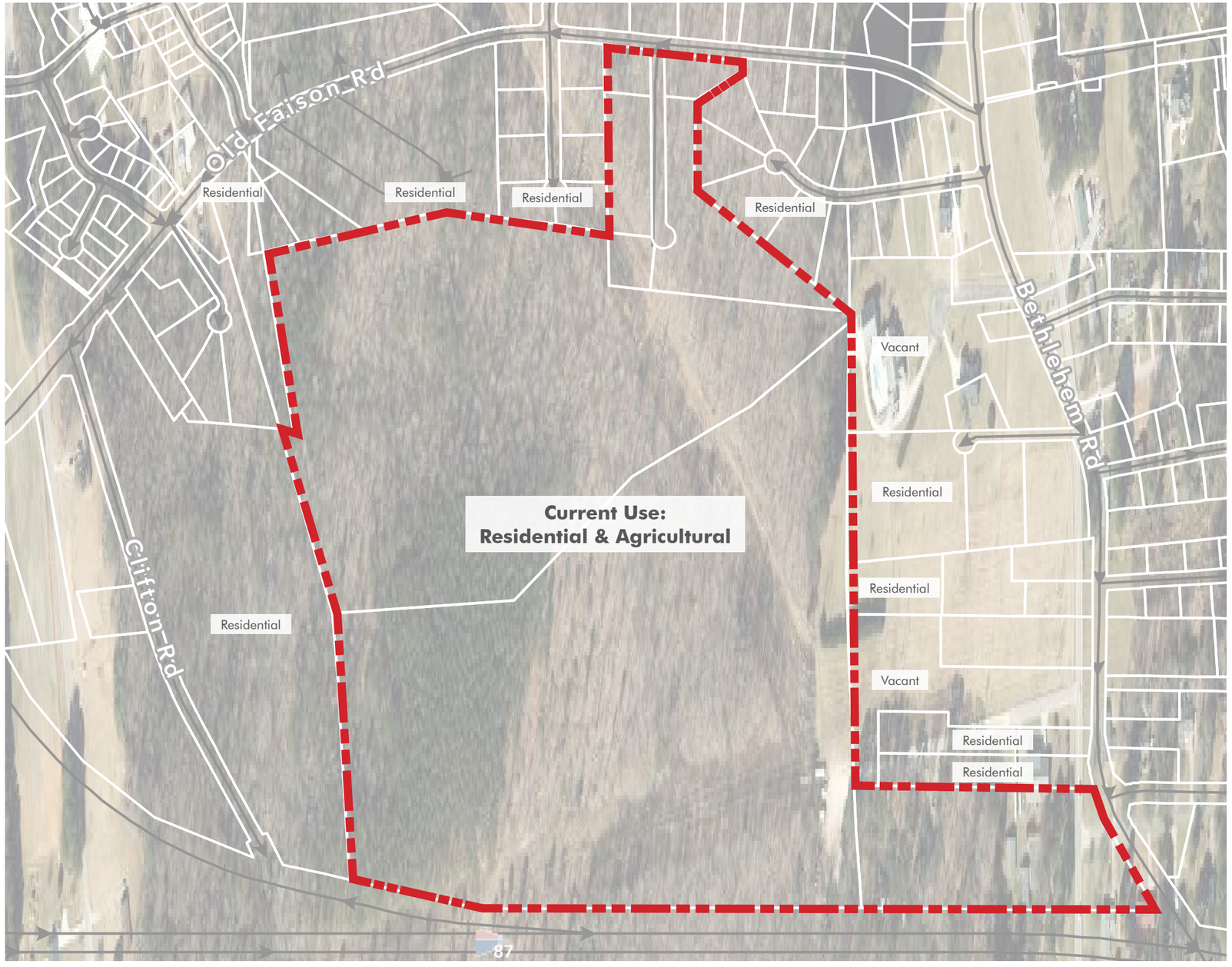


Figure 8: Current Uses Map

0 250′ 500′ 1,000′

Topography & Boundary Map

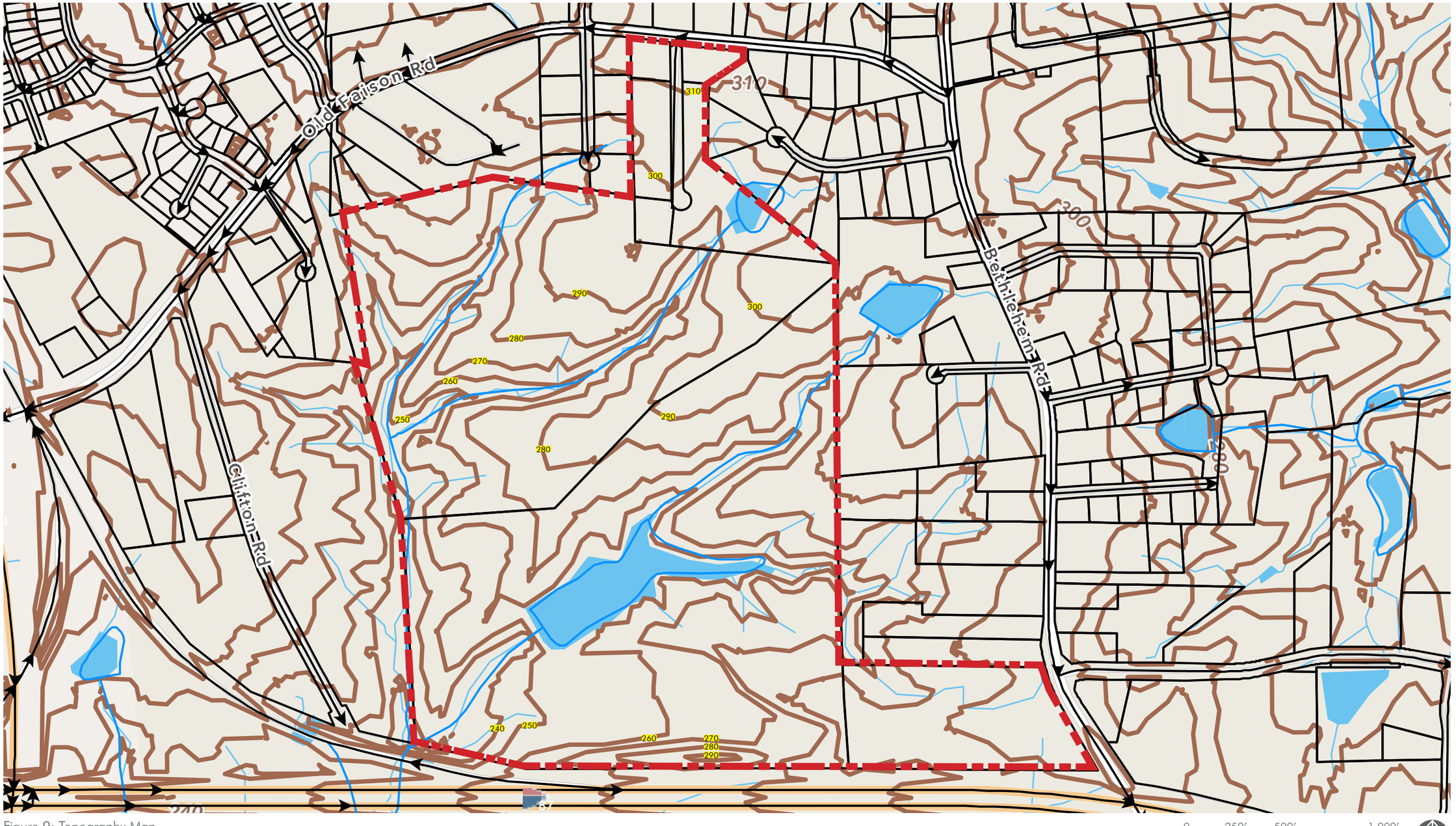


Figure 9: Topography Map

0 250′ 500′ 1,000′

Soils Map

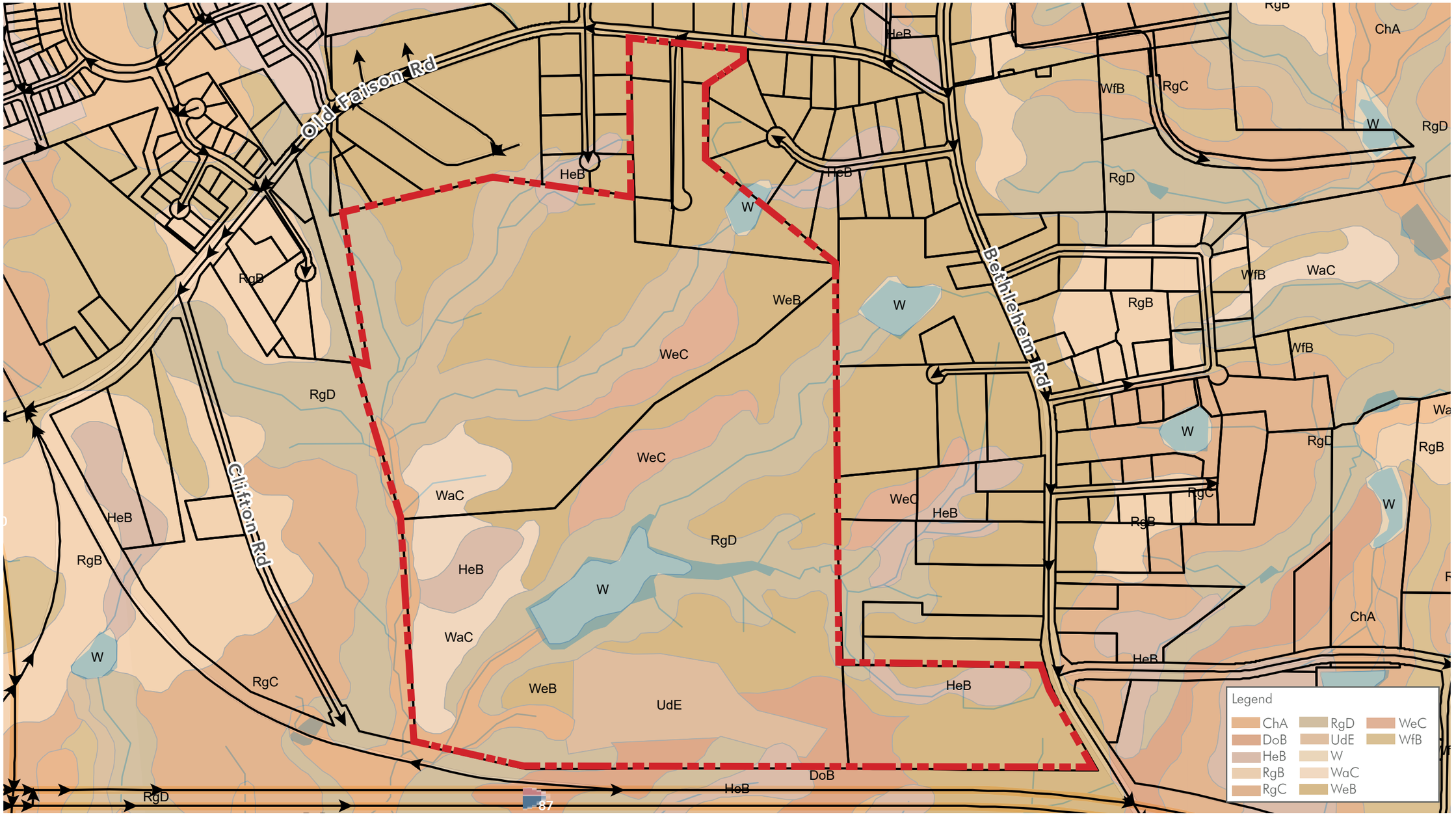
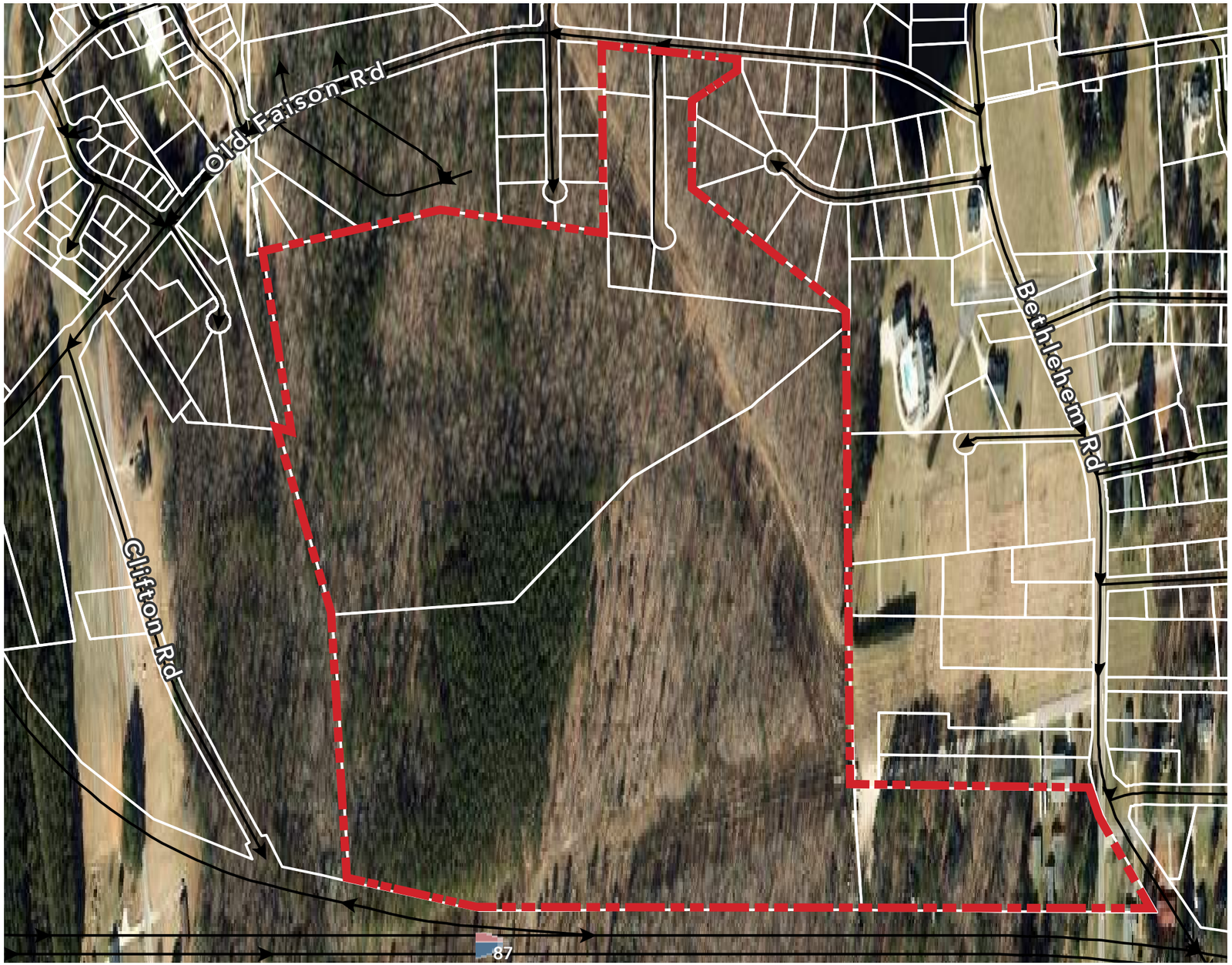


Figure 10: Soils Map

Vegetation Map



The site currently consists of mainly vacant land, two existing ponds, four perennial streams, two large electric easements, and several single family homes.

Figure 11: Vegetation Map

0 250′ 500′ 1,000′

Preliminary Wetland & Stream Map

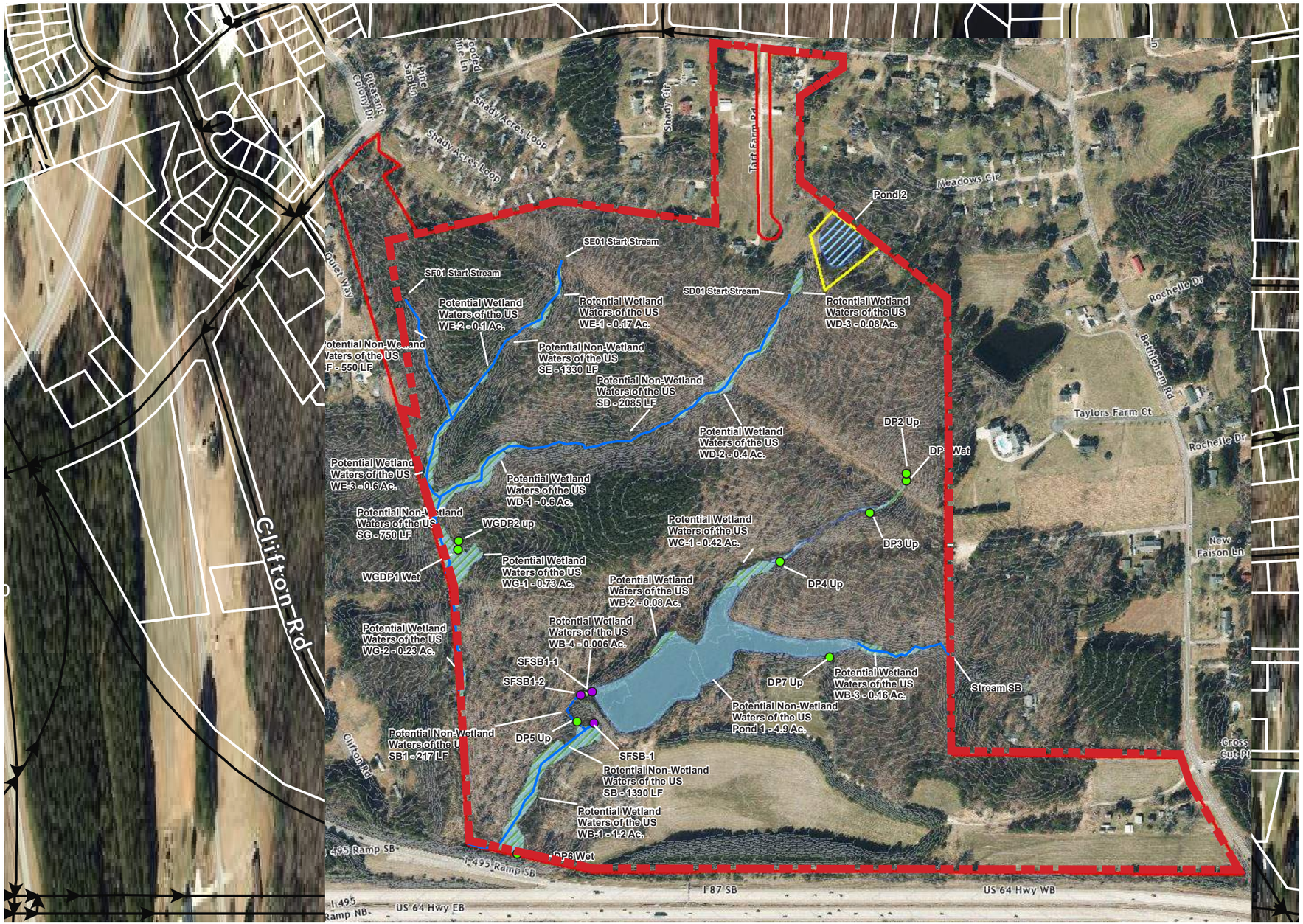


Figure 12: Wetland Sketch Map from Sage Ecological Services

Legend

- Project Study Area
- Too Thick Too Evaluate
- 2' Contour
- Data Point
- 50-Foot Neuse River Riparian Stream Buffer
- Non-Buffered Intermittent Stream - Jurisdictional Waters of the US
- Perennial Stream - Jurisdictional Waters of the US; Subject to 50-Foot Neuse River Riparian Buffers
- Wetlands - Jurisdictional Waters of the US
- Non-Jurisdictional Pond - Pond Built In High Ground
- Pond - Jurisdictional Waters of the US; Subject to 50-Foot Neuse River Riparian Buffer

Detailed Delineation of Waters of the US
Suitable for Preliminary Planning Only

S&EC reserves the right to modify this map based on more fieldwork, and any other additional information. Approximations were mapped using topographic maps, air photos and ground truthing. If the site is going to be disturbed, S&EC's detailed delineation should be approved and permitted by the U.S. Army Corps of Engineers as required. If the user of this work desires an accurate map of the regulated features flagged by S&EC, they should retain a NC Registered Professional Land Surveyor to locate S&EC's flagging.

Figure 3

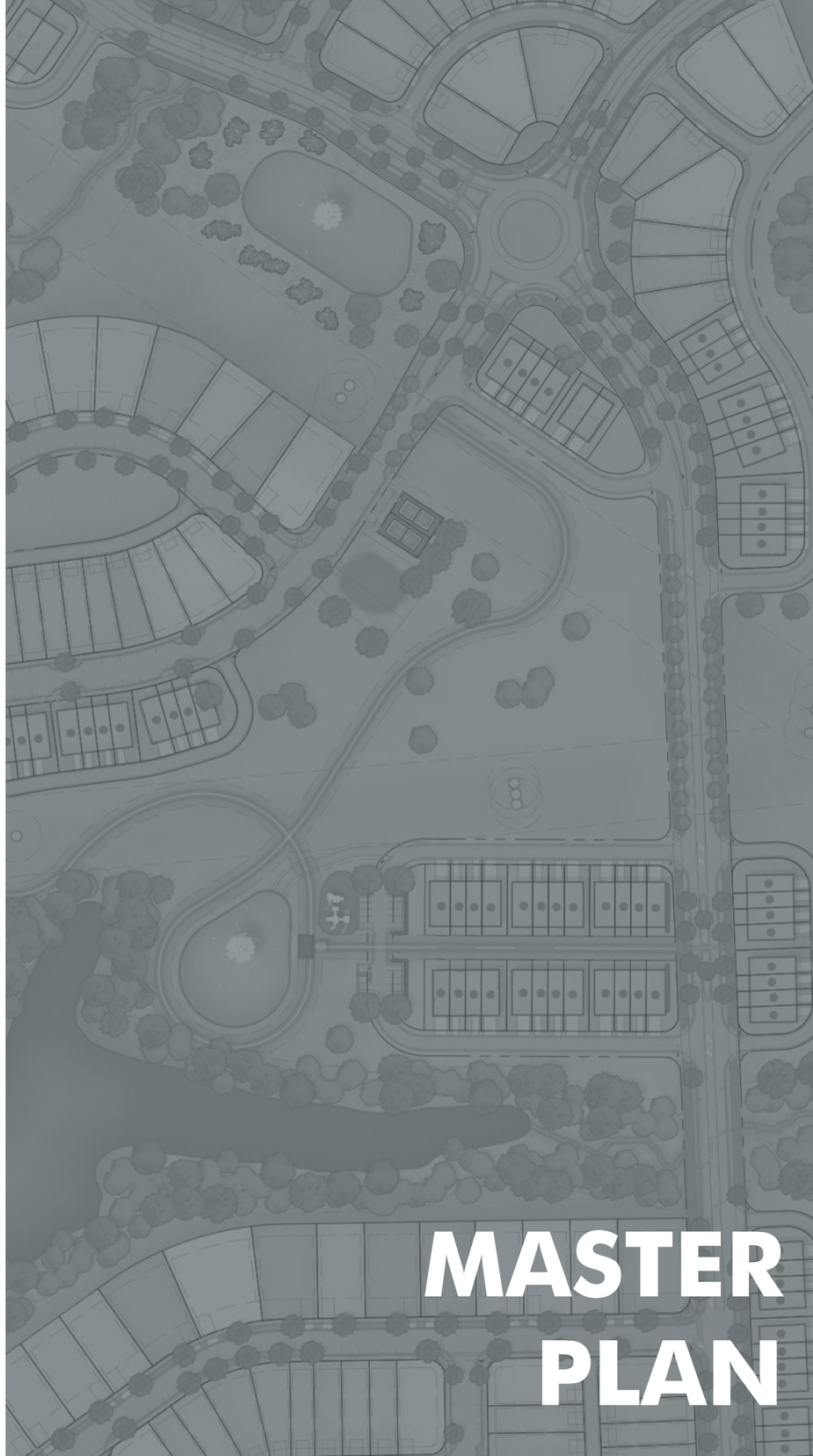
Drawn By:
David Gainey

Sage Ecological Services, Inc.
Office: 919-335-6757
Cell: 919-559-1537

NOTE: Location, shape and size of depicted features on the evaluated site are approximate and should be surveyed by a licensed NC surveyor for final site planning.

0 250' 500' 1,000'

04



MASTER PLAN

Lyndon Oaks - Master Plan

Figure 13: Lyndon Oaks Master Plan

SITE DATA

» ACRES:	± 171.88 AC TOTAL
» PINS:	1753-15-2116; 1743-95-3683; 1743-97-1085; 1743-98-6356; 1743-98-9384; 1753-07-1583; 1743-97-6575
» EXISTING ZONING:	RT
» PROPOSED ZONING:	RMX-PUD

DEVELOPMENT SUMMARY

COMMERCIAL:	**± 15,000 SF**
RESIDENTIAL:	
FRONT LOADED (SINGLE FAM. DETACHED)	
60' LOTS	66 DU
70' LOTS	24 DU
80' LOTS	10 DU
REAR LOADED (SINGLE FAM. DETACHED)	
30' LOTS	46 DU
35' LOTS	39 DU
40' LOTS	24 DU
TOWNHOMES (REAR LOADED)	
20' UNITS	117 DU
22' UNITS	130 DU
DUPLEXES (REAR LOADED)	
22' UNITS	26 DU
TOTAL:	**482 DU(UP TO 500 DU)**

REQ. PARKING (MINIMUM):	
SINGLE FAMILY:	627 SPACES
TOWNHOMES:	819 SPACES
COMMERCIAL:	27 SPACES
• *EV*	*2 SPACES*
• *BICYCLE*	*3 SPACES*

NOTES:
1. THIS PLAN IS CONCEPTUAL IN NATURE AND IS SUBJECT TO CHANGE.
2. THIS EXHIBIT WAS PREPARED USING AVAILABLE RECORD INFORMATION, ALTA SURVEY, GIS MAPS, RECORD PLANS, AERIAL IMAGERY, AND LAND RECORDS.
3. THIS PLAN WILL BE SUBJECT TO REVIEW AND APPROVAL BY LOCAL AND STATE PLANNING AND ENGINEERING REVIEW AGENCIES.
4. THE WORK OF THIS PRODUCT IS THE PROPERTY OF URBAN DESIGN PARTNERS, PLLC. NO USE OR REPRODUCTION OF THIS PLAN IS PERMITTED WITHOUT WRITTEN AUTHORIZATION FROM URBAN DESIGN PARTNERS, PLLC.

0 125' 250' 500'

Lyndon Oaks - Distribution of Uses

USE AREAS				
USE TYPE	TYP. LOT SIZE (SF)	# OF LOTS	TOTAL AREA (SF)	ACRES
SINGLE FAMILY				
30' LOT	3,600	51	183,600	
35' LOT	4,200	53	222,600	
40' LOT	4,800	27	129,600	
60' LOT	7,200	68	489,600	
70' LOT	8,400	25	210,000	
80' LOT	9,600	12	115,200	
			1,350,600	**31.0**
DUPLEX / TOWNHOUSE				
20' TH	1,800	116	208,800	
22' TH	1,980	126	249,480	
22' DUPLEX	2,160	22	47,520	
			505,800	**11.6**
COMM/RETAIL**			**77,033**	**1.77**

DISTRIBUTION OF USES			
			ACRES
GROSS SITE AREA (PER SURVEY)			171.8
DEDICATED RECREATIONAL OPEN SPACE			21.4
PUBLIC R/W			28.3
NET AREA***			122.1
USE TYPE	PROP. (AC)	MIN.-MAX. DISTRIBUTION(%)	PROV. DIST. (%)
SINGLE FAMILY	31.0	15%-60%	25.4%
DUPLEX / TOWNHOUSE	11.6	10%-40%	9.5%
COMMERCIAL / RETAIL	1.77	5%-20%	1.4%

** Retail is not required in Lyndon Oaks because there are no multi-family units being proposed.

*** Net area is calculated by removing the area of open space (required amount) and rights-of-way from the total site area. The Town of Knightdale UDO Sec 11.1.B states that the required distribution of uses shall be calculated as the net development area which excludes streets rights-of-way and dedicated open space.

Lyndon Oaks is proposing a development density of ±3 dwelling units per acre. The maximum density for RMX zoning is 18 dwelling units per acre. Density is calculated by dividing the amount of dwelling units by the total site area. Knightdale requires use distribution minimum and maximum percentages (based on use areas) for subdivisions with both residential and non residential uses (Section 11.1.B of the UDO). The distribution of uses is calculated by dividing the use areas by the net site area. In this PUD, we are proposing an allowance on the distribution of uses for both duplex/townhomes, and retail. See site allowances page for more information.

05

INFRASTRUCTURE

Street Plan

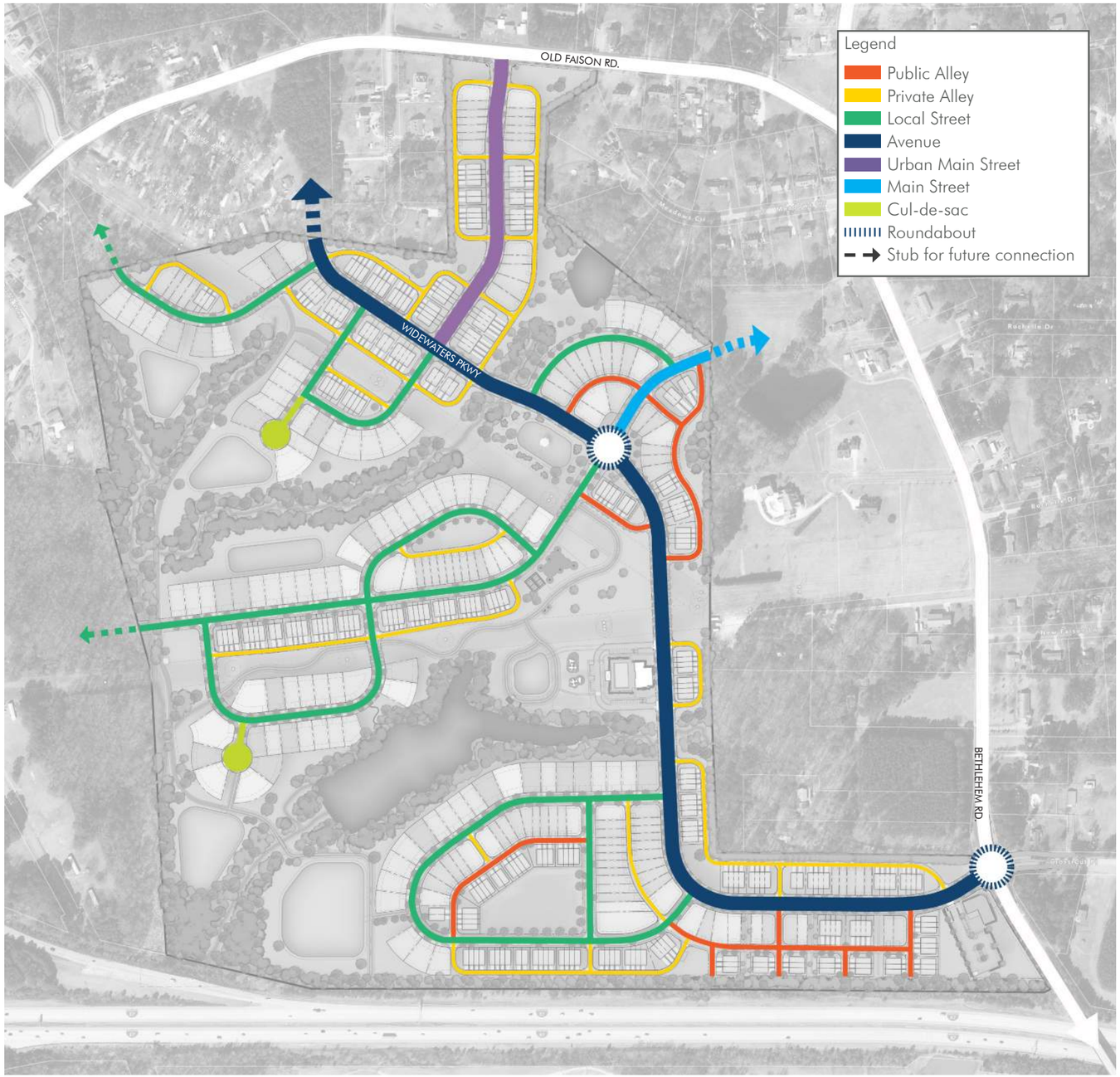


Figure 14: Vehicular Circulation

TOWN OF KNIGHTDALE STREET TYPES

PRIVATE ALLEY
- » RIGHT OF WAY: 20'
- » STREET WIDTH: 20' (BOC-BOC)
- » DESIGN SPEED: 10 MPH

PUBLIC ALLEY
- » RIGHT OF WAY: 32'
- » STREET WIDTH: 18' (FOC-FOC)
- » DESIGN SPEED: 10 MPH

LOCAL STREET
- » RIGHT OF WAY: 54'
- » STREET WIDTH: 28'- 41' (FOC-FOC)
- » DESIGN SPEED: 20 - 25 MPH

URBAN MAIN STREET
- » RIGHT OF WAY: 72'
- » STREET WIDTH: 48' (BOC-BOC)
- » DESIGN SPEED: 20 - 25 MPH

CUL-DE-SAC
- » RIGHT OF WAY: 61.5'
- » STREET WIDTH: 48' RADIUS
- » DESIGN SPEED: 20 - 25 MPH

MAIN STREET
- » RIGHT OF WAY: 70'
- » STREET WIDTH: 47'
- » DESIGN SPEED: 20 - 25 MPH

WIDEWATERS PARKWAY AVENUE (3 LANE - SIDEPATHS)
- » RIGHT OF WAY: 75'-80'
- » STREET WIDTH: VARIES
- » DESIGN SPEED: 30 - 35 MPH

Connectivity Index

Figure 15: Connectivity Index for Lyndon Oaks

TOWN OF KNIGHTDALE CONNECTIVITY INDEX*

REQUIRED SCORE: 1.40 MIN.
PROVIDED SCORE: 1.47

LINKS: 28 LINKS

NODES: 19 NODES

$$\frac{\text{28 LINKS}}{\text{19 NODES}} = \text{1.47 CONNECTIVITY INDEX SCORE}$$

*Connectivity index is calculated according to Town of Knightdale UDO Sec. 11.3.E.7
** Block lengths shown are the lengths of the links. Block lengths are all under 800 LF when alleys are included. See Master Plan ZMA-2-23.

0 125′ 500′ 1000′

Pedestrian Circulation Plan

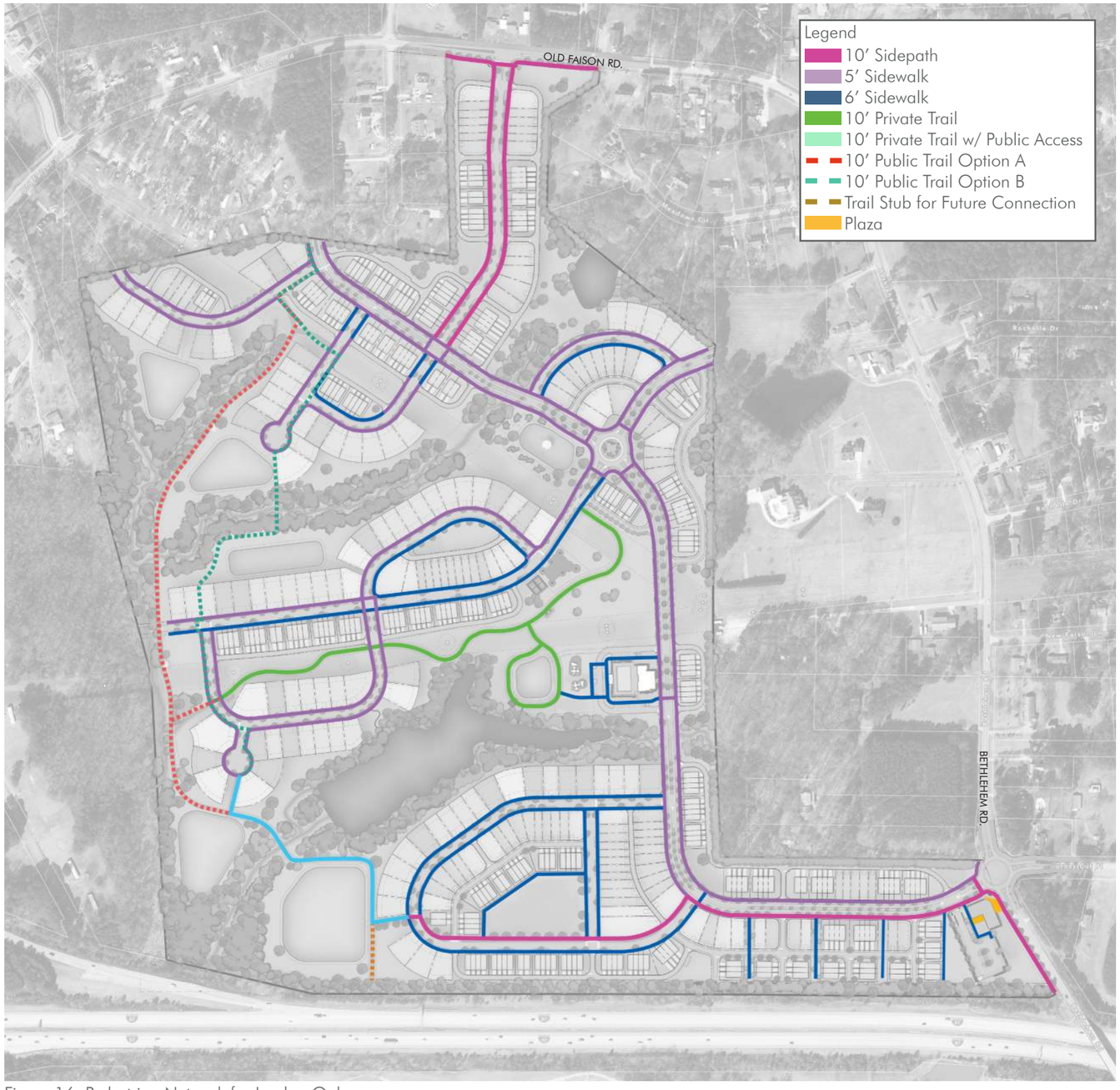


Figure 16: Pedestrian Network for Lyndon Oaks

PEDESTRIAN CIRCULATION

Lyndon Oaks is proposing a connected network of amenity spaces and dwelling units through the use of sidewalks, sidepaths, and greenway trails to create a walkable, pedestrian-friendly community as seen in Figure 16.

» The plan shown is preliminary and subject to change at the time of site plan.

SIDEWALK NETWORK

» WIDTH: 5'-6' wide

SIDE PATH

» WIDTH: 10' wide

GREENWAY TRAIL

» WIDTH: 10' pavement width (30' easement)

PLAZA

» PROVIDED SIZE: ± 2,000 SF

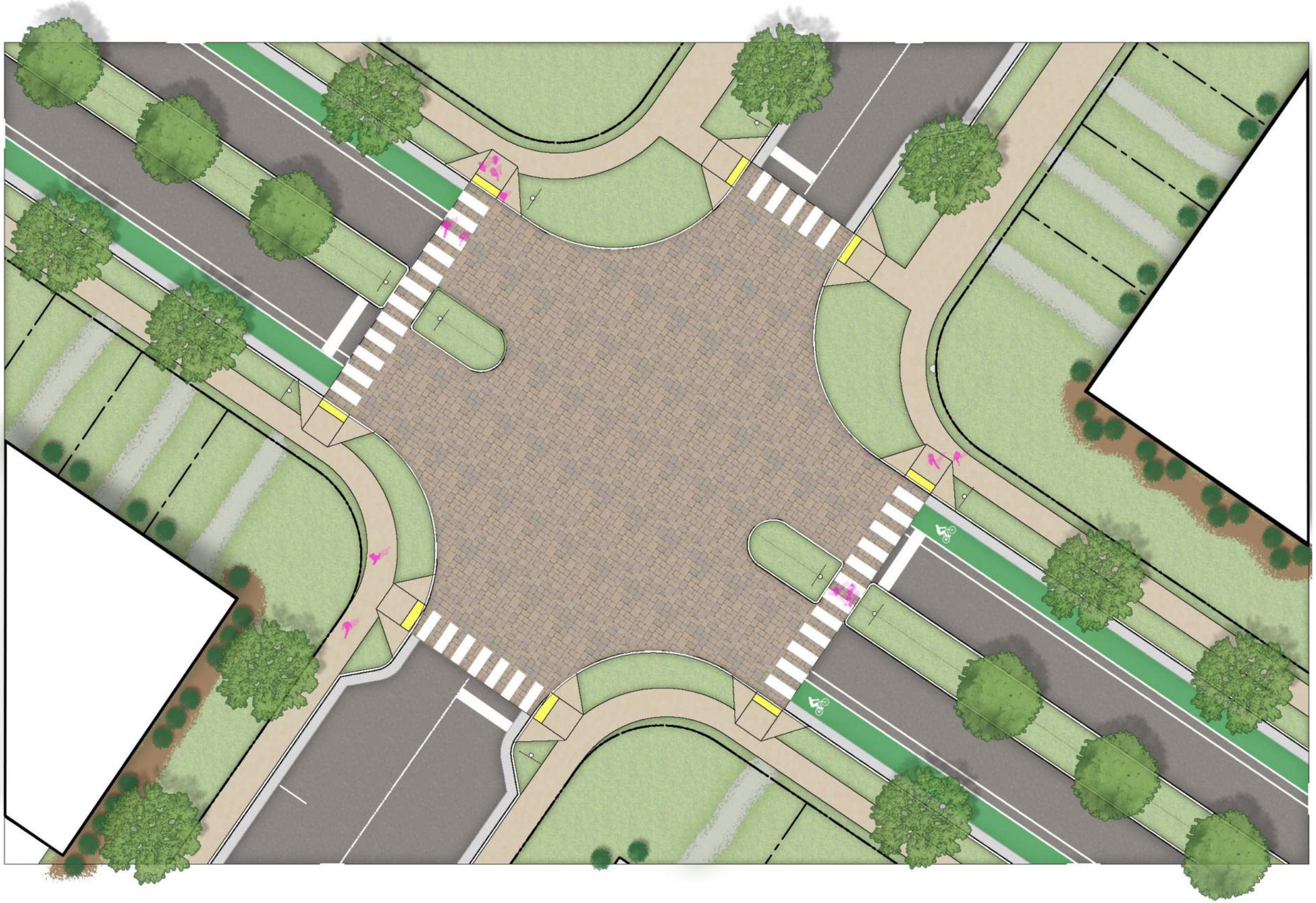
AMENITY SPACES

» See Open Space Plan

Easement for future pedestrian bridge over I-87: Prior to approval of construction drawings for the first phase of development, the applicant will offer a minimum of 100 square feet of site area as a non-exclusive, permanent easement area to be dedicated to the Town for construction, maintenance, and repair of footings for a future pedestrian bridge over 1-87, together with such temporary construction easements as are necessary for completion of such work. If accepted by the Development Services Director, such easement area shall be shown on the construction drawings and subdivision plat and granted to the Town pursuant to a recorded Deed of Easement.

0 125' 500' 1000'

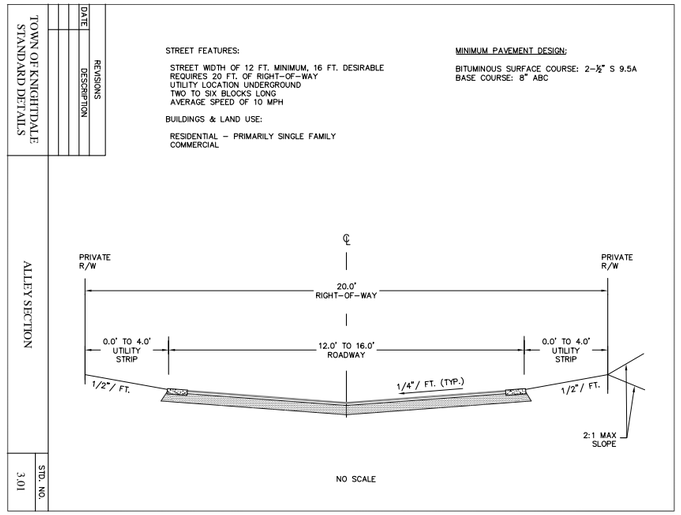
Urban Main St (Tart Farm Rd) & Widewaters Parkway Intersection Design



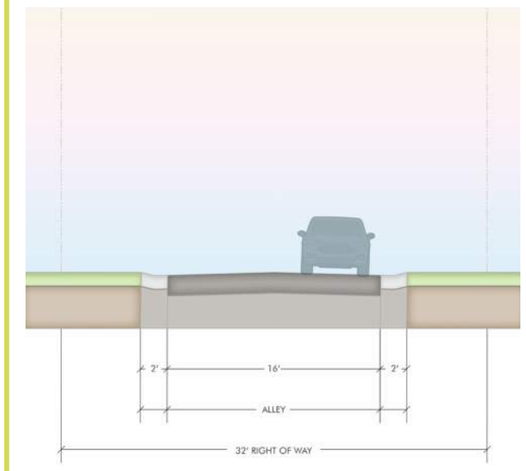
PEDESTRIAN CIRCULATION

Lyndon Oaks proposes a four-way stop with traffic calming measures, including high-visibility crosswalks, stamped concrete, Rectangular Rapid Flash Beacons (RRFBs), and pedestrian refuges in the Widewaters Parkway median at the intersection of the Urban Main Street and Widewaters Parkway.

Street Sections

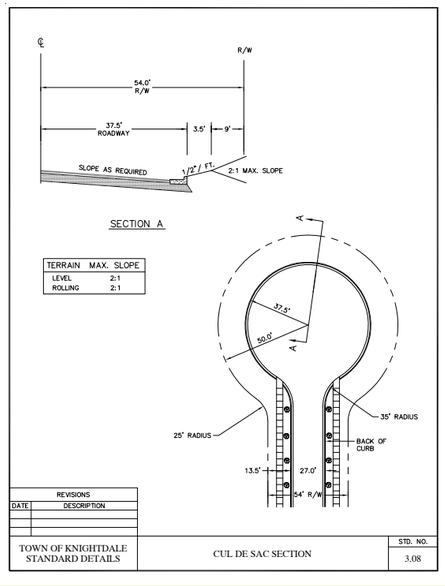


Private Alley

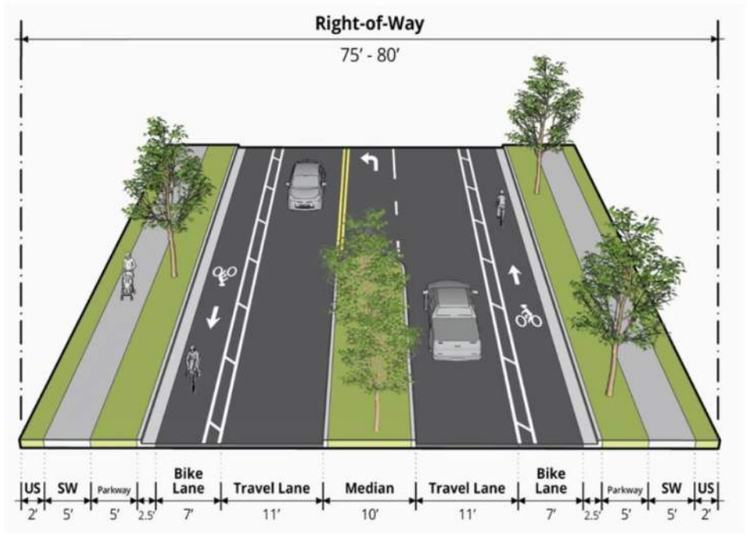


Public Alley

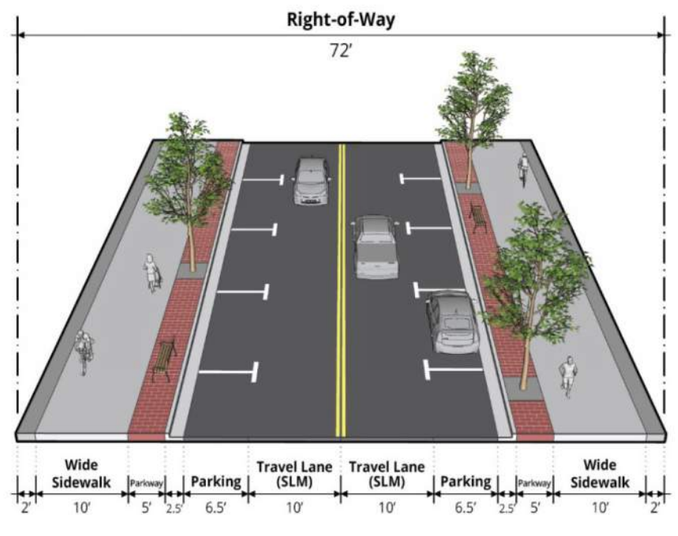
Main Street



Cul-de-sac



Avenue 3 Lane Divided



Urban Main Street

*Note: Staff is developing updated sections and details. Sections to be updated once updates received from Town of Knightdale

Local Street Sections

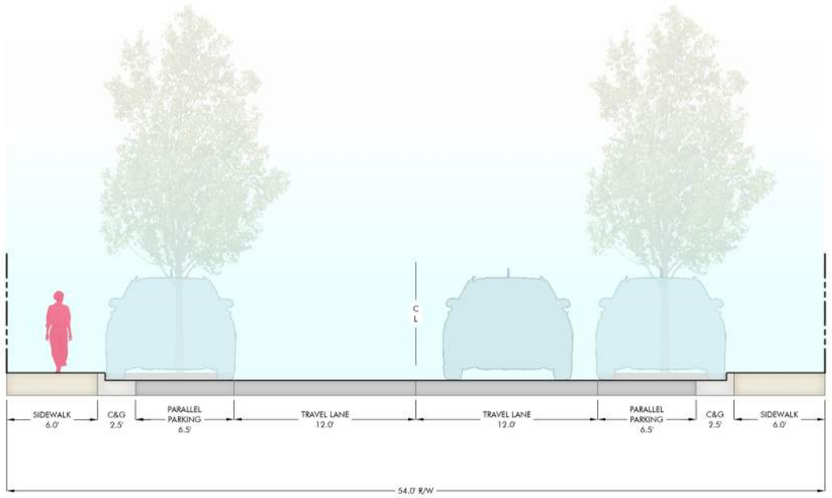
LOCAL STREET: NO ON STREET PARKING (54' R/W)

*Note: "No Parking" signage shall be provided where on-street parking is not present to prevent parking in the travel lane.

LOCAL STREET: 1 SIDE ON STREET PARKING (54' R/W)

*Note: "No Parking" signage shall be provided where on-street parking is not present to prevent parking in the travel lane.

LOCAL STREET: 2 SIDE ON STREET PARKING (54' R/W)



LOCAL STREET: GREENWAY CONNECTOR (54' R/W)

*Note: "No Parking" signage shall be provided where on-street parking is not present to prevent parking in the travel lane.

Preliminary Stormwater Plan

Figure 17a: Stormwater Plan for Lyndon Oaks

STORMWATER

The property is located within the Neuse River Basin. The site consists of two existing ponds, and 4 perennial streams which create four unique drainage areas. Stormwater runoff within these areas will be controlled by multiple SCMs as seen in Figure 17a. The outfall is located at the southwest corner of the property. All stormwater shall be subject to the stormwater management requirements set forth in Chapter 9 of The Town of Knightdale Unified Development Ordinance. The stormwater treatment shall adhere to guidelines established in the NCDEQ Stormwater Design Manual.

The SCM in the center of the site and near the central roundabout will have a fountain installed to create a water amenity. See Figure 17b for an example of a pond fountain. One of the stormwater management devices located in and around the main amenity center shall include alternative SCM infrastructure such as cisterns, bioswales, or planted wetlands, with educational signage (Figure 17c).

The developer will work will Town staff during the construction drawing phase on SCM design if any "additional safety structures such as fences, vegetative buffers, landscaping elements, or any combination of the three" are needed, pursuant to UDO Sec. 7.3.J, and shall look for ways to incorporate elements into the design that mimic nature, reduce maintenance burdens, and/or provide natural aesthetic value.

» The plan shown is preliminary and subject to change per direction from Knightdale staff.

Figure 17b: SCM fountain example

Figure 17c: Alternative SCM infrastructure examples

Legend
- Storm pipe
- SCM
- SCM w/ Fountain
- Catch Basin
- Flared End Section

0 125′ 500′ 1000′

Preliminary Utility Plan

Figure 18: Utility Plan for Lyndon Oaks

WATER & SEWER

Lyndon Oaks will design all water and sewer to meet the standards of the City of Raleigh. Water allocation points will be met for the Major Subdivision through the use of many site elements that listed in the tables below. Precedent images of these elements can be found in the Site Programming section of this PUD.

» The plan shown is preliminary and subject to change per direction from City of Raleigh staff.

WATER ALLOCATION POLICY

Required amount: 50 pts.

MAJOR SUBDIVISION	
Major Subdivision (Base points)	15 pts.
Conservation of Natural Habitat	7 pts.
Construct a fountain within the SCM	4 pts.
On Street Parking	4 pts.
Residential Architectural Standards	15 pts.
3,000' or more of 6-foot wide path	3 pts.
Resort Style Pool	2 pts.
Deck/Patio (2,000 SF minimum)	2 pts.
Clubhouse (No Meeting Space, bathrooms and changing rooms only)	3 pts.
Pickleball Courts	5 pts.
Outdoor display of public art	4 pts
IPEMA Certified Playground Equipment	4 pts.
TOTAL PROVIDED	68 pts.
TOTAL MIN. REQUIRED	50 pts.

SINGLE-USE RETAIL	
Single Use Retail Base Points	41 pts.
Construction of Gateway Landscaping	5 pts.
Deck/Patio (2,000 SF minimum)	2 pts.
Outdoor Display of Public Art	4 pts.
TOTAL PROVIDED	52 pts.
TOTAL MIN. REQUIRED	50 pts.

Note: Any combination of features listed above can be used to meet the 50 point minimum requirement. Single-Use Retail Water Allocation Policy points are preliminary and subject to change when the developer of the commercial outparcel submits a site plan.

0 125' 500' 1000'

Transportation Impact Analysis Summary

A Traffic Impact Analysis (TIA) was conducted by Ramey Kemp Associates in accordance with the Knightdale Unified Development Ordinance (UDO) and the North Carolina Department of Transportation (NCDOT) capacity analysis guidelines. A full copy of the TIA was submitted for review and approval with the PUD submittal. The listed recommended improvements are subject to further review and final approval by NCDOT, and shall be phased with the development.

Study Area

The study area for the TIA was determined through coordination with the Town and NCDOT and consists of the following existing intersections:

- Old Faison Road & Bethlehem Road
- Old Faison Road & Tart Farm Road
- Old Faison Road & Pleasant Colony Drive
- Old Faison Road & Quiet Way
- Bethlehem Road & Crosscut Place
- US 64 EB Ramps & Hodge Road
- US 64 WB Ramps & Old Faison Road
- Smithfield Road & Old Ferrell Road
- Bethlehem Road & Poole Road

Recommended Improvements

Based on the analysis of the TIA (including improvements to be installed by the Lyndon Oaks development), the following improvements have been recommended to be constructed to mitigate traffic impacts by the proposed development.

Westbound I-87 Ramps & Hodge Road (Improvements by STIP W-5705AK)

- Construct a westbound right turn lane with 100 feet of storage and appropriate decel and taper.
- Construct a westbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Modify signal timings and signal phasing.

Old Faison Road & Bethlehem Road (Improvements by Developer)

- Construct a signal. A mast arm signal design will be provided if a transportation impact fee credit term is included in the Development Agreement between the Developer and the Town of Knightdale.
- Developer will provide additional gateway features desired by the Town, including landscaping and/or gateway signage in the right-of-way, if these upgrades fit within the right-of-way required for the signal, do not require additional right-of-way or easements to be acquired, and are approved by NCDOT and Town staff. The total cost of these gateway features to the Developer shall not exceed $40,000.
- Construct a northbound left turn lane with 250 feet of storage.
- Construct a westbound right turn lane with 250 feet of storage.
- Construct a westbound left turn lane with 175 feet of storage.
- Roundabout improvement may be provided in lieu of the signal and turn lanes recommended by the TIA if later requested by the Town, sufficient right-of-way is available, and this improvement is approved by NCDOT.

Old Faison Road & Tart Farm Road / Site Access A (Improvements by Developer)

- Construct an eastbound right turn lane with 75 feet of storage and appropriate decel and taper.
- Construct exclusive northbound left turn lane with full storage.
- Provide stop control for northbound approach.

Bethlehem Road & Crosscut Place / Site Access B (Improvements by Developer)

- Construct a single-lane roundabout.
- Construct eastbound approach with one ingress and one egress lane.
- Provide yield control for eastbound approach.

Westbound I-87 Ramps & Hodge Road (Improvements by Developer)

- Extend westbound left turn lane to contain 175 feet of storage and appropriate decel and taper.
- Extend southbound left turn lane to contain 275 feet of storage and appropriate decel and taper.
- Extend eastbound left-through lane to contain 275 feet of storage and appropriate decel and taper.

Bethlehem Road & Poole Road (Improvements by Developer)

- Construct left turn lanes with 100 feet of storage.

06

AMENITIES

Site Programming

Lyndon Oaks will provide a variety of amenities to promote a healthy lifestyle, opportunities to enjoy the outdoors, and foster a sense of community. The site is proposing a network of ±20 acres of open space and recreational amenities. The proposed amenities may include but are not limited to the following:

1 Greenway Trail
- » Public and private greenway trails will be located throughout Lyndon Oaks and will be 10' wide asphalt paths. In addition to the 10' multi-use paths along Widewaters Parkway, there are many pedestrian routes through the community.

2 Village Green
- » The Village Green will be a large open green space that can be used for a variety of activities by the community.

3 Playground
- » The IPEMA certified playground will be located in two open spaces to allow for greater access for families in Lyndon Oaks

4 Dog Park
- » The playground will be located in one of the active open space areas and will provide a place for residents to let their dogs run.

5 SCM Fountains
- » The pond fountains will amenitize the stormwater ponds located in both the center of the site, and near the central roundabout active open space.

6 Neighborhood Serving Commercial
- » The commercial outparcel will be low-intensity, and will meet the needs of nearby residents.

7 Pickleball Court
- » Two Pickleball courts will allow for additional active recreational opportunities for the neighborhood

Site Programming

1 Pocket Park

» Pocket parks will be located in several places throughout Lyndon Oaks and may include benches, open play lawn, landscaping, exercise equipment, and other recreational opportunities.

2 Bench Swing Park

» A bench Swing Park will be located in one of the open spaces for the community and will provide a fun seating alternative for people of all ages.

3 Hammock Park

» A Hammock Park will be located in Lyndon Oaks to add an additional type of open space that will allow residents of all ages to relax and unwind.

4 Pollinator Garden

» A pollinator garden will be provided around the SCM nearest to the central roundabout to create a habitat for pollinators in the community.

5 Overlook with Gazebo

» The central pond will have an overlook plaza and gazebo to allow for a community gathering focal point.

6 Benches

» Benches will be provided in open spaces around Lyndon Oaks to provide spaces for the community to relax & rest.

7 Public Display of Art

» An art installation and roadside landscaping may be provided near the central roundabout for enjoyment from both vehicular and pedestrian users of the site.

8 Workout Stations

» Workout stations will be provided in several areas throughout Lyndon Oaks.

Entry Signage Concept

*Note: Signage is conceptual in nature and subject to change at time of construction documents.

Clubhouse Programming

1 Clubhouse
Lyndon Oaks will have a Clubhouse for the residents that will include community amenities and a resort-style pool.

2 Pool
The Clubhouse will include an outdoor resort-style pool for the neighborhood residents.

3 Clubhouse Amenities
The Clubhouse may include a kitchen, outdoor area, and community room.

Open Space Plan

Figure 19: Open Space Plan for Lyndon Oaks

Lyndon Oaks provides both active and passive recreation areas throughout the development. All recreation spaces are located in places that are accessible to all residents of the community. The network of public Greenway Trails and private trails create additional connection opportunities between all of the provided open spaces.

Active open space areas may include but are not limited to the following uses: A Clubhouse, Resort-style Pool, (2) Playgrounds, (2) Pickleball courts, Greenway Trails with fitness equipment, and and additional pocket parks with exercise equipment.

Passive open space areas may include but are not limited to the following uses: Village Green, Pollinator Gardens, Public Display of Art, Path & Benches, a Bench Swing Park, a Hammock Park, Open Lawns, and entry landscaping and hardscaping.

Enhanced landscaping, hardscaping, and unique signage will be provided at both neighborhood entrances.

A minimum of three (3) pieces of exercise equipment shall be provided along the public and private trails for more active recreational opportunities for users.

Please see Site programming page for example imagery.

RECREATIONAL OPEN SPACE STANDARDS*

PROXIMITY ZONE:	All outside 1/2 mile distance
REQ. OPEN SPACE:	± 751,920 sf (17.26 ac)
» REQ. ACTIVE SPACE (50%):	± 8.63 ac (50% of req.)
» REQ. PASSIVE SPACE (50%):	± 8.63 ac (50% of req.)
PROP. OPEN SPACE:	± 21.40 ac total
» PROP. ACTIVE SPACE:	± 9.03 ac (0.4 ac over req.)
» PROP. PASSIVE SPACE:	± 12.37 ac (3.74 ac over req.)

* Open space is calculated according to Town of Knightdale UDO Sec. 11.2.c.
**According to Town of Knightdale UDO Sec. 11.2.A, Recreational Open Space can not include areas covered by buildings, structures, parking lots, dry ponds, required setbacks, or public R/W.

07

LANDSCAPE

Preliminary Landscape Plan

Figure 20: Landscape Plan for Lyndon Oaks

Lyndon Oaks will design all landscape areas according to the Knightdale Unified Development Ordinance. The site is surrounded by a 20' Type B Buffer yard as required in Section 7.4.1.1. of the UDO. The preliminary plan only shows typical buffer plantings and street tree plantings as seen in Figure 20. The riparian buffer will consist of tree preservation to maintain the natural qualities of the site.

- The plan shown is preliminary and subject to change per direction from Town of Knightdale staff.
- More detailed landscape plans with planting details and species list will be provided at the time of site plan and are subject to review from Town of Knightdale Staff.
- Location and amounts of trees are conceptual in nature and subject to change.

Landscape Buffers

The perimeter Lyndon Oaks contains a Type B Buffer Yard per Town of Knightdale Unified Development Ordinance Chapter 7. Figure 21 shows a typical 100' section of the Type B buffer for Lyndon Oaks.

TYPE B BUFFER YARD STANDARDS (UDO Sec. 7.4.I.3)

Minimum width: 20'

Minimum landscape height/opacity:

- » Ground to 6' — Semi-opaque screen
- » 6' - 30' — Intermittent visual obstruction

Maximum landscape horizontal openings:

- » 5' — Semi-opaque screen
- » 20' — Intermittent visual obstruction

Required plantings:

- » Canopy Trees — 3 per 100 linear feet
- » Understory Trees — 5 per 100 linear feet
- » Shrubs — 20 per 100 linear feet
- » Evergreen vs. deciduous
  - Canopy trees: A minimum of 40% / maximum 60% must be evergreen
  - Understory trees: A minimum of 40% / maximum 60% must be evergreen
  - Shrubs: At least 80% must be evergreen

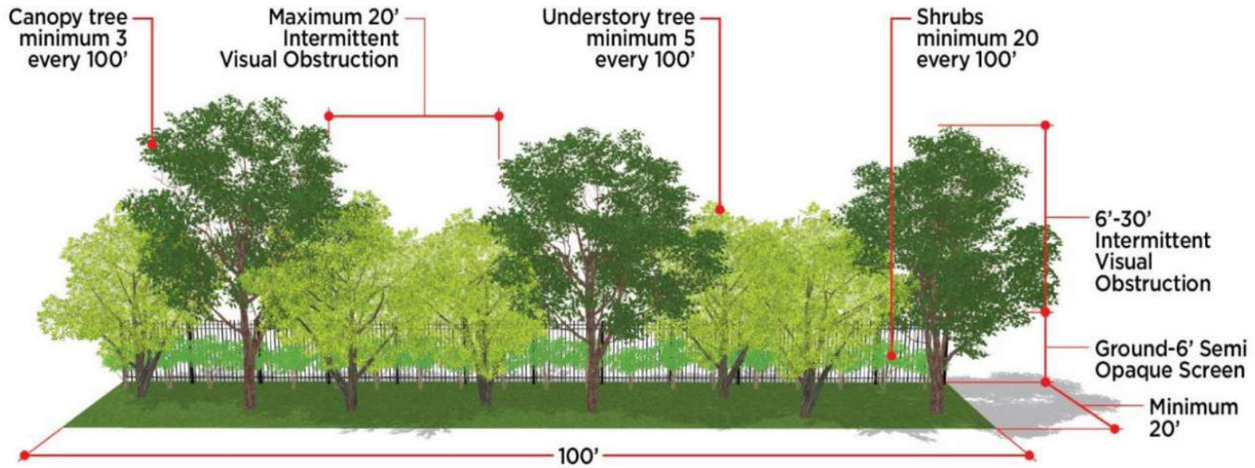


Figure 21: Type B Buffer

The southern property line of Lyndon Oaks contains a Type D Buffer Yard per Town of Knightdale Unified Development Ordinance Chapter 7. Figure 22 shows a typical 100' section of the Type D buffer for Lyndon Oaks.

TYPE D BUFFER YARD STANDARDS (UDO Sec. 7.4.I.5)

Minimum width: 50'

Minimum landscape height/opacity:

- » Ground to 30' — Opaque Screen
- » Ground to 6' — Earthen Berm

Maximum landscape horizontal openings:

- » None permitted

Required plantings:

- » Canopy Trees — 5 per 100 linear feet
- » Understory Trees — 8 per 100 linear feet
- » Shrubs — 35 per 100 linear feet
- » Evergreen vs. deciduous
  - Canopy trees: A minimum of 40% / maximum 60% must be evergreen
  - Understory trees: A minimum of 40% / maximum 60% must be evergreen
  - Shrubs: At least 80% must be evergreen

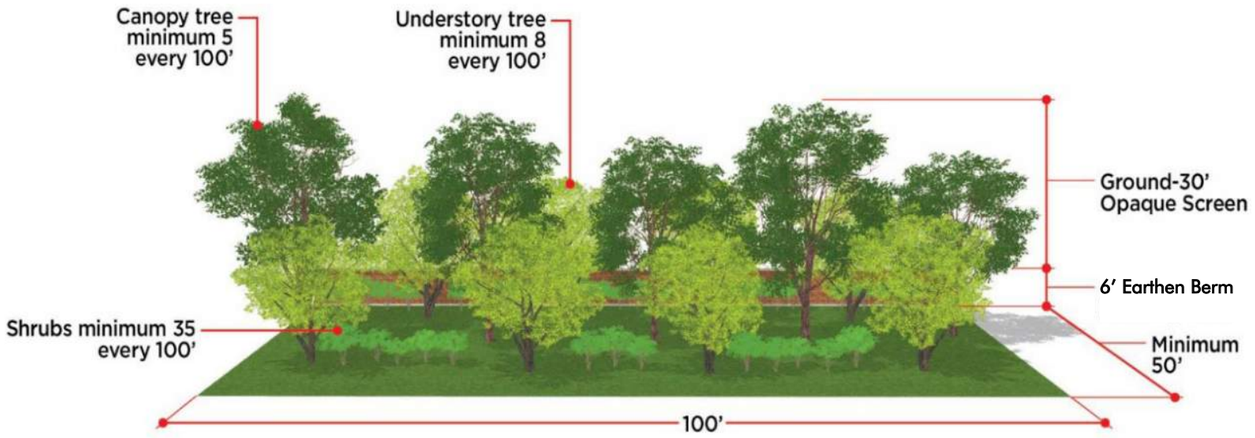


Figure 22: Type D Buffer

08

ARCHITECTURAL DESIGN STANDARDS

Architectural Elevations - Single Family Detached













Note: Elevations shown are conceptual in nature and subject to change.
See page 45 for list of architectural standards.












Architectural Elevations - Single Family Attached (Townhomes)

Elevations shown are conceptual in nature and subject to change. Individual townhome units will be combined into duplexes, triplexes, and quadplexes. (See images in upper middle and upper right.) See page 45 for list of architectural standards.

STANDARDS FOR ALL HOMES

1. All homes will have a combination of two or more of the following materials on the front facade (not including foundation) unless the home is only stone or brick:

   - *stone*
   - *brick*
   - *lap siding*
   - *Shakes*
   - *board and batten*
   - *window pediments*
   - *recessed windows*
   - *side and/or front window box bays*
   - *roof gables*
   - *roof dormers*
   - *roofline cornices*
   - *metal roofing as accent*
   - *column*
   - *shutters*
   - *fiber cement siding*

2. The exterior siding material on the side and rear facades will be fiber cement. When two materials are used, the materials shall be different but complimentary colors.

3. Vinyl is prohibited except for window trim, soffits, fascia, and/or corner boards.

4. Main roof pitches (excluding porches) will be at least 6:12

5. For every 30 feet (or fraction) of continuous side elevation (calculated on a per floor basis), there shall be one window or door added to the side elevations. Any siding break on the side of the home such as a fireplace, side porch, wall offsets could be used as an alternative to windows.

6. Anti-monotony provisions: in order to promote variation in home appearances, no home located adjacent, across the street, or diagonal shall have the same elevation and color combination.

7. All front doors shall have glass inserts, transoms, or glazing.

8. There shall be a minimum 12" overhang on every gable end.

9. Each front entrance shall contain a covered stoop or porch.

10. Foundation shall be raised to a minimum height of 18 inches above finished yard grade in the front and shall contain a minimum of 2 stair risers up to the front porch. Foundations will be wrapped in brick or stone on all sides. Areas under front porches may be enclosed with lattice or other decorative form of screening to match architectural style.

STANDARDS FOR SINGLE-FAMILY DETACHED FRONT-LOADED HOMES

1. Single-family 2 story homes will have a minimum heated area of 1,900 square feet.

2. Single-family 1 or 1.5 story homes will have a minimum heated area of 1,600 square feet.

3. All homes will have a front porch with a minimum depth of 6 feet, which may encroach up to 6 feet in the front setback. Front porch posts will be at least 6"x6".

4. Garages will not protrude more than 6 feet from the front porch stoop, unless an alternative is approved by staff.

5. All garage doors shall contain window inserts and decorative hardware.

6. Garages will not exceed 50% of the front façade width or will be split into two bays.

7. All homes shall have a minimum 100 square foot patio, deck, terrace, or courtyard.

8. A minimum of 33% of homes shall include stone or brick as a front facade material.

Architectural Design Standards (cont.)

STANDARDS FOR SINGLE-FAMILY DETACHED REAR-LOADED HOMES

1. Homes will have a minimum heated area of 1,500 square feet, except up to 50% of rear-loaded single-family detached homes may have a minimum heated area of 800 square feet.

2. All homes will have a front porch with a minimum depth of 5 feet, which may encroach up to 6 feet in the front setback. Front porch posts will be at least 6”x6”.

STANDARDS FOR TOWNHOMES AND DUPLEXES

1. Townhomes shall be at least 2 stories with rear loaded garages and a with a minimum heated area of 1,100 square feet.

2. All townhouse units shall provide detailed design elements using at least one (1) of the features from each of the four categories below:

   a. Entrance

      i. *Recessed entry with 6” minimum width door trim*

      ii. *Covered porch with 6” minimum width pillars/posts/columns*

   b. Building Offset

      i. *Facade offset*

      ii. *Roofline offset*

   c. Roof

      i. *Dormer*

      ii. *Gable*

      iii. *Cupola/Tower/Chimney*

      iv. *Decorative cornice of roof line (flat roof only)*

   d. At least two (2) of the following facade elements:

      v. *Bay window*

      vi. *Balcony*

      vii. *Porch*

      viii. *Shutters*

      ix. *Window trim with 4” minimum width*

      x. *Patterned finish (scales, shakes, wainscoting, brick, or stone)*

3. Townhomes shall have a front porch with a minimum depth of 4 feet.

Development Conditions - Commercial Outparcel

1. Use Standards: The proposed use standards will restrict certain uses otherwise permitted in the RMX zoning district. This will encourage more neighborhood oriented and small businesses to better serve residents.
    - » Businesses with operating hours of 24 hours per day are not permitted.
    - » Vape, Tobacco, and CBD Stores, or businesses that sell these products are not permitted.
    - » The following principal uses shall be the only allowable uses, and shall be permitted by-right:
        - Child/Adult Day Care Center (6 or more people)
        - Personal Services
        - Professional Services
        - Medical Services
        - Neighborhood Retail/Restaurant (2,000 sf or less)
        - Allowed RMX district accessory uses
        - Bar/Tavern/Microbrewery
        - Studio (Arts, dance, martial arts, music)
2. Developer shall stub potable water, sanitary sewer, and storm drainage to commercial outparcel prior to plat recordation.
3. Developer shall construct curb, gutter, and sidewalk improvements along commercial outparcel prior to plat recordation.
4. The commercial outparcel shall not be owned by the Homeowners Association.
5. Developer is responsible for maintaining the commercial outparcel in a manner consistent with Lyndon Oaks Homeowners Association properties, until the commercial property is developed and/or sold by developer.
6. A 10' landscape buffer shall be planted adjacent to residential lots prior to plat recordation.
7. Parking lots shall contain vegetative screening in accordance with Knightdale's UDO.
8. Buildings shall be permitted up to two (2) stories.
9. Buildings shall meet the design standards for mixed-use buildings in UDO Sec 6.8.
10. All infrastructure on the residential portion of the project shall be sized appropriately to accommodate a two story commercial building.
11. Development of the proposed retail outparcel shall be completed within the term of the Development Agreement between the Developer and the Town of Knightdale.
12. Food trucks shall be permitted if a Food Truck Permit has been issued by the Town of Knightdale.
13. Temporary uses, such as seasonal sales, or other temporary uses and special events like farmers' markets, produce stands, or special social events, shall be permitted for up to forty-five (45) days with a zoning compliance permit approved by the Land Use Administrator.

09

SITE DEVELOPMENT ALLOWANCES

Lyndon Oaks - Site Development Allowances

The proposed zoning for Lyndon Oaks is RMX-PUD. Lyndon Oaks meets all standards set forth in the Town of Knightdale's Unified Development Ordinance with the exception of a few conditions. Due to primarily environmental and other site constraints, and in order to provide more landscape conservation and beneficial common open space for an overall better-integrated design, the applicant is requesting the following site development allowances:

Bulk and Dimensional Standards (UDO Sec. 3.4)

- Lot width (street loaded)
  - » In the RMX base district, the minimum required lot width for a street loaded single-family lot is 80', and the minimum lot width for an alley-loaded single-family lot is 30'.
  - » In order to create a variety of housing types and price-points, and a more walkable community, we are proposing single family detached front-loaded homes with lot widths of less than 80', and single family attached alley-loaded homes with lot widths of less than 30'.
- Driveway length
  - » In the RMX base district, the minimum required driveway length is 35' for a residential lot.
  - » For front-loaded residential types, we are proposing a 25' minimum driveway length, and a 20' minimum driveway length for rear-loaded. This is mitigated by ample on-street guest parking, and the proposed driveway lengths allow for homeowners or guests to park a car in the driveways without blocking pedestrian facilities.
- Setbacks
  - » For the House building type, the minimum required rear setback is 25' and the side setbacks can be a minimum of 20% of the lot width (to a minimum of 5' for lots over 60' wide and 3' for lots less than 60' wide).
  - » For front-loaded single family lots, we are proposing a 20' rear minimum setback and 5' minimum side setback, and for a rear-loaded single family lots, we are proposing a 10' rear minimum setback and a 3' side minimum setback, in order to adequately develop all lots within site constraints.

Standard Street Sections (UDO Sec. 10.4.A.1.b & Town Standard Details)

- Local Street Section - Two Way
  - » The standard detail calls for a 54.0' right-of-way, and allows for informal parking.
  - » Lyndon Oaks is proposing on-street parking along sections of road where there are no residential driveways. On street parking will allow for guest parking near units. We are not providing on-street parking on street with front-loaded units to avoid any potential sight triangle conflicts as residents exit their driveways. Trees will be provided on residential lots adjacent to on-street parking and sidepaths at the same planting rate required for street trees.

Proposed Distribution (UDO Sec. 11.1.B)

- Lyndon Oaks is providing residential uses and nonresidential space, and thus has a required distribution of uses listed in Knightdale's UDO Sec. 11.1.B. Lyndon Oaks will meet the required distribution ranges for single-family homes, but will not be providing a multifamily component, and the commercial component, which is not at a planned Neighborhood Node and will likely be small-scale neighborhood-serving commercial or office use(s), is smaller than the minimum 5%. The proposed distribution range for townhomes is also smaller than the minimum of 10%. The proposed use distribution is as follows:
  - » Dwelling - Single Family 25.4%
  - » Dwelling - Townhouse 9.5%
  - » Retail/Restaurant/Entertainment/Office/Service 1.4%

Residential Clearing & Grading (UDO Sec. 9.3.B)

- Lyndon Oaks will require a site development allowance pertaining to Residential Clearing and Grading as specified in Section 9.3.B of the UDO in order to provide more efficient utility infrastructure and effective stormwater design.
  - » Currently, mass grading is prohibited on lots 60' in width or greater.
  - » Lyndon Oaks requests to mass grade 60' and 70' single-family lots (an additional 96 lots, 19.2% of the lots being developed). Any lot 80' in width or greater shall not be mass graded.

Street Section for Neighborhood Streets (UDO Sec. 11.3.B.3.)

- The project places residential development in pods to avoid additional impacts to the site's many streams and wetlands, and the pod at the center of the site is greater than 20 acres and can only be accessed by the street to the west of the Widewaters Parkway roundabout without creating additional undue environmental impacts. Because the street provides access from Widewaters Parkway to a residential area of over 20 acres, UDO 11.3.B.3 would require a Main Street section; however, Lyndon Oaks proposes a modified Local Street Section - Two Way, which is 16' feet narrower than the Main Street section, and will allow for more green space on the site. The proposed modified Local Street Section - Two Way would not require a median, which would cause the residential sections to the north and south of the road to be disconnected and makes pedestrian crossings more difficult. The project does not wish to build a larger street section than what is needed to access this pod of residential development, and that will not be needed to connect to what is planned to be Mixed Density Residential development on the approximately 20 vacant acres to the east on Clifton Road, which is a dead-end road and is not planned to connect over I-87 on the Roadway Network Plan. Thus, this future street connection will likely only serve to connect two residential neighborhoods and will not collect regional trips, so a more neighborhood-friendly, slower street section is more appropriate.

Lyndon Oaks - Site Development Allowances Continued

Rear-Loaded Homes that Front a Public Green with Pedestrian Facilities (UDO Sec. 11.2.C.11)

- In order to provide flexibility for the proposed neighborhood design that includes small groups of rear-loaded townhomes that front passive open space areas with pedestrian facilities to encourage community gathering and use of alternative forms of transportation, Lyndon Oaks requests a site development allowance for open space areas that have a minimum of 34' of frontage on either a public street or alley, rather than 50' of frontage.

Public Alleys for Utilities (UDO Sec. 10.4.A.1.b)

- Lyndon Oaks requests 32' public rights-of-way widths for alleys, as shown in the Master Plan, in order to provide utilities to rear-loaded homes that either front public open space rather than a public right-of-way, or do not directly front a public right-of-way, and alley access provides a more-direct route to connect homes to public utilities (particularly around the Widewaters Parkway roundabout). A wider public alley right-of-way may be approved administratively if 32' is deemed impractical by the Land Use Administrator on the basis of infrastructure or other identified constraints.

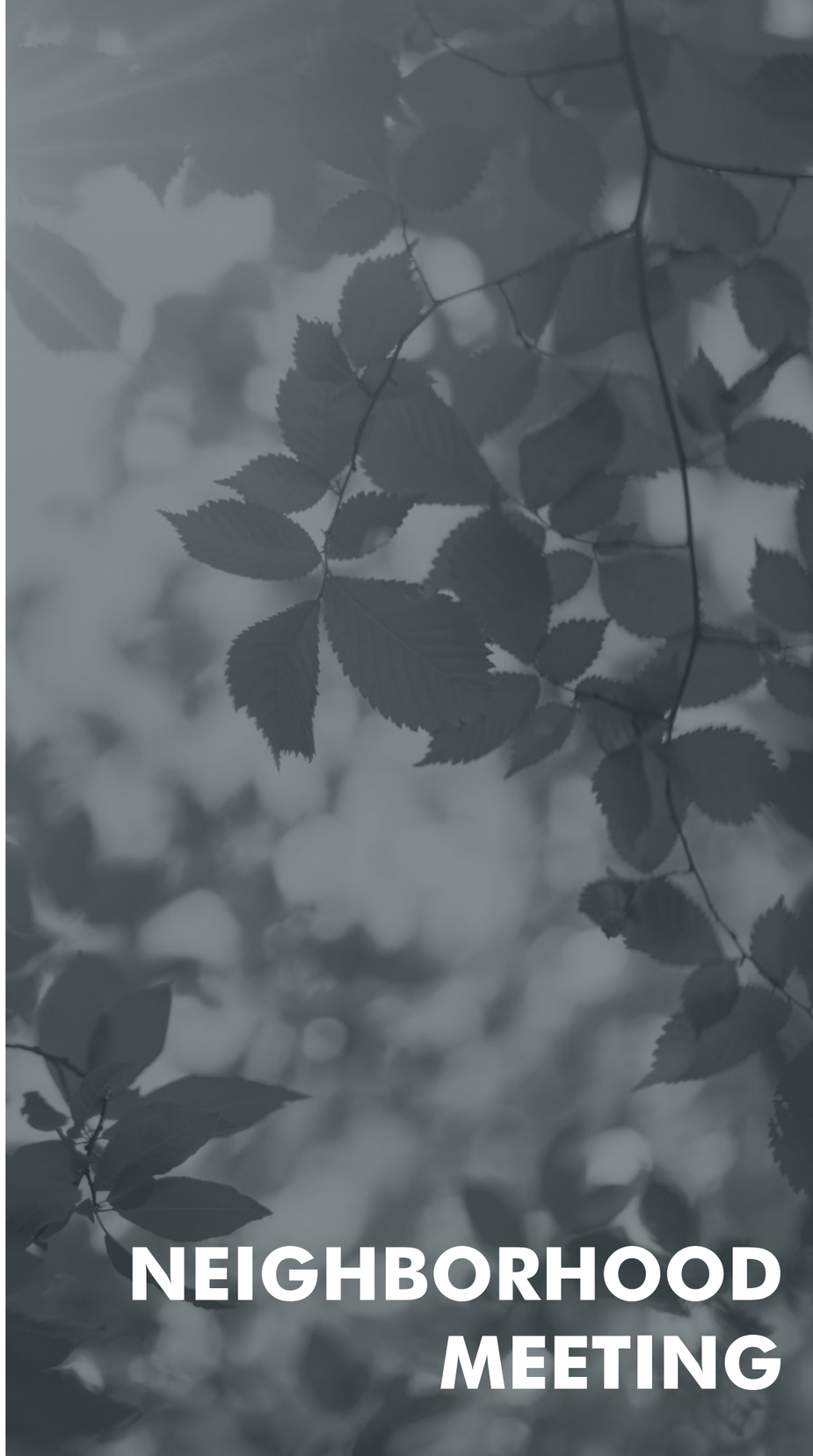
Modified Avenue (currently called Tart Farm Rd) and Widewaters Parkway Intersection Design (UDO 11.3.B.4)

- Lyndon Oaks proposes a four-way stop with traffic calming measures, including high-visibility crosswalks, stamped concrete, Rectangular Rapid Flash Beacons (RRFBs), and pedestrian refuges in the Widewaters Parkway median at the intersection of the Urban Main Street, and Widewaters Parkway. These measures will slow down traffic and ensure pedestrian safety at this intersection, which is very close to the intersection of Widewaters Parkway and the Roadway Network Plan's planned Main Street connection to a future Neighborhood Node at the intersection of Bethlehem and Old Faison Roads, where the development will be providing a roundabout to calm traffic as well.

Active Private Greenways (UDO Sec. 11.2.C.7)

- The Open Space Menu in Figure 11.1 lists "Private Greenways" as a passive open space use and "Public Greenways" as an active open space use. Lyndon Oaks proposes a network of privately-maintained greenways that will be indistinguishable from publicly-maintained greenways. They will have the same design and easement area, and Lyndon Oaks has committed to further activating the private trails by providing benches, dog waste stations, and fitness equipment along the trails. Thus, the proposed private trails provide the same active recreational opportunities for residents (and likely nonresidents) as the public trails, and Lyndon Oaks proposes to count its private trails as an active open space feature.

10



NEIGHBORHOOD MEETING

Meeting Information

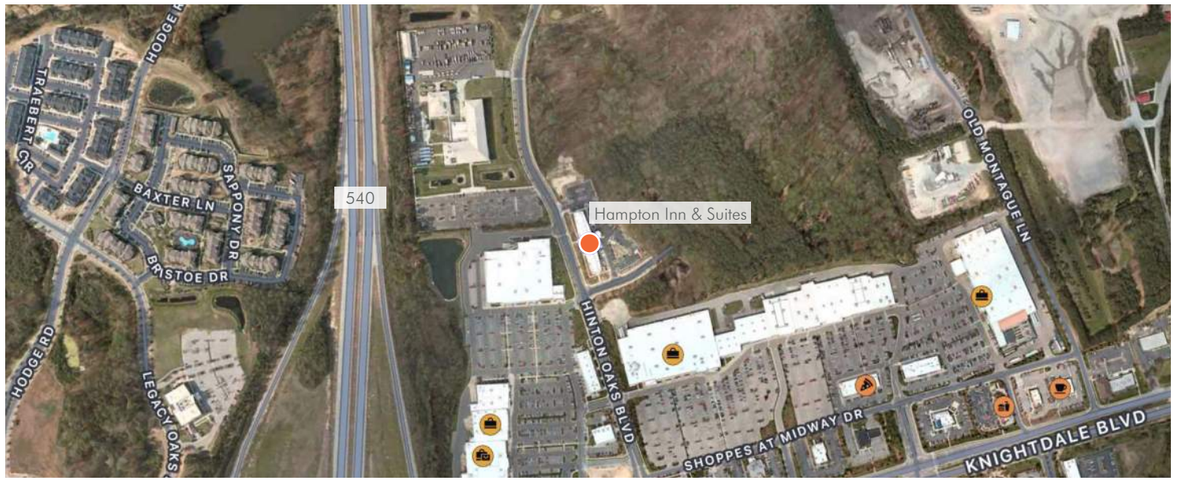


Figure 23: Hampton Inn & Suites Knightdale Vicinity Map (Not to scale)

A neighborhood meeting was held on November 14th, 2023 at 6:00 pm at the Hampton Inn & Suites Knightdale. See Figure 23 for a map of the meeting location. There were approximately 40 neighbors in attendance, along with a member of the development team, four members of the design team, and one Senior Planner from the Town of Knightdale.

Date of meeting:	Tuesday Nov. 14, 2023
Time of meeting:	6:00 pm EST
Meeting address:	Hampton Inn & Suites Knightdale 405 Hinton Oaks Blvd. Knightdale, NC 27545
Developer:	
» DR Horton:	Reese Bridges, PE, Entitlements Manager Cameron Jones
Design consultants:	
» Urban Design Partners:	Brian Richards, PLA
» Ramey Kemp Associates:	Caroline Cheeves, PE
» Parker Poe:	Ashley Honeycutt Terrazas, Land Use Attorney
Town of Knightdale:	Gideon Smith, AICP, Senior Planner

Neighborhood Meeting Questions

At the neighborhood meeting for Lyndon Oaks, the neighbors had questions about stormwater, density, renter vs. owner housing, traffic, number of new children in schools, forced annexation, construction timeline, target price for homes, quality of residents moving, wildlife habitat, and property values. Their questions are as follows:

» Question/Concern #1: Stormwater, Runoff, and Grading
- Applicant clarified that grading is not complete but the goal is for the site to be balanced (no import, no export dirt) but ultimately the site will tie into the grade along the perimeter of the site. Stormwater runoff is state-regulated and cannot be increased on adjacent properties. SCMs are monitored yearly.

» Question/Concern #2: How Is Density Calculated?
- Applicant clarified that density is calculated based on total gross acreage, it does not exclude amenity areas, thus residential density on the site is less than 3 units/acre.

» Question/Concern #3: Renter vs. Owner-Occupied Housing
- Applicant clarified that North Carolina law prohibits regulating occupancy in a zoning ordinance.

» Question/Concern #4: Traffic on Bethlehem Road & Roundabouts Being Dangerous for Large Emergency Vehicles
- Applicant clarified that roundabouts are designed such that emergency vehicles can drive over the center island. Roundabouts are safer because they eliminated left turns which are the most dangerous at an intersection. Knightdale UDO has been prioritizing roundabouts to improve community safety.

» Question/Concern #5: Traffic in General, TIA Process, Intersections Studied
- Applicant's transportation engineer clarified the Traffic Impact Analysis process and highlighted that focus is on weekday peak hours, 7AM-9AM and 4PM-6PM. She clarified that all of the traffic counts and turning movements are taken into account. She listed the intersections that would be studied. She clarified that the goal of TIA is to determine worst-case scenario (maximum trip generation at buildout). Town requires study of roadway network considering compounded growth until 2042. TIA would be submitted with the application.

» Question/Concern #6: Number of New Children in Schools & Strain on Emergency Services
- Applicant clarified information will be submitted to Wake County Public Schools and emergency services.

» Question/Concern #7: Taking Neighbors Land, Forced Annexation
- Applicant clarifies that it is giving land to Knightdale to make roadway improvements. Applicant clarified that roadway improvements will be within the already existing public right of way, but if property needed to be acquired to make an improvement, the Town and NCDOT cannot use eminent domain to take property for a private development. NC law now requires voluntary annexation.

» Question/Concern #8: Timeline of Construction of Development
- Applicant clarified estimated timing: Zoning process through Spring and Summer of 2024; Design drawings (water, sewer, grading, traffic) 12 months later (end of 2024); At least a year to a year and a half to develop the first phase (end of 2025, beginning 2026); begin wrapping up houses at end of 2026; Early 2027 moving first customers into first phase

Neighborhood Meeting Questions (Continued)

» Question/Concern #9: Target Price for the Homes
- Applicant clarified that sizes ranged from 1,500 square feet for townhouses and smaller houses to 3,000+ square feet for single family homes; in today's terms, pricing would range from $200,000 to $600,000+, but could not commit to pricing for future market rates.

» Question/Concern #10: Quality of Residents Moving
- Town is strict about architectural standards, and the plan is to provide a high quality product.

» Question/Concern #11: Wildlife and Native Habitat
- Applicant clarified that natural vegetation will be retained around pond, lake, and streams and there will be a walking trail as a natural amenity onsite and they are doing their homework to develop consistently with the history of the land. Approximately 17 acres of preserved area.

» Question/Concern #12: Decrease in Property Values
- Applicant clarified they have never seen property values decrease due to development with exception of some industrial projects.

Attendance Sheet

Neighborhood Meeting for Lyndon Oaks Planned Unit Development

Hampton Inn & Suites, 405 Hinton Oaks Blvd, Knightdale, NC 27545

Date: November 14, 2023

Name	Address
Karen Palke	121 Meadows Cr Knightdale
Leamon Dixon	107 Shady Circle Knightdale
Eddie Matthews	106 Shady Circle Knightdale
Joyce Liles (Gayle)	4040 Clifton Rd
Tim Ferrell	3033 Churchill Road
Kristin Trent	5309 Crosscut Pl
Don Curtis Jr.	5309 Crosscut Pl
Carole & Kenny Faison	802 Bethlehem Rd Knightdale
Chris Posh	4308 Old Faison Rd Knightdale
Trey Tart	106 Tart Farm Rd Knightdale
EC Tart	4325 Old Faison Rd
Sonya Debnam	4521 Old Faison Rd
Wesley Knapp	919-740-9955 Churchill HOA
Nanay & Gene Zack	133 Meadows Circle Knightdale
Caster Kennemer	
Gwen Gray	4275 Old Faison Rd Knightdale
Don & Doris Curtis	5309 Cross Cut Place Knightdale
Annette Miltz	128 Meadows Circle Knightdale
Trudy Guffey	5101 Woodfield Ln Knightdale
Rhonda Neely	129 Meadows Circle Knightdale
Brian & Kim King	125 Meadows Circle Knightdale
Tim & Denise Jones	132 Meadows Circle Knightdale
Jack & Angela Worden	4407 Omaha Dr. Knightdale
Gerald & Ann Akland	112 Old Ferrell Rd

Name	Address
Kenny Holley	307 Rochelle Dr. Knightdale
Donald Kay	932 Bethlehem Rd Knightdale
Barbara & Dick Sossomon	1124 Poplar Circle Knightdale
Brad Pope	1008 Bethlehem Rd. Knightdale
Carrie Gray	1940 Bethlehem Rd. Raleigh
Michael & Karen Palko	121 Meadows Circle Knightdale
Laurie Pope	116 Bethlehem Rd Knightdale
Sam Maise	203 Robertson St. Knightdale
Patricia Loftin	1044 Stone Eagle Lane Raleigh 27610
Sara Hauser	4228 K Held Rd Knightdale

URBAN DESIGN PARTNERS

LANDSCAPE ARCHITECTURE + CIVIL ENGINEERING

Parker Poe
Attorneys & Counselors at Law

ashleyterrazas@parkerpoe.com
919.835.4043

November 3, 2023

Dear Knightdale Area Property Owner:

You are invited to a neighborhood meeting to learn more about a proposed project adjacent to or near your property. A Neighborhood Meeting is required by the Town of Knightdale Unified Development Ordinance and all property owners within 200 feet of the proposed development must receive notification of the meeting. The meeting will be an opportunity for residents and property owners to learn more about the project and provide feedback. This is the very beginning of the rezoning process prior to submitting an application to the Town. Following this meeting, the next steps include possible revisions to the plan based on comments received, application submittal, a Town Council Joint Public Hearing, a Land Use Review Board meeting, and finally the Town Council decision.

Meeting Date: November 14, 2023 Meeting Time: 6:00 – 7:00 pm

Meeting Location: The Hampton Inn & Suites Knightdale
405 Hinton Oaks Blvd., Knightdale, NC 27545

Application Type: Planned Unit Development rezoning

Approving Authority: Town Council Legislative Approval

Address/PIN: 0 Bethlehem Road (PIN 1743953683)
940 Bethlehem Road (PIN 1753152116)
0 Old Faison Road (PIN 1743971085)
0 Old Faison Road (PIN 1753071583)
4313 Old Faison Road (PIN 1743989384)
4325 Old Faison Road (PIN 1743986356)
106 Old Tart Farm Road (PIN 1743976575)

Description of Proposal: The applicant is requesting to rezone 7 parcels of land in order to build a primarily residential community with a small amount of neighborhood-serving commercial space. The land is currently zoned Rural Transition (RT) and is proposed to be rezoned to General Residential Low Density (GR3) or Medium Density (GR8) and Residential Mixed Use (RMX) or Neighborhood Mixed Use (NMX), with a Planned Unit Development overlay (PUD). The proposed uses are front and rear-loaded single-family detached homes, duplexes, townhomes, and commercial uses.

Estimated Submittal Date: November 27, 2023

Enclosed is a map showing the location of the property being considered for this proposal. Additional materials and information may be available at the meeting. Please see the Development Services 2023 Meeting and Submittal Schedule for future public meetings dates

Parker Poe
Attorneys & Counselors at Law

ashleyterrazas@parkerpoe.com
919.835.4043

(https://www.knightdalenc.gov/sites/default/files/uploads/DevelopmentServices/submittal_and_meeting_schedule_2023.pdf).

If you have any questions, comments, or concerns about the proposal prior to the meeting you may contact me at (919) 835-4043 or via email at ashleyterrazas@parkerpoe.com. These will be recorded as part of the meeting summary, which is submitted to Town staff and elected officials. You may also contact the Town of Knightdale Development Services Department at (919) 217-2243.

Thank you,

Ashley Honeycutt Terrazas

Cc: Town of Knightdale Development Services Department

Parker Poe
Attorneys & Counselors at Law

ashleyterrazas@parkerpoe.com
919.835.4043

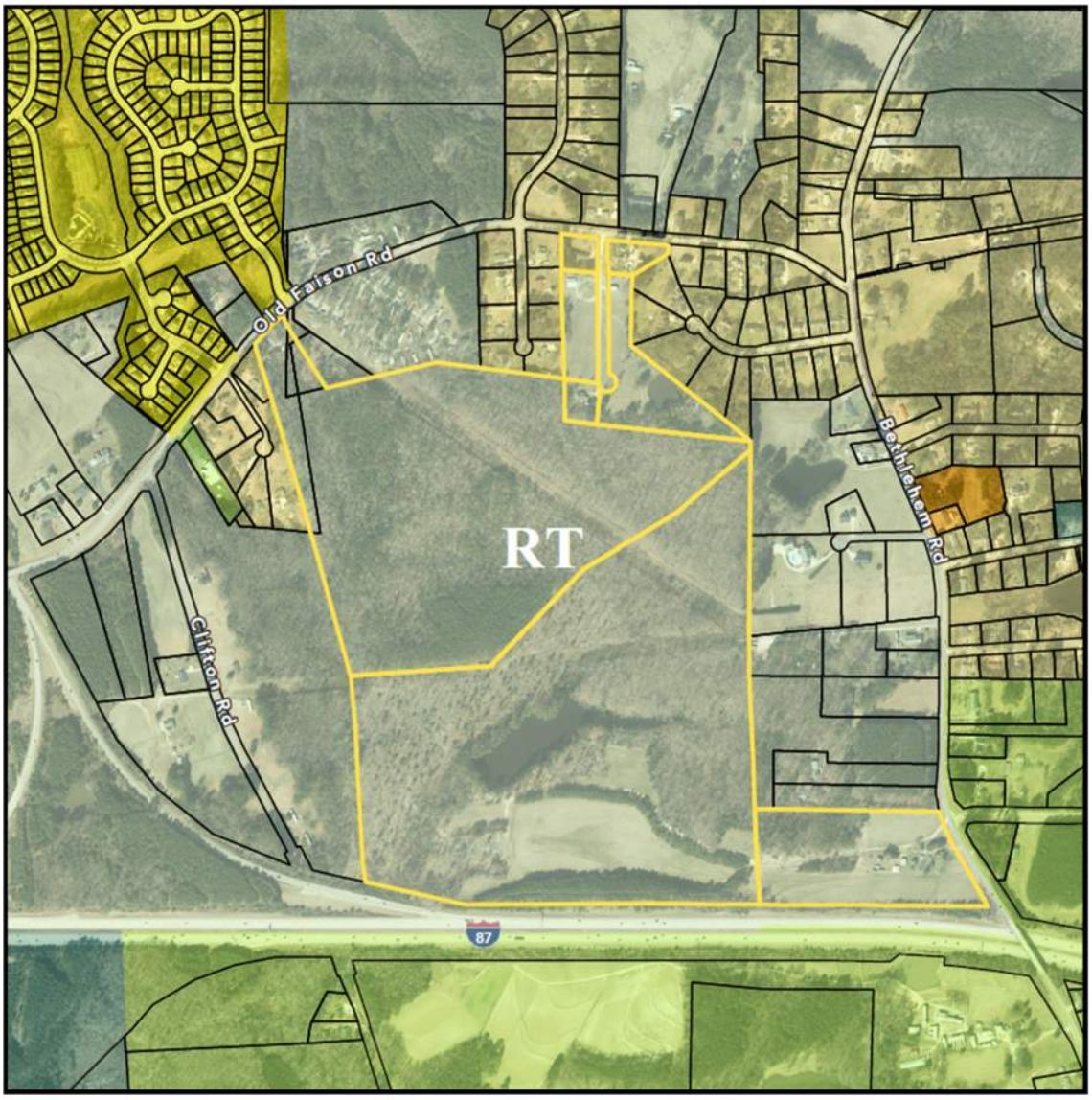
Meeting Agenda

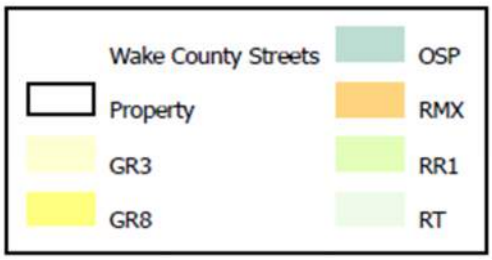
1. Applicant presentation: applicant will describe the nature of this rezoning request.

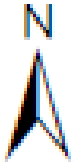
2. Public questions: applicant will field any questions from the public.

ashleyterrazas@parkerpoe.com
919.835.4043

Vicinity Map w/ Current Knightdale Zoning

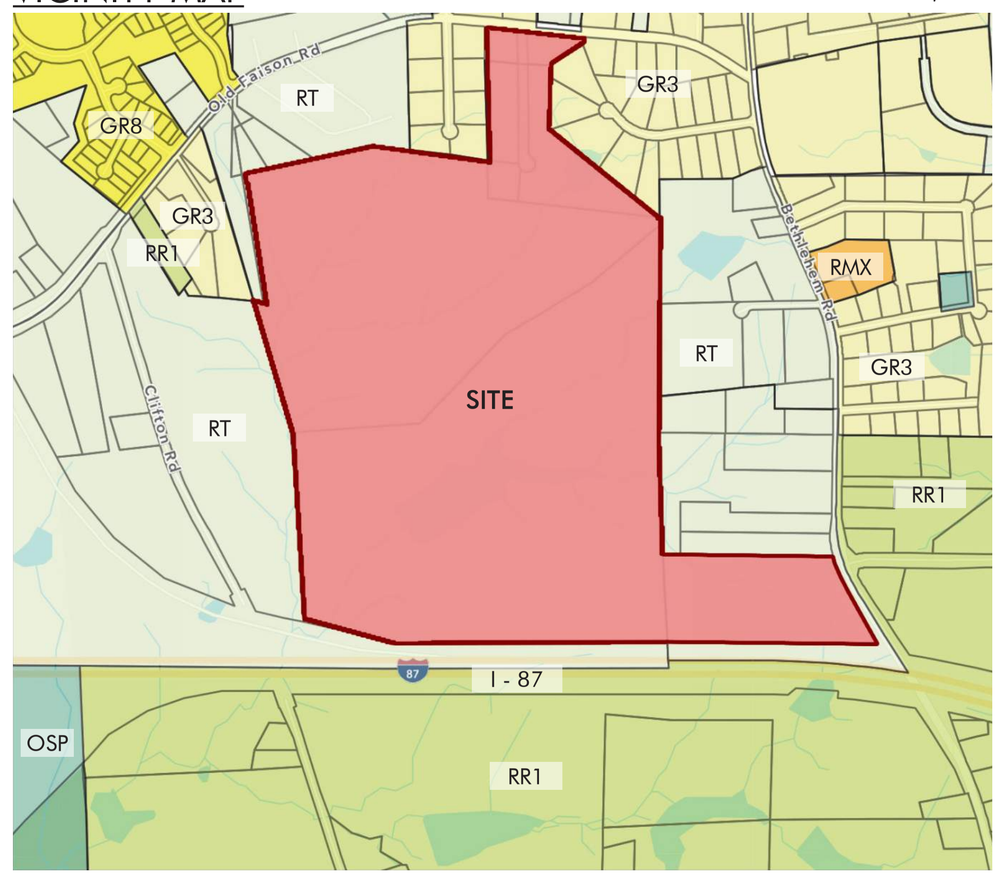






VICINITY MAP

1" = 1,600'



NOTES

1. THIS PLAN IS CONCEPTUAL IN NATURE AND IS SUBJECT TO CHANGE.
2. THIS EXHIBIT WAS PREPARED USING AVAILABLE RECORD INFORMATION, ALTA SURVEY, GIS MAPS, RECORD PLANS, AERIAL IMAGERY, AND LAND RECORDS.
3. THIS PLAN WILL BE SUBJECT TO REVIEW AND APPROVAL BY LOCAL AND STATE PLANNING AND ENGINEERING REVIEW AGENCIES.
4. THE WORK OF THIS PRODUCT IS THE PROPERTY OF URBAN DESIGN PARTNERS, PLLC. NO USE OR REPRODUCTION OF THIS PLAN IS PERMITTED WITHOUT WRITTEN AUTHORIZATION FROM URBAN DESIGN PARTNERS, PLLC.

SITE DATA

ACRES:	± 171.88 AC TOTAL	
PIN:	1753-15-2116, 1743-97-1085, 1743-98-9384, 1743-97-6575	1743-95-3683, 1743-98-6356, 1753-07-1583,
EXISTING ZONING:	RT	
PROPOSED ZONING:	PUD	
BASE DISTRICT:	G	

DEVELOPMENT SUMMARY

COMMERCIAL:	**± 15,000 SF**
RESIDENTIAL:	
FRONT-LOADED (SINGLE FAM. DETACHED)	
60' LOTS	75 DU (15.0%)
70' LOTS	33 DU (6.6%)
80' LOTS	26 DU (5.2%)
REAR-LOADED (SINGLE FAM. DETACHED)	
30' LOTS	77 DU (15.4%)
35' LOTS	47 DU (9.4%)
40' LOTS	50 DU (10.0%)
TOWNHOMES (REAR-LOADED)	
20' UNITS	84 DU (16.8%)
22' UNITS	88 DU (17.6%)
24' UNITS	20 DU (4.0%)
TOTAL:	**500 DU**

REQ. PARKING (MINIMUM):

• SINGLE FAMILY	616 SPACES
• TOWNHOMES	384 SPACES
• COMMERCIAL	53 SPACES
» *EV*	*2 SPACES*
» *BICYCLE*	*2 SPACES*

REQ. OPEN SPACE: ± 20.9 AC

500 DU x 3.5 BEDS = 1,750 BEDS

1,750 BEDS x 520sf = 910,000sf (20.9 AC)

URBAN DESIGN PARTNERS

LYNDON OAKS | SKETCH PLAN

KNIGHTDALE, NC

0 200 400

OCTOBER 13, 2023

22-RDU-083

150 Fayetteville St. Suite 1310 Raleigh, NC 27601 | urbandesignpartners.com | 919.275.5002

KNIGHTDALE development services

Town of Knightdale | 950 Steeple Square Ct. | Knightdale, NC 27545
KnightdaleNC.gov | 919-217-2241

Project Contact Information

Project Name: Lyndon Oaks Proposed Zoning: PUD

Location: See attached addendum.

Property PIN(s): See attached addendum. Acreage/Square Feet: See attached addendum.

Property Owner: See attached addendum.

Address: See attached addendum

City: State: Zip:

Phone: Email:

Developer: D.R. Horton

Address: 7208 Falls of Neuse Road, Suite 201

City: Raleigh State: NC Zip: 27615

Phone: (984) 247-9614 Email: trbridges@drhorton.com

Engineer: Urban Design Partners

Address: 150 Fayetteville Street, Suite 1310

City: Raleigh State: NC Zip: 27601

Phone: (919) 275-5002 Email:

Builder (if known): Same as Developer

Address:

City: State: Zip:

Phone: Email:

Lyndon Oaks
Ownership Addendum

Owner Information

Parcel 1

Site Address:	0 Bethlehem Road
Pin:	1743953683
Deed Reference (book/page):	15657/540
Acreage:	81.31 ac
Owner:	Terry Lance Ferrell, Randall Hutchins Ferrell, and Timothy Clarence Ferrell
Owner Address:	26 Saint Julians Court, Pawleys Island, SC 29585-6309

Parcel 2

Site Address:	940 Bethlehem Road
Pin:	1753152116
Deed Reference (book/page):	15657/540
Acreage:	14.18 ac
Owner:	Terry Lance Ferrell, Randall Hutchins Ferrell, and Timothy Clarence Ferrell
Owner Address:	26 Saint Julians Court, Pawleys Island, SC 29585-6309

Parcel 3

Site Address:	0 Old Faison Road
Pin:	1743971085
Deed Reference (book/page):	6075/504
Acreage:	65.43 ac
Owner:	Wayne L. Harper and Eugene J. Harper
Owner Address:	4113 Brewster Drive, Raleigh, NC 7606-1711

Parcel 4

Site Address:	0 Old Faison Road
Pin:	1753071583
Deed Reference (book/page):	(Not Listed)
Acreage:	8.83 ac
Owner:	Deborah Jane Tart and Melton E. Tart, Jr.
Owner Address:	4325 Old Faison Road, Knightdale, NC 27545-9179

Parcel 5

Site Address:	4313 Old Faison Road
Pin:	1743989384
Deed Reference (book/page):	15474/755
Acreage:	1.08 ac
Owner:	Lee T. Alford
Owner Address:	4313 Old Faison Road, Knightdale, NC 27545-9179

Parcel 6

Site Address:	4325 Old Faison Road
Pin:	1743986356
Deed Reference (book/page):	2253/285
Acreage:	1.05 ac
Owner:	Milton E. Tart, Jr. and Patsy P .Tart
Owner Address:	4325 Old Faison Road, Knightdale, NC 27545-9179

Parcel 7

Site Address:	106 Tart Farm Road
Pin:	1743976575
Deed Reference (book/page):	9018/621
Acreage:	1.0 ac
Owner:	Milton Edward Tart, III and Janet Stanley Tart
Owner Address:	106 Tart Farm Road, Knightdale, NC 27545-8134

KNIGHTDALE development services

Town of Knightdale | 950 Steeple Square Ct. | Knightdale, NC 27545
KnightdaleNC.gov | 919-217-2241

Neighborhood Meeting Guidelines

Neighborhood Meetings are a required step within the rezoning process. The standards for Neighborhood Meetings can be found in UDO Section 12.2.C.3. Neighborhood Meetings may be held in-person or virtually.

Why are Neighborhood Meetings required?

UDO Section 12.2.C.3 requires a Neighborhood Meeting prior to the submittal of any Zoning Map Amendment or Special Use Permit. The goal is to solicit feedback from neighboring residents to assist in bettering the proposal prior to the required public hearing. Applications for proposals must be submitted within six (6) months of the meeting (Sec 12.2.C.3.a); failure to submit within this time will require a subsequent meeting.

Roles and Responsibilities

All stakeholders will be given the opportunity to speak and provide constructive comments, ask clarifying questions, and make realistic suggestions to contribute to the development of Knightdale. The conversation should remain respectful; disruptive behavior will not be allowed. The roles of all participants are defined below.

- Staff Liaison – Development Services Staff Member
  - Listens to and records comments/questions
  - Answers process and ordinance related question

- Developer – Applicant and Development Team
  - Presents the project accurately
  - Listens to and records comments/questions
  - Answers general questions

- Community – Residents, Property Owners, Business Owners
  - Receives project details
  - Asks productive questions
  - Provides practical comments

Index	Property Address	Owner	Mailing Address 1	Mailing Address 2
2	105 SHADY CIR	ROHRER, JOSEPH W MASON, CHELSEA	105 SHADY CIR	KNIGHTDALE NC 27545-9703
3	121 MEADOWS CIR	PALKO, MICHAEL E PALKO, KAREN	121 MEADOWS CIR	KNIGHTDALE NC 27545-9301
4	4513 OLD FAISON RD	VANDYKE, LANCE R VANDYKE, JACQUELINE	4513 OLD FAISON RD	KNIGHTDALE NC 27545-9183
5	106 TART FARM RD	TART, MILTON EDWARD III TART, JANET STANLEY	106 TART FARM RD	KNIGHTDALE NC 27545-8134
6	929 BETHLEHEM RD	LEE, JACKIE L	PO BOX 362	KNIGHTDALE NC 27545-0362
7	4272 OLD FAISON RD	KNIGHTDALE CHURCH OF GOD	4272 OLD FAISON RD	KNIGHTDALE NC 27545-8708
8	4505 OLD FAISON RD	L&L TREE AND TURF FARMS LLC	5 BETHLEHEM CHURCH RD	YOUNGSVILLE NC 27596-8175
10	103 SHADY CIR	GALLEGOS, MELISSA K LOPEZ, FIDEL GALLEGOS	103 SHADY CIR	KNIGHTDALE NC 27545-9703
11	101 SHADY CIR	LUCAS, SYLVIA B	101 SHADY CIR	KNIGHTDALE NC 27545-9703
12	1121 QUIET WAY	SOLIZ-RUBIO, ARTURO SOLIZ, CLAUDIA	1121 QUIET WAY	KNIGHTDALE NC 27545-8121
14	932 BETHLEHEM RD	KAY, DONALD W KAY, JUDY S	932 BETHLEHEM RD	KNIGHTDALE NC 27545-9318
15	4325 OLD FAISON RD	TART, MILTON E JR TART, PATSY P	4325 OLD FAISON RD	KNIGHTDALE NC 27545-9179
16	940 BETHLEHEM RD	FERRELL, TERRY LANCE FERRELL, RANDALL HUTCHINS	26 SAINT JULIANS CT	PAWLEYS ISLAND SC 29585-6309
18	4313 OLD FAISON RD	ALFORD, LEE T	4313 OLD FAISON RD	KNIGHTDALE NC 27545-9179
19	0 OLD FAISON RD	HARPER, WAYNE L HARPER, EUGENE J	4113 BREWSTER DR	RALEIGH NC 27606-1711
20	106 SHADY CIR	MATTHEWS, EDDIE M	106 SHADY CIR	KNIGHTDALE NC 27545-9703
21	117 MEADOWS CIR	SALTER, DONALD A SALTER, JEANNIE GUTHRIE	117 MEADOWS CIR	KNIGHTDALE NC 27545-9301
22	107 SHADY CIR	DIXON, LEAMON	107 SHADY CIR	KNIGHTDALE NC 27545-9703
23	104 SHADY CIR	WALSTON, WALLACE R WALSTON, KATIE K	104 SHADY CIR	KNIGHTDALE NC 27545-9703
24	125 MEADOWS CIR	KING, BRIAN J JR KING, KIMBERLY L	125 MEADOWS CIR	KNIGHTDALE NC 27545-9301
25	129 MEADOWS CIR	NEELY, MIKE NEELY, RHONDA	129 MEADOWS CIR	KNIGHTDALE NC 27545-9301
26	132 MEADOWS CIR	JONES, J TIMOTHY JONES, DENISE W	132 MEADOWS CIR	KNIGHTDALE NC 27545-9301
27	4275 OLD FAISON RD	GRAY, GWENDOLYN SMITH	4275 OLD FAISON RD	KNIGHTDALE NC 27545-8709
28	128 MEADOWS CIR	MILTZ, THOMAS W MILTZ, ANNETTE S	128 MEADOWS CIR	KNIGHTDALE NC 27545-9301
29	919 BETHLEHEM RD	DAVIS, NEDRA M	919 BETHLEHEM RD	KNIGHTDALE NC 27545-9319
30	115 TAYLORS FARM CT	MITCHELL, CHARLES W MITCHELL, LISA F	115 TAYLORS FARM CT	KNIGHTDALE NC 27545-7480
31	5004 WOODFIELD LN	BROOME, WILLIAM C BROOME, ELIZABETH B	5004 WOODFIELD LN	KNIGHTDALE NC 27545-9101
32	800 BETHLEHEM RD	FAISON, KENNETH JAMES	802 BETHLEHEM RD	KNIGHTDALE NC 27545-9316
33	909 BETHLEHEM RD	KNAPP, WESLEY	909 BETHLEHEM RD	KNIGHTDALE NC 27545-9319
34	4308 OLD FAISON RD	POOLE, CHRISTOPHER ROBERT	5121 POOLE COUNTRY LN	KNIGHTDALE NC 27545-8707
37	4100 CLIFTON RD	LILES, JOYCE C	4040 CLIFTON RD	KNIGHTDALE NC 27545-9120
38	4259 OLD FAISON RD	AMONETTE, JACOB	4259 OLD FAISON RD	KNIGHTDALE NC 27545-8709
39	4264 OLD FAISON RD	SEARS, WANDA W	4264 OLD FAISON RD	KNIGHTDALE NC 27545-8708
40	1016 OLD FERRELL RD	LEE, CATHERINE N	PO BOX 362	KNIGHTDALE NC 27545-0362
41	4521 OLD FAISON RD	DEBNAM, SONYA LEVON	4521 OLD FAISON RD	KNIGHTDALE NC 27545-9183
42	4316 OLD FAISON RD	BROWN, CAROLYN PRICE	4316 OLD FAISON RD	KNIGHTDALE NC 27545-9178
44	133 MEADOWS CIR	ZACK, EUGENE M ZACK, NANCY A	133 MEADOWS CIR	KNIGHTDALE NC 27545-9301

Parker Poe
Attorneys & Counselors at Law

ashleyterrazas@parkerpoe.com
919.835.4043

March 22, 2024

Dear Knightdale Area Property Owner:

You are invited to a second neighborhood meeting to learn more about a pending project adjacent to or near your property. This is a voluntary meeting and will be an opportunity for the applicant to provide nearby residents and property owners updates and information about the case, and give them a chance to provide additional feedback. Following this meeting, the next steps include possible revisions to the plan based on comments received, a Town Council Joint Public Hearing, a Land Use Review Board meeting, and finally the Town Council decision.

Meeting Date: April 4, 2024

Meeting Time: 7:00 – 8:00 pm

Meeting Location: The Knightdale Recreation Center
101 Lawson Ridge Road, Knightdale, NC 27545

Application Type: Planned Unit Development rezoning

Approving Authority: Town Council Legislative Approval

Address/PIN: 0 Bethlehem Road (PIN 1743953683)
940 Bethlehem Road (PIN 1753152116)
0 Old Faison Road (PIN 1743971085)
0 Old Faison Road (PIN 1753071583)
4313 Old Faison Road (PIN 1743989384)
4325 Old Faison Road (PIN 1743986356)
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Description of Proposal: The applicant is requesting to rezone 7 parcels of land in order to build a primarily residential community with a small amount of neighborhood-serving commercial space. The land is currently zoned Rural Transition (RT) and is proposed to be rezoned to Residential Mixed Use (RMX) with a Planned Unit Development overlay (PUD). The proposed uses are front and rear-loaded single-family detached homes, duplexes, townhomes, and +\- 15,000 square feet commercial uses.

Submittal Date: Application was submitted on November 27, 2023

Enclosed is a map showing the location of the property being considered for this proposal. Additional materials and information may be available at the meeting. Please see the Development Services 2023 Meeting and Submittal Schedule for future public meetings dates (https://www.knightdalenc.gov/sites/default/files/uploads/DevelopmentServices/submittal_and_meeting_schedule_2023.pdf).

Parker Poe
Attorneys & Counselors at Law

ashleyterrazas@parkerpoe.com
919.835.4043

If you have any questions, comments, or concerns about the proposal prior to the meeting you may contact me at (919) 835-4043 or via email at ashleyterrazas@parkerpoe.com. These will be recorded as part of the meeting summary, which is submitted to Town staff and elected officials. You may also contact the Town of Knightdale Development Services Department at (919) 217-2243.

Thank you,

Ashley Honeycutt Terrazas

Cc: Town of Knightdale Development Services Department

Parker Poe
Attorneys & Counselors at Law

ashleyterrazas@parkerpoe.com
919.835.4043

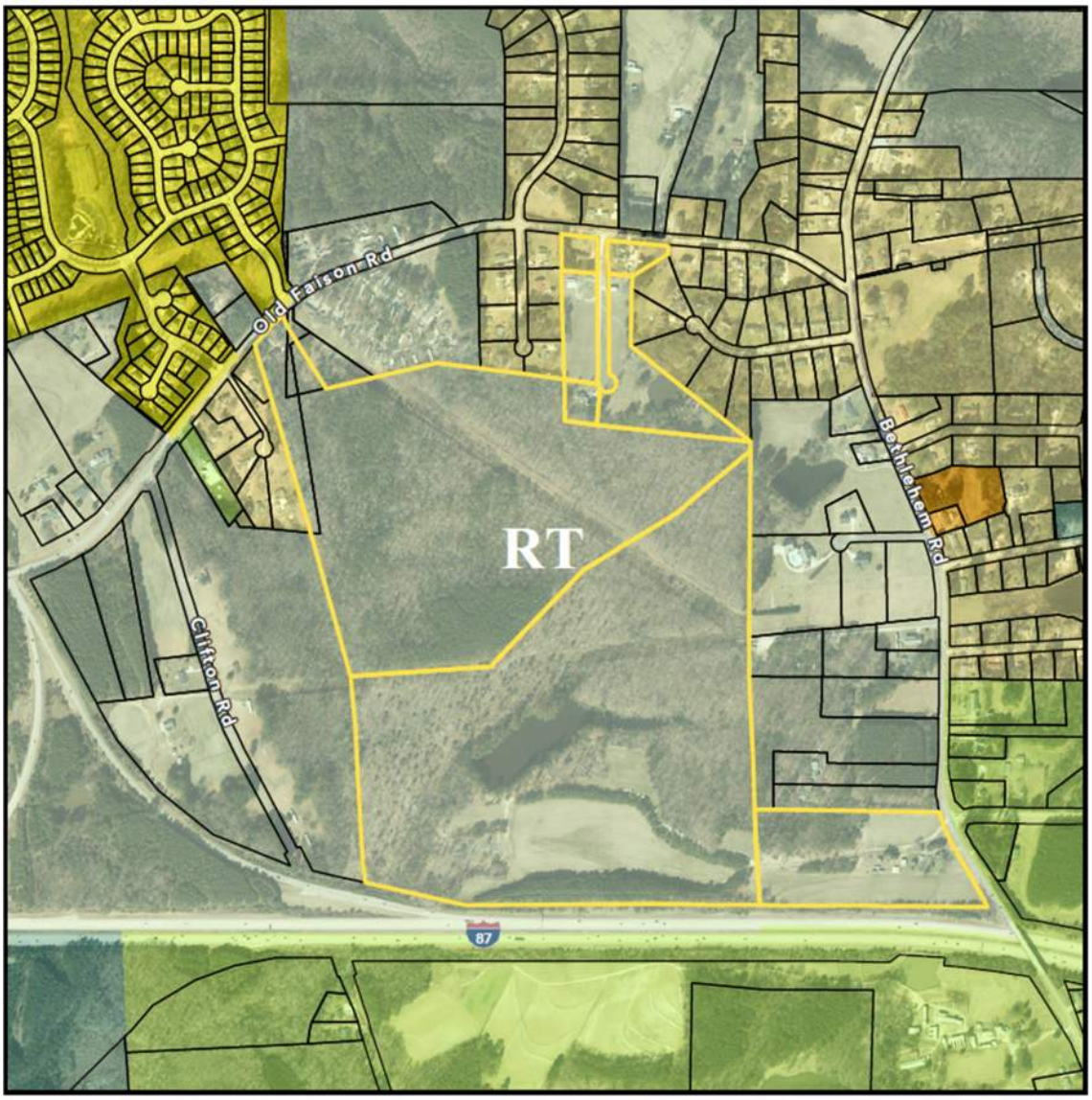
Meeting Agenda

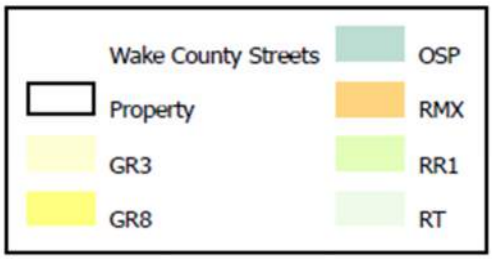
1. Applicant presentation: applicant will describe the nature of this rezoning request.

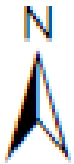
2. Public questions: applicant will field any questions from the public.

ashleyterrazas@parkerpoe.com
919.835.4043

Vicinity Map w/ Current Knightdale Zoning







LYNDON OAKS

MASTER PLAN

KNIGHTDALE, NC

URBAN DESIGN PARTNERS

SITE DATA

» ACRES:	± 171.88 AC TOTAL
» PINS:	1753-15-2116; 1743-95-3683; 1743-97-1085; 1743-98-6356; 1743-98-9384; 1753-07-1583; 1743-97-6575
» EXISTING ZONING:	RT
» PROPOSED ZONING:	RMX-PUD

DEVELOPMENT SUMMARY

COMMERCIAL: **± 15,000 SF**

RESIDENTIAL:

FRONT LOADED (SINGLE FAM. DETACHED)

60' LOTS	71 DU
70' LOTS	25 DU
80' LOTS	11 DU

REAR LOADED (SINGLE FAM. DETACHED)

30' LOTS	71 DU
35' LOTS	53 DU
40' LOTS	49 DU

TOWNHOMES (REAR LOADED)

20' UNITS	96 DU
22' UNITS	106 DU
24' DUPLEX UNITS	18 DU

TOTAL: **500 DU**

REQ. PARKING (MINIMUM):

SINGLE FAMILY:	840 SPACES
TOWNHOMES:	660 SPACES
COMMERCIAL:	27 SPACES
• EV	*2 SPACES*
• BICYCLE	*3 SPACES*

NOTES:
1. THIS PLAN IS CONCEPTUAL IN NATURE AND IS SUBJECT TO CHANGE.
2. THIS EXHIBIT WAS PREPARED USING AVAILABLE RECORD INFORMATION, ALTA SURVEY, GIS MAPS, RECORD PLANS, AERIAL IMAGERY, AND LAND RECORDS.
3. THIS PLAN WILL BE SUBJECT TO REVIEW AND APPROVAL BY LOCAL AND STATE PLANNING AND ENGINEERING REVIEW AGENCIES.
4. THE WORK OF THIS PRODUCT IS THE PROPERTY OF URBAN DESIGN PARTNERS, PLLC. NO USE OR REPRODUCTION OF THIS PLAN IS PERMITTED WITHOUT WRITTEN AUTHORIZATION FROM URBAN DESIGN PARTNERS, PLLC.

0 100 200

MARCH 11, 2024

22-RDU-083

150 Fayetteville St. Suite 1310 Raleigh, NC 27601 | urbandesignpartners.com | 919.275.5002

KNIGHTDALE development services

Town of Knightdale | 950 Steeple Square Ct. | Knightdale, NC 27545
KnightdaleNC.gov | 919-217-2241

Project Contact Information

Project Name: Lyndon Oaks Proposed Zoning: PUD

Location: See attached addendum.

Property PIN(s): See attached addendum. Acreage/Square Feet: See attached addendum.

Property Owner: See attached addendum.

Address: See attached addendum

City: State: Zip:

Phone: Email:

Developer: D.R. Horton

Address: 7208 Falls of Neuse Road, Suite 201

City: Raleigh State: NC Zip: 27615

Phone: (984) 247-9614 Email: trbridges@drhorton.com

Engineer: Urban Design Partners

Address: 150 Fayetteville Street, Suite 1310

City: Raleigh State: NC Zip: 27601

Phone: (919) 275-5002 Email:

Builder (if known): Same as Developer

Address:

City: State: Zip:

Phone: Email:

Lyndon Oaks
Ownership Addendum

Owner Information

Parcel 1

Site Address:	0 Bethlehem Road
Pin:	1743953683
Deed Reference (book/page):	15657/540
Acreage:	81.31 ac
Owner:	Terry Lance Ferrell, Randall Hutchins Ferrell, and Timothy Clarence Ferrell
Owner Address:	26 Saint Julians Court, Pawleys Island, SC 29585-6309

Parcel 2

Site Address:	940 Bethlehem Road
Pin:	1753152116
Deed Reference (book/page):	15657/540
Acreage:	14.18 ac
Owner:	Terry Lance Ferrell, Randall Hutchins Ferrell, and Timothy Clarence Ferrell
Owner Address:	26 Saint Julians Court, Pawleys Island, SC 29585-6309

Parcel 3

Site Address:	0 Old Faison Road
Pin:	1743971085
Deed Reference (book/page):	6075/504
Acreage:	65.43 ac
Owner:	Wayne L. Harper and Eugene J. Harper
Owner Address:	4113 Brewster Drive, Raleigh, NC 7606-1711

Parcel 4

Site Address:	0 Old Faison Road
Pin:	1753071583
Deed Reference (book/page):	(Not Listed)
Acreage:	8.83 ac
Owner:	Deborah Jane Tart and Melton E. Tart, Jr.
Owner Address:	4325 Old Faison Road, Knightdale, NC 27545-9179

Parcel 5

Site Address:	4313 Old Faison Road
Pin:	1743989384
Deed Reference (book/page):	15474/755
Acreage:	1.08 ac
Owner:	Lee T. Alford
Owner Address:	4313 Old Faison Road, Knightdale, NC 27545-9179

Parcel 6

Site Address:	4325 Old Faison Road
Pin:	1743986356
Deed Reference (book/page):	2253/285
Acreage:	1.05 ac
Owner:	Milton E. Tart, Jr. and Patsy P .Tart
Owner Address:	4325 Old Faison Road, Knightdale, NC 27545-9179

Parcel 7

Site Address:	106 Tart Farm Road
Pin:	1743976575
Deed Reference (book/page):	9018/621
Acreage:	1.0 ac
Owner:	Milton Edward Tart, III and Janet Stanley Tart
Owner Address:	106 Tart Farm Road, Knightdale, NC 27545-8134

KNIGHTDALE development services

Town of Knightdale | 950 Steeple Square Ct. | Knightdale, NC 27545
KnightdaleNC.gov | 919-217-2241

Neighborhood Meeting Guidelines

Neighborhood Meetings are a required step within the rezoning process. The standards for Neighborhood Meetings can be found in UDO Section 12.2.C.3. Neighborhood Meetings may be held in-person or virtually.

Why are Neighborhood Meetings required?

UDO Section 12.2.C.3 requires a Neighborhood Meeting prior to the submittal of any Zoning Map Amendment or Special Use Permit. The goal is to solicit feedback from neighboring residents to assist in bettering the proposal prior to the required public hearing. Applications for proposals must be submitted within six (6) months of the meeting (Sec 12.2.C.3.a); failure to submit within this time will require a subsequent meeting.

Roles and Responsibilities

All stakeholders will be given the opportunity to speak and provide constructive comments, ask clarifying questions, and make realistic suggestions to contribute to the development of Knightdale. The conversation should remain respectful; disruptive behavior will not be allowed. The roles of all participants are defined below.

- Staff Liaison – Development Services Staff Member
  - Listens to and records comments/questions
  - Answers process and ordinance related question

- Developer – Applicant and Development Team
  - Presents the project accurately
  - Listens to and records comments/questions
  - Answers general questions

- Community – Residents, Property Owners, Business Owners
  - Receives project details
  - Asks productive questions
  - Provides practical comments

Index	Property Address	Owner	Mailing Address 1	Mailing Address 2
2	105 SHADY CIR	ROHRER, JOSEPH W MASON, CHELSEA	105 SHADY CIR	KNIGHTDALE NC 27545-9703
3	121 MEADOWS CIR	PALKO, MICHAEL E PALKO, KAREN	121 MEADOWS CIR	KNIGHTDALE NC 27545-9301
4	4513 OLD FAISON RD	VANDYKE, LANCE R VANDYKE, JACQUELINE	4513 OLD FAISON RD	KNIGHTDALE NC 27545-9183
5	106 TART FARM RD	TART, MILTON EDWARD III TART, JANET STANLEY	106 TART FARM RD	KNIGHTDALE NC 27545-8134
6	929 BETHLEHEM RD	LEE, JACKIE L	PO BOX 362	KNIGHTDALE NC 27545-0362
7	4272 OLD FAISON RD	KNIGHTDALE CHURCH OF GOD	4272 OLD FAISON RD	KNIGHTDALE NC 27545-8708
8	4505 OLD FAISON RD	L&L TREE AND TURF FARMS LLC	5 BETHLEHEM CHURCH RD	YOUNGSVILLE NC 27596-8175
10	103 SHADY CIR	GALLEGOS, MELISSA K LOPEZ, FIDEL GALLEGOS	103 SHADY CIR	KNIGHTDALE NC 27545-9703
11	101 SHADY CIR	LUCAS, SYLVIA B	101 SHADY CIR	KNIGHTDALE NC 27545-9703
12	1121 QUIET WAY	SOLIZ-RUBIO, ARTURO SOLIZ, CLAUDIA	1121 QUIET WAY	KNIGHTDALE NC 27545-8121
14	932 BETHLEHEM RD	KAY, DONALD W KAY, JUDY S	932 BETHLEHEM RD	KNIGHTDALE NC 27545-9318
15	4325 OLD FAISON RD	TART, MILTON E JR TART, PATSY P	4325 OLD FAISON RD	KNIGHTDALE NC 27545-9179
16	940 BETHLEHEM RD	FERRELL, TERRY LANCE FERRELL, RANDALL HUTCHINS	26 SAINT JULIANS CT	PAWLEYS ISLAND SC 29585-6309
18	4313 OLD FAISON RD	ALFORD, LEE T	4313 OLD FAISON RD	KNIGHTDALE NC 27545-9179
19	0 OLD FAISON RD	HARPER, WAYNE L HARPER, EUGENE J	4113 BREWSTER DR	RALEIGH NC 27606-1711
20	106 SHADY CIR	MATTHEWS, EDDIE M	106 SHADY CIR	KNIGHTDALE NC 27545-9703
21	117 MEADOWS CIR	SALTER, DONALD A SALTER, JEANNIE GUTHRIE	117 MEADOWS CIR	KNIGHTDALE NC 27545-9301
22	107 SHADY CIR	DIXON, LEAMON	107 SHADY CIR	KNIGHTDALE NC 27545-9703
23	104 SHADY CIR	WALSTON, WALLACE R WALSTON, KATIE K	104 SHADY CIR	KNIGHTDALE NC 27545-9703
24	125 MEADOWS CIR	KING, BRIAN J JR KING, KIMBERLY L	125 MEADOWS CIR	KNIGHTDALE NC 27545-9301
25	129 MEADOWS CIR	NEELY, MIKE NEELY, RHONDA	129 MEADOWS CIR	KNIGHTDALE NC 27545-9301
26	132 MEADOWS CIR	JONES, J TIMOTHY JONES, DENISE W	132 MEADOWS CIR	KNIGHTDALE NC 27545-9301
27	4275 OLD FAISON RD	GRAY, GWENDOLYN SMITH	4275 OLD FAISON RD	KNIGHTDALE NC 27545-8709
28	128 MEADOWS CIR	MILTZ, THOMAS W MILTZ, ANNETTE S	128 MEADOWS CIR	KNIGHTDALE NC 27545-9301
29	919 BETHLEHEM RD	DAVIS, NEDRA M	919 BETHLEHEM RD	KNIGHTDALE NC 27545-9319
30	115 TAYLORS FARM CT	MITCHELL, CHARLES W MITCHELL, LISA F	115 TAYLORS FARM CT	KNIGHTDALE NC 27545-7480
31	5004 WOODFIELD LN	BROOME, WILLIAM C BROOME, ELIZABETH B	5004 WOODFIELD LN	KNIGHTDALE NC 27545-9101
32	800 BETHLEHEM RD	FAISON, KENNETH JAMES	802 BETHLEHEM RD	KNIGHTDALE NC 27545-9316
33	909 BETHLEHEM RD	KNAPP, WESLEY	909 BETHLEHEM RD	KNIGHTDALE NC 27545-9319
34	4308 OLD FAISON RD	POOLE, CHRISTOPHER ROBERT	5121 POOLE COUNTRY LN	KNIGHTDALE NC 27545-8707
37	4100 CLIFTON RD	LILES, JOYCE C	4040 CLIFTON RD	KNIGHTDALE NC 27545-9120
38	4259 OLD FAISON RD	AMONETTE, JACOB	4259 OLD FAISON RD	KNIGHTDALE NC 27545-8709
39	4264 OLD FAISON RD	SEARS, WANDA W	4264 OLD FAISON RD	KNIGHTDALE NC 27545-8708
40	1016 OLD FERRELL RD	LEE, CATHERINE N	PO BOX 362	KNIGHTDALE NC 27545-0362
41	4521 OLD FAISON RD	DEBNAM, SONYA LEVON	4521 OLD FAISON RD	KNIGHTDALE NC 27545-9183
42	4316 OLD FAISON RD	BROWN, CAROLYN PRICE	4316 OLD FAISON RD	KNIGHTDALE NC 27545-9178
44	133 MEADOWS CIR	ZACK, EUGENE M ZACK, NANCY A	133 MEADOWS CIR	KNIGHTDALE NC 27545-9301

NEIGHBORHOOD MEETING MINUTES
Lyndon Oaks – Amendment to PUD / Master Plan

Meeting Date/Time:	Thursday, April 4, 2024 from 7:00 pm to 8:00 pm
Meeting Location:	Knightdale Recreation Center, 101 Lawson Ridge Rd, Knightdale, NC 27545
Development Team:	D.R. Horton – Reese Bridges, Anne Oakley
	Parker Poe - Ashley Honeycutt Terrazas
	Urban Design Partners - Brian Richards, Lexi Chacalos
	Ramey Kemp - Caroline Cheeves
Town of Knightdale:	-
Community Members:	12

Introduction: *The Development Team explained the rezoning and PUD process, the purpose of the neighborhood meeting, housing types, anticipated rezoning schedule, Comprehensive Plan Consistency, housing types and trails, planned amenities, potential commercial uses on Bethlehem Rd.*

Caroline Cheeves discussed the findings of the TIA and the recommended improvements that would be phased in with the project.

Question/Concern #1: Will Bethlehem Rd need to be widened for Old Faison/Bethlehem Rd improvement?

Transportation engineer clarified that the improvement had not been designed yet, and that design would happen later. Typically, there is enough existing right-of-way for at least one additional turn lane.

Question/Concern #2: Concerns about tractor trailers and heavy equipment driving over roundabouts on Bethlehem Rd

Transportation engineer clarified that roundabouts are constructed with mountable curb that trailers and heavy equipment can be driven over safely. Applicant clarified that Town preferred roundabouts and wants roundabouts at Crosscut/Bethlehem, and was also performing an additional study with respect to a roundabout at Old Faison/Bethlehem Rd. Applicant clarified that the TIA showed that a signal and turn lanes would operate better at Old Faison/Bethlehem Rd. That the project would be bringing at least a signal to that intersection, but the Town has made some indications that they still wanted a roundabout, so cannot guarantee it would not be a roundabout.

Question/Concern #3: Level of Service at Old Faison/Bethlehem Rd intersection

Transportation engineer clarified that this intersection currently has an LOS F, but that, even with the traffic from the proposed development, with a signal and turn lanes, it would operate at an LOS C.

Question/Concern #4: Queuing at future traffic signal on Old Faison/Bethlehem Rd blocking entrances to existing subdivisions on Old Faison Rd.

Transportation engineer clarified that, at three leg intersections, there are typically shorter cycle lengths and at the projected level of service, the waiting cars would clear with each cycle, so there should not be queuing in front of the Meadow Circle entrance. There would be breaks in traffic with the signal.

Question/ Concern #5: Concern about growth from other development in Knightdale and traffic

Applicant clarified that this background growth was taken into account for the TIA and that Applicant would be providing transportation improvements to mitigate impacts from other development that had already been approved and/or built. These improvements are not in NCDOT's nor the Town's budget, and will come much more quickly when applicant installs them.

Question/Concern #6: When would traffic improvements be installed? After neighborhood is built?

Transportation engineer clarified that NCDOT would require all improvements before neighborhood built out. After rezoning, improvement design and phasing for project is finalized, and then, typically, applicant submits a phasing plan to NCDOT to determine at which point during buildout improvements need to be installed.

Question/Concern #7: Where will sewer be coming from?

Applicant clarified that it is still working with City of Raleigh on the route of utilities. The most likely scenario is that it will be all gravity sewer, coming from under I-87. Based on feedback from CORPUD, a pump station is unlikely, but even if there were a pump station, it would be discreet and would be unlikely to impact surrounding neighbors.

Question/Concern #8: Who do neighbors contact if there are runoff or construction traffic issues during buildout?

There will be a sign on the site with a development manager's phone number for someone to call with any issues or concerns during construction.

Question/Concern #9: Which series/product type would be provided in the neighborhood?

Town is strict about architectural standards, and the plan is to provide a high-quality product. Exact product is not known at this time.

In today's terms, pricing would range from $200,000 to $600,000+, but could not commit to pricing for future market rates.

Question/Concern #10: How is density calculated? Which areas are being conserved?

Density is about 2.91 units/acre, based on the site's total acreage. Applicant clarified that trees in the stream buffers would be preserved and that it would preserve trees in perimeter buffers where possible.

Question/Concern #11: Buffers

Applicant clarified that a 20' perimeter buffer with landscaping or existing vegetation between lots and adjacent properties would be provided and a 50' buffer with a berm on I-87.

Question/Concern #12: Where did project name come from?

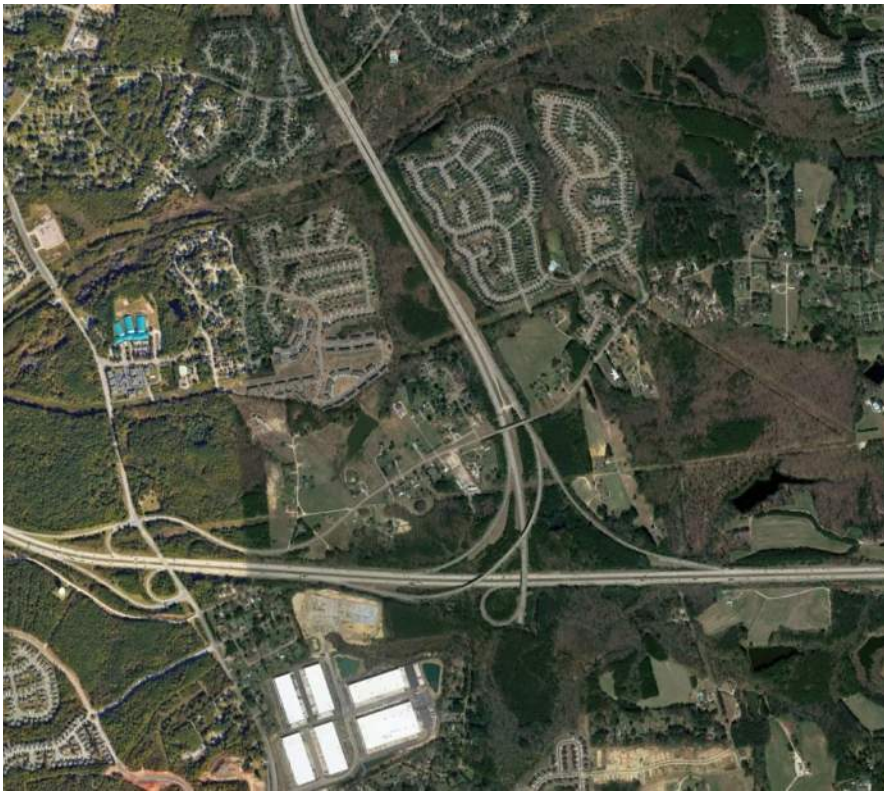
"Lyndon" is the first name of one of the engineers that was originally working on the project, and the marketing department liked the name. They wanted to incorporate it into the project name.

Attendance List

Name	Address
Michael & Karen Palko	121 Meadows Cir
Leamon Dixon	107 Shady Cir
Brian & Kim King	125 Meadows Cir
Jerry & Gayle Liles	4040 Clifton Rd
Rhonda Neely	129 Meadows Cir
Janet Starly	
Barbara Sossomon	1124 Poplar Cir

RAMEY KEMP ASSOCIATES

TOGETHER WE ARE LIMITLESS



Lyndon Oaks

Traffic Impact Analysis

Knightdale, North Carolina

RKA

rameykemp.com

TRAFFIC IMPACT ANALYSIS

FOR

LYNDON OAKS

LOCATED

IN

KNIGHTDALE, NC

Prepared For:
Urban Design Partners
1318 Central Avenue, Suite E6
Charlotte, NC 28205

11-27-2023

Prepared By:
Infrastructure Consulting Services, Inc.
dba
Ramey Kemp Associates
5808 Faringdon Place
Raleigh, NC 27609
License #F-1489

NOVEMBER 2023

RKA Project No. 22584

Prepared By: CDS

Reviewed By: CTS

TRAFFIC IMPACT ANALYSIS
LYNDON OAKS
KNIGHTDALE, NORTH CAROLINA

EXECUTIVE SUMMARY

1. Development Overview

A Traffic Impact Analysis (TIA) was conducted for the proposed Lyndon Oaks subdivision development in accordance with the Knightdale (Town) Unified Development Ordinance (UDO) and North Carolina Department of Transportation (NCDOT) capacity analysis guidelines. The proposed development is to be located on the west side of Bethlehem Road between Interstate 87 and Old Faison Road in Knightdale, North Carolina. The proposed development, anticipated to be completed in 2031, is proposed to consist of 308 single-family homes, 192 townhomes, and 15,000 square feet of commercial space. Site access is proposed via one (1) full-movement driveway on Old Faison Road at the existing location of Tart Farm Road and one roundabout at the existing intersection of Bethlehem Road and Crosscut Place.

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2023 Existing Traffic Conditions
- 2031+1 No-Build Traffic Conditions
- 2031+10 No-Build Traffic Conditions
- 2031+1 Build Traffic Conditions
- 2031+10 Build Traffic Conditions

2. Existing Traffic Conditions

The study area for the TIA was determined through coordination with the Town and NCDOT and consists of the following existing intersections:

- Old Faison Road and Bethlehem Road
- Old Faison Road and Tart Farm Road
- Old Faison Road and Pleasant Colony Drive
- Old Faison Road and Quiet Way

- Bethlehem Road and Crosscut Place
- US 64 EB Ramps and Hodge Road
- US 64 WB Ramps and Old Faison Road
- Smithfield Road and Old Ferrell Road
- Bethlehem Road and Poole Road

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersection listed below, in April of 2023 by Quality Counts during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods:

- Old Faison Road and Bethlehem Road
- Old Faison Road and Tart Farm Road
- Old Faison Road and Pleasant Colony Drive
- Old Faison Road and Quiet Way
- Bethlehem Road and Crosscut Place
- US 64 EB Ramps and Hodge Road
- US 64 WB Ramps and Old Faison Road
- Smithfield Road and Old Ferrell Road
- Bethlehem Road and Poole Road

Traffic volumes were balanced between study intersections, where appropriate.

3. Site Trip Generation

The proposed development is assumed to consist of 308 single-family homes, 192 townhomes, and 15,000 square feet of commercial space. Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE Trip Generation Manual, 11th Edition. Table E-1 provides a summary of the trip generation potential for the site.

Table E-1: Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Detached (210)	308 DU	2,840	52	155	180	106
Townhomes (215)	192 DU	1,414	24	70	66	45
Strip Retail Plaza (822)	10 KSF	652	17	12	39	39
High-Turnover Restaurant (932)	5 KSF	536	26	22	28	17
Total Trips		5,442	119	259	313	207
*Internal Capture (7% AM & 6% PM)**			*-9*	*-17*	*-20*	*-13*
Total External Trips			110	242	293	194
Pass-By Trips			*-0*	*-0*	*-19*	*-19*
Total Primary (New) Trips			110	242	274	175

4. Future Traffic Conditions

Through coordination with NCDOT and the Town, it was determined that an annual growth rate of 3% would be used to generate 2032 projected weekday AM and PM peak hour traffic volumes. For the 2041 future analysis, a 1% growth rate was applied each year after the build +1 year analysis. The following adjacent developments were identified to be considered under future conditions:

- Riverview Commons
- Widewaters Expansion

5. Capacity Analysis Summary

The analysis considered weekday AM and PM peak hour traffic for 2023 existing, 2032 no-build, 2032 build, 2041 no-build, and 2041 build conditions. Refer to Section 7 of the TIA for the capacity analysis summary performed at each study intersection.

6. Recommendations

Based on the findings of this study, specific geometric and traffic control improvements have been identified at study intersections. The improvements are summarized below and are illustrated in Figure E-1.

Recommended Improvements by STIP W-5705AK

Westbound I-87 Ramps and Hodge Road

- Construct westbound right turn lane with 100 feet of storage and appropriate decel and taper.
- Construct westbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Modify signal timings and signal phasing

Recommended Improvements by Developer

Old Faison Road and Bethlehem Road

- Coordinate with Town on desired improvements. Provide fee in lieu contribution as necessary

Old Faison Road and Tart Farm Road/Site Access A

- Construct an eastbound right turn lane with 75 feet of storage and appropriate decel and taper.
- Construct exclusive northbound left turn lane with full storage.
- Provide stop control for northbound approach.

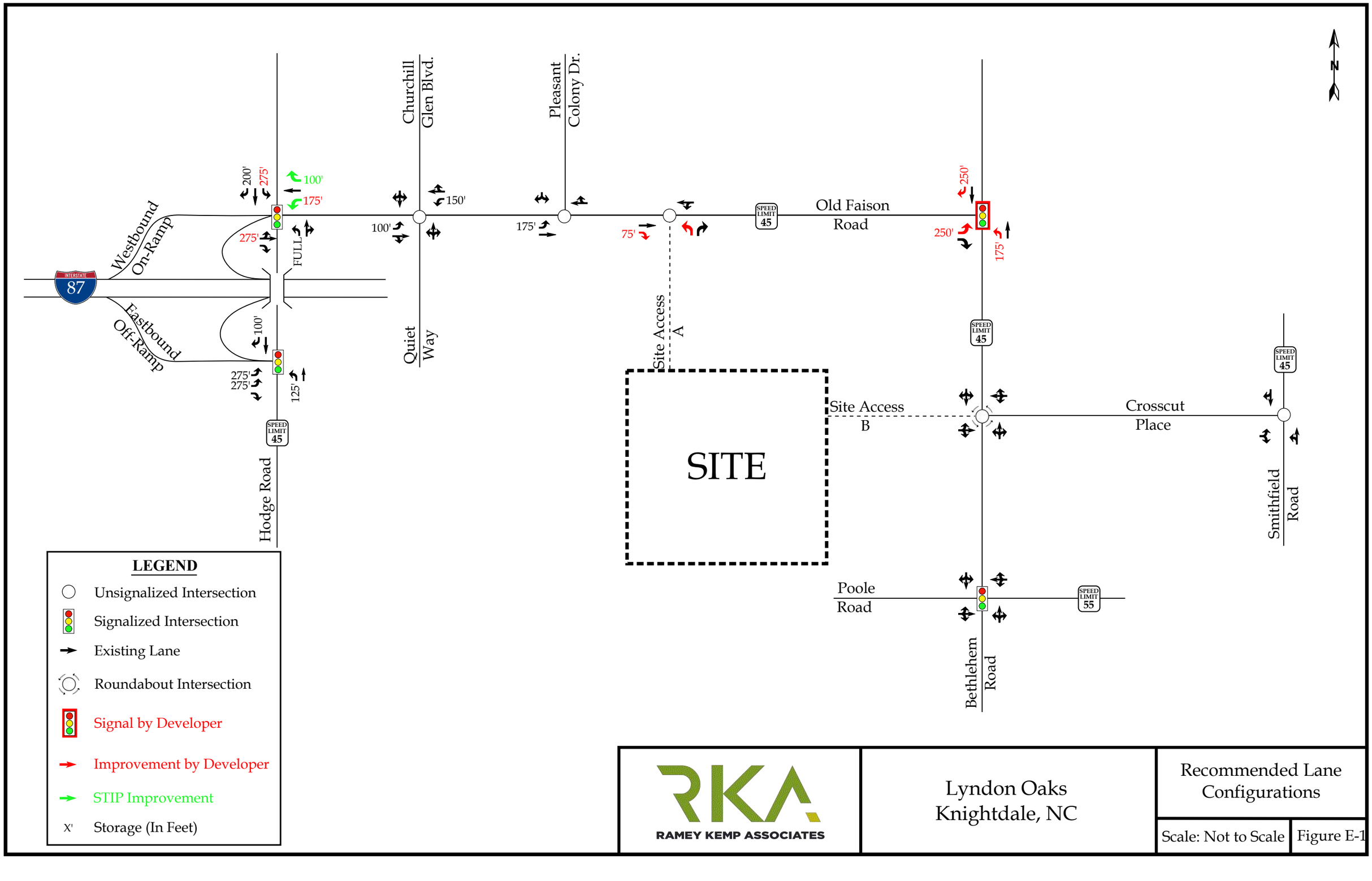
Bethlehem Road and Crosscut Place/Site Access B

- Construct a single-lane roundabout.
- Construct eastbound approach with one ingress and one egress lane.
- Provide yield control for eastbound approach.

Westbound I-87 Ramps and Hodge Road

- Extend westbound left turn lane to contain 175 feet of storage and appropriate decel and taper.
- Extend southbound left turn lane to contain 275 feet of storage and appropriate decel and taper.

- Extend eastbound left-through lane to contain 275 feet of storage and appropriate decel and taper.


N
Churchill Glen Blvd.
Pleasant Colony Dr.
Old Faison Road
SPEED LIMIT 45
INTERSTATE 87
Westbound On-Ramp
Eastbound Off-Ramp
200'
275'
100'
175'
275'
FULL
100'
150'
100'
175'
75'
250'
250'
175'
100'
275'
275'
125'
Quiet Way
Site Access A
Site Access B
Crosscut Place
SITE
Hodge Road
Smithfield Road
Poole Road
SPEED LIMIT 55
Bethlehem Road
LEGEND
Unsignalized Intersection
Signalized Intersection
Existing Lane
Roundabout Intersection
Signal by Developer
Improvement by Developer
STIP Improvement
X' Storage (In Feet)
RAMEY KEMP ASSOCIATES
Lyndon Oaks
Knightdale, NC
Recommended Lane Configurations
Scale: Not to Scale
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TRAFFIC IMPACT ANALYSIS
LYNDON OAKS
KNIGHTDALE, NORTH CAROLINA

1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Lyndon Oaks subdivision development to be located on the west side of Bethlehem Road between Interstate 87 and Old Faison Road in Knightdale, North Carolina. The purpose of this study is to determine the potential impacts to the surrounding transportation system created by traffic generated by the proposed development, as well as recommend improvements to mitigate the impacts.

The proposed development, anticipated to be completed in 2031, is proposed to consist of 308 single-family homes, 192 townhomes, and 15,000 square feet of commercial space. At the time that this TIA was completed, the commercial uses were unknown; however, for a conservative approach to the analysis, 10,000 square feet of strip retail and 5,000 square feet of high-turnover restaurant were assumed.

Per the Town of Knightdale (Town) Unified Development Ordinance (UDO), future analysis should include the build year + 1, as well as a future (build year + 10 years) scenario. The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2023 Existing Traffic Conditions
- 2031+1 No-Build Traffic Conditions
- 2031+10 No-Build Traffic Conditions
- 2031+1 Build Traffic Conditions
- 2031+10 Build Traffic Conditions

1.1. Site Location and Study Area

The development is proposed to be located on the west side of Bethlehem Road between Interstate 87 and Old Faison Road in Knightdale, North Carolina. Refer to Figure 1 for the site location map.

The study area for the TIA was determined through coordination with the North Carolina Department of Transportation (NCDOT) and the Town and consists of the following existing intersections:

- Old Faison Road and Bethlehem Road
- Old Faison Road and Tart Farm Road
- Old Faison Road and Pleasant Colony Drive
- Old Faison Road and Quiet Way
- Bethlehem Road and Crosscut Place
- US 64 EB Ramps and Hodge Road
- US 64 WB Ramps and Old Faison Road
- Smithfield Road and Old Ferrell Road
- Bethlehem Road and Poole Road

Refer to Appendix A for the approved scoping documentation.

1.2. Proposed Land Use and Site Access

The proposed development is assumed to consist of the following uses:

- 308 single-family detached homes
- 192 townhomes
- 10,000 square feet (s.f.) of strip retail
- 5,000 s.f. of high-turnover restaurant

Site access is proposed via one (1) full-movement driveway on Old Faison Road at the existing location of Tart Farm Road and one roundabout at the existing intersection of Bethlehem Road and Crosscut Place. This roundabout is in concordance with the Town's code. Refer to Figure 2 for a copy of the preliminary site plan.

1.3. Adjacent Land Uses

The proposed development is located in an area consisting primarily of residential development.

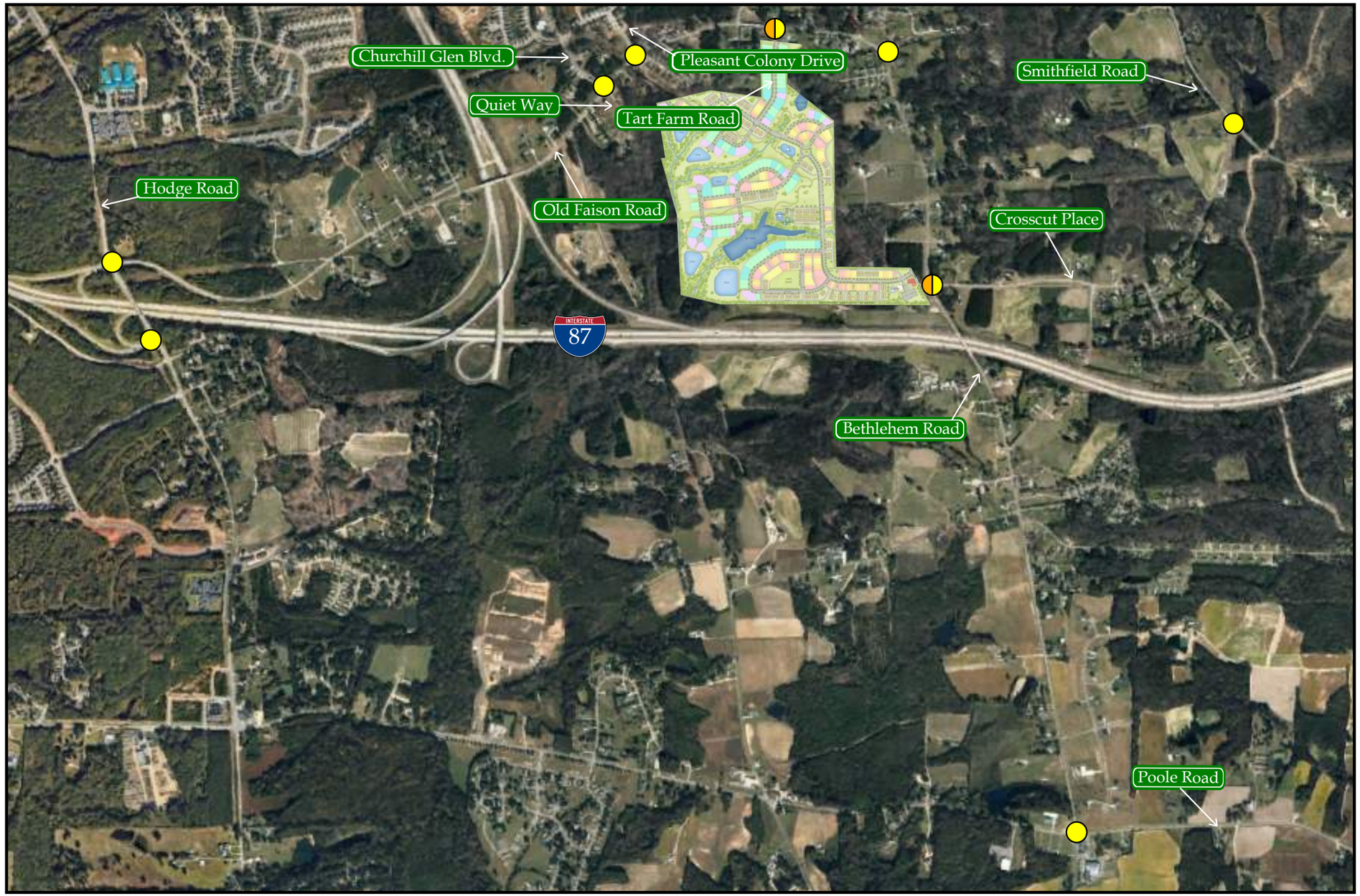
1.4. Existing Roadways

Existing lane configurations (number of traffic lanes on each intersection approach), lane widths, storage capacities, and other intersection and roadway information within the study area are shown in Figure 3. Table 1 provides a summary of this information, as well.

Table 1: Existing Roadway Inventory

Road Name	Route Number	Typical Cross Section	Speed Limit	2019 AADT (vpd)
I-495	I-495	8-lane divided	65 mph	88,500
Old Faison Road	SR 2515	2-lane undivided	45 mph	4,100**
Bethlehem Road	SR 5270	2-lane undivided	45 mph	6,400
Crosscut Place / Old Ferrell Road	SR 2512	2-lane undivided	45 mph	760**
Tart Farm Road	N / A	2-lane undivided	Not Posted	40***
Pleasant Colony Drive	N / A	2-lane undivided	25 mph	1,010***
Quiet Way	N / A	2-lane undivided	Not Posted	90***
Hodge Road	SR 2516	2-lane undivided	Not Posted	9,900
Poole Road	SR 1007	2-lane undivided	55 mph	4,600
Smithfield Road	SR 2233	2-lane undivided	45 mph	8,200

*ADT from 2021
**ADT from 2015
***ADT based on the traffic counts from 2023 and assuming the weekday PM peak hour volume is 10% of the average daily traffic.



LEGEND

- Study Intersection
- Proposed Site Access
- Study Area

N

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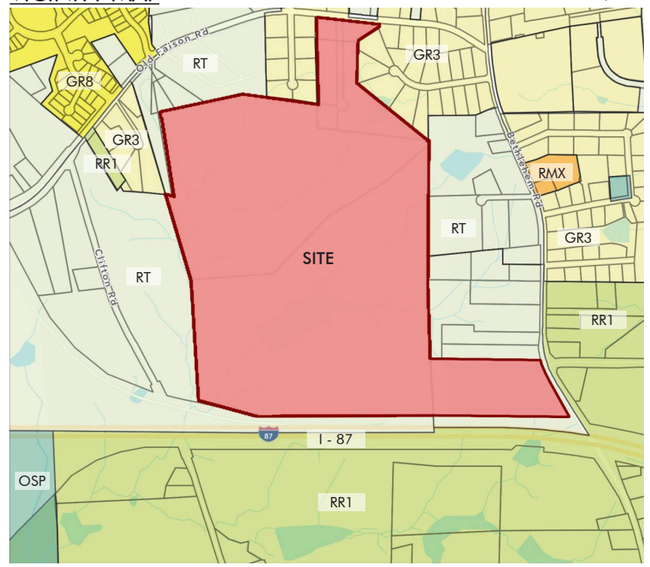
Knightdale, NC

Site Location Map

Scale: Not to Scale | Figure 1

VICINITY MAP

1" = 1,600'



NOTES

1. THIS PLAN IS CONCEPTUAL IN NATURE AND IS SUBJECT TO CHANGE.
2. THIS EXHIBIT WAS PREPARED USING AVAILABLE RECORD INFORMATION, ALTA SURVEY, GIS MAPS, RECORD PLANS, AERIAL IMAGERY, AND LAND RECORDS.
3. THIS PLAN WILL BE SUBJECT TO REVIEW AND APPROVAL BY LOCAL AND STATE PLANNING AND ENGINEERING REVIEW AGENCIES.
4. THE WORK OF THIS PRODUCT IS THE PROPERTY OF URBAN DESIGN PARTNERS, PLLC. NO USE OR REPRODUCTION OF THIS PLAN IS PERMITTED WITHOUT WRITTEN AUTHORIZATION FROM URBAN DESIGN PARTNERS, PLLC.

SITE DATA

ACRES:	± 171.88 AC TOTAL
PIN:	1753-15-2116, 1743-95-3683, 1743-97-1085, 1743-98-6356, 1743-98-9384, 1753-07-1583, 1743-97-6575
EXISTING ZONING:	RT
PROPOSED ZONING:	PUD
BASE DISTRICT:	GR8

DEVELOPMENT SUMMARY

COMMERCIAL:	**± 15,000 SF**
RESIDENTIAL:	
FRONT-LOADED (SINGLE FAM. DETACHED)	
60' LOTS	75 DU (15.0%)
70' LOTS	33 DU (6.6%)
80' LOTS	26 DU (5.2%)
REAR-LOADED (SINGLE FAM. DETACHED)	
30' LOTS	77 DU (15.4%)
35' LOTS	47 DU (9.4%)
40' LOTS	50 DU (10.0%)
TOWNHOMES (REAR-LOADED)	
20' UNITS	84 DU (16.8%)
22' UNITS	88 DU (17.6%)
24' UNITS	20 DU (4.0%)
TOTAL:	**500 DU**

REQ. PARKING (MINIMUM):

• SINGLE FAMILY	616 SPACES
• TOWNHOMES	384 SPACES
• COMMERCIAL	53 SPACES
» *EV*	*2 SPACES*
» *BICYCLE*	*2 SPACES*

REQ. OPEN SPACE: **± 20.9 AC**

500 DU x 3.5 BEDS = 1,750 BEDS

1,750 BEDS x 520sf = 910,000sf (20.9 AC)

LYNDON OAKS | SKETCH PLAN

KNIGHTDALE, NC

0 200 400

OCTOBER 13, 2023

22-RDU-083

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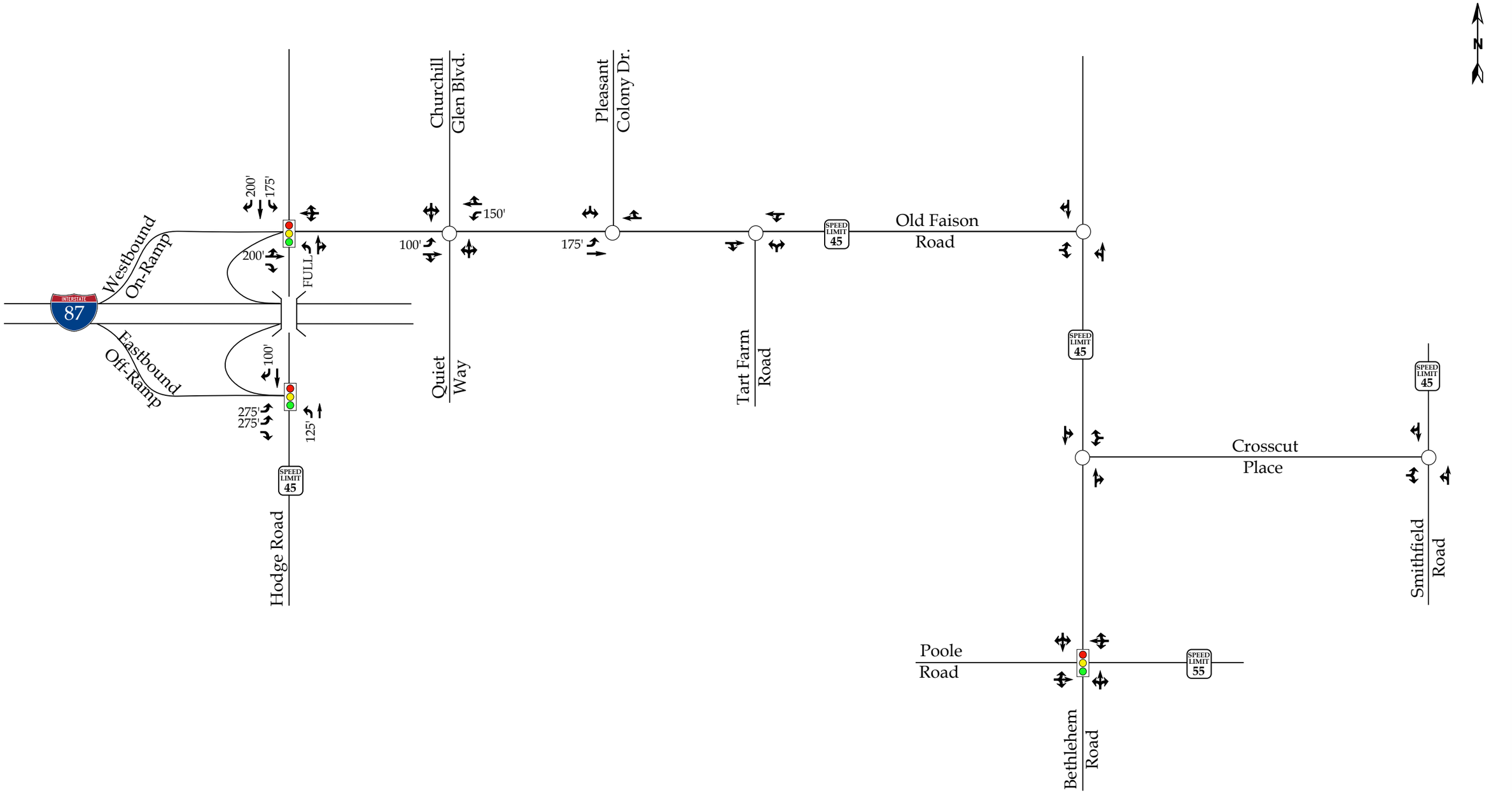

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2023 Existing
Lane Configurations

Scale: Not to Scale | Figure 3

2. 2023 EXISTING PEAK HOUR CONDITIONS

2.1. 2023 Existing Peak Hour Traffic Volumes

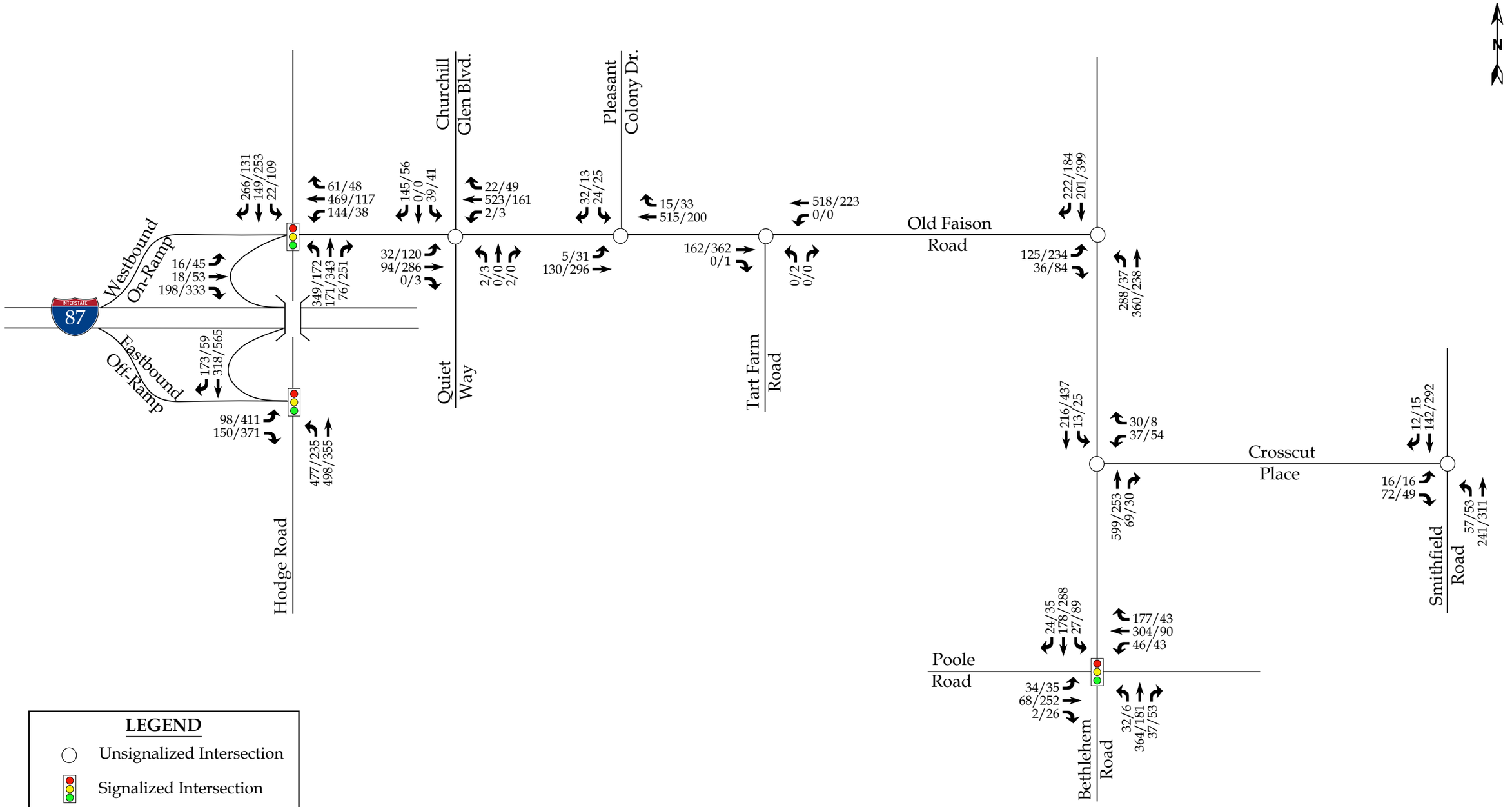
Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in April of 2023 by Quality Counts during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods while schools were in session:

- Old Faison Road and Bethlehem Road
- Old Faison Road and Tart Farm Road
- Old Faison Road and Pleasant Colony Drive
- Old Faison Road and Quiet Way
- Bethlehem Road and Crosscut Place
- US 64 EB Ramps and Hodge Road
- US 64 WB Ramps and Old Faison Road
- Smithfield Road and Old Ferrell Road
- Bethlehem Road and Poole Road

Weekday AM and PM traffic volumes were balanced between study intersections, where appropriate. Refer to Figure 4 for 2023 existing weekday AM and PM peak hour traffic volumes. A copy of the count data is located in Appendix B of this report.

2.2. Analysis of 2023 Existing Peak Hour Traffic Conditions

The 2023 existing weekday AM and PM peak hour traffic volumes were analyzed to determine the current levels of service at the study intersections under existing roadway conditions. Signal information was obtained from NCDOT and is included in Appendix C. The results of the analysis are presented in Section 7 of this report.



LEGEND

- ○ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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Knightdale, NC

2023 Existing
Peak Hour Traffic

Scale: Not to Scale | Figure 4

3. NO-BUILD PEAK HOUR CONDITIONS

In order to account for growth of traffic and subsequent traffic conditions at a future year, no-build traffic projections are needed. No-build traffic is the component of traffic due to the growth of the community and surrounding area that is anticipated to occur regardless of whether or not the proposed development is constructed. No-build traffic is comprised of existing traffic growth within the study area and additional traffic created as a result of adjacent approved developments.

3.1. Ambient Traffic Growth

Through coordination with NCDOT and the Town, it was determined that an annual growth rate of 3% would be used to generate 2032 projected weekday AM and PM peak hour traffic volumes. For the 2041 future analysis, a 1% growth rate was applied each year after the build +1 year analysis. Refer to Figure 5a for 2032 projected peak hour traffic and Figure 5b for 2041 projected peak hour traffic.

3.2. Adjacent Development Traffic

Through coordination with NCDOT and the Town, Riverview Commons should be considered as an approved adjacent development in this study. A residential development located near the Widewaters expansion that is not yet approved by NCDOT was also to be considered in the analysis. Site trips for this development were generated based off of methodology contained in the ITE *Trip Generation Manual*, 11th Edition then distributed based on the regional distributions for the proposed site., Table 2, on the following page, provides a summary of the adjacent developments.

Table 2: Adjacent Development Information

Development Name	Location	Build-Out Year	Land Use / Intensity	TIA Performed
Riverview Commons	North of Poole Road, west of Hodge Road	2023	364 dwelling units of apartments and 30 townhomes	Davenport
Widewaters Expansion	North of Old Faison Road, West of Woodfield Lane	Before 2032	257 single-family attached, 98 single-family attached	N / A

It should be noted that including trips from the above adjacent developments on top of an annually compounded growth rate is anticipated to provide conservative results in this area, as local development growth is the most impactful for more rural areas. Additionally, there is expected to be interaction between some of the adjacent developments and the proposed development based on the different land uses; however, no reduction in adjacent development trips was proposed to provide a conservative estimation of future traffic volumes. It should be noted that the adjacent developments were approved, during scoping, by NCDOT and the Town. Adjacent development trips are shown in Figure 6. Additional adjacent development information can be found in Appendix D.

3.3. Future Roadway Improvements

Based on coordination with NCDOT and the Town, State Transportation Improvement Program (STIP) project W-5705AK was to be included in all future analyses. STIP W-5705AK is expected to widen the westbound approach of Old Faison Road (at Hodge Road) to provide exclusive left and right turn lanes. Updated signal plans for the intersection of Hodge Road and Old Faison Road can be found in Appendix C showing the improvements proposed by W-5705AK.

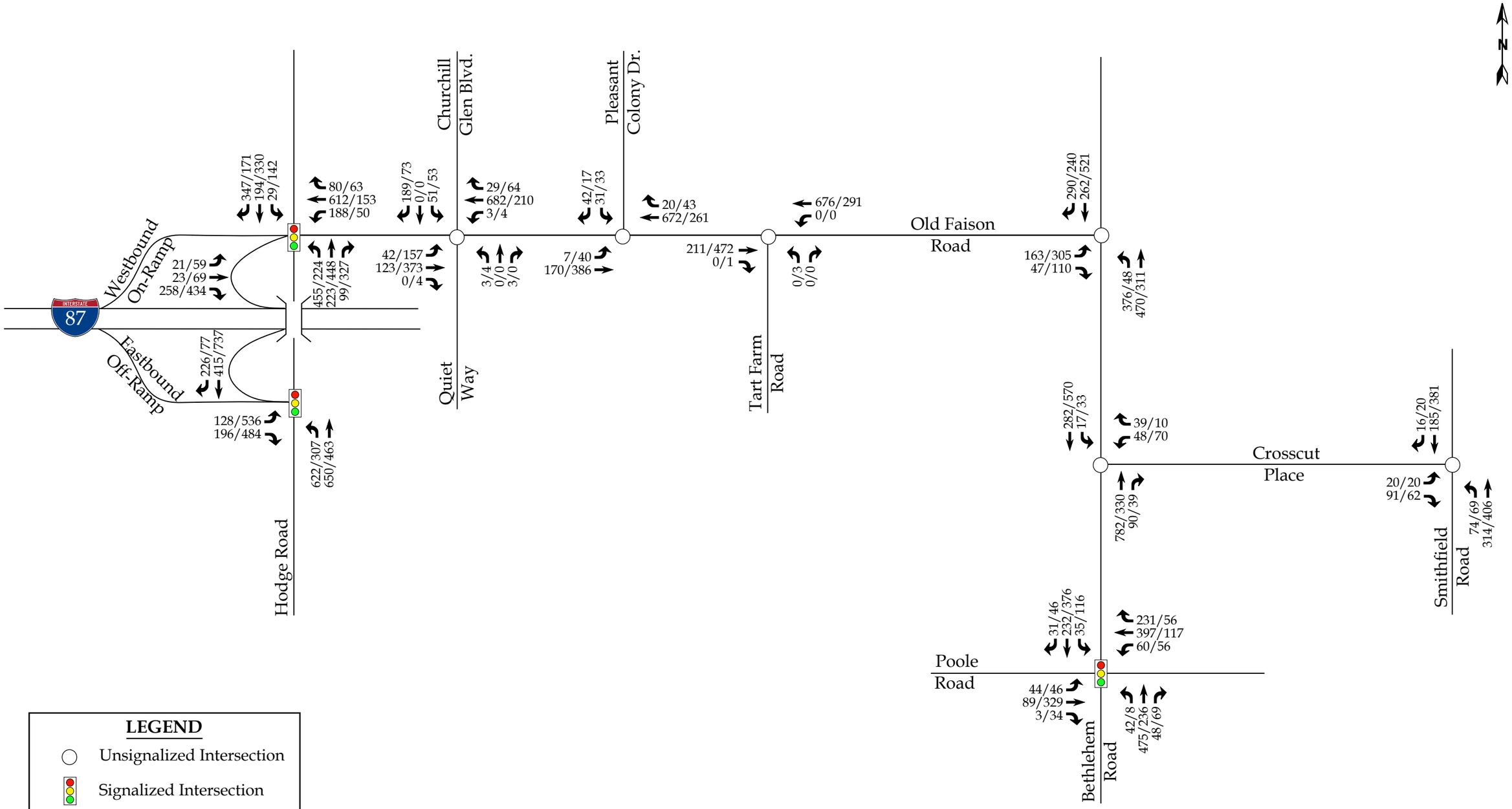
3.4. No-Build Peak Hour Traffic Volumes

The no-build traffic volumes were determined by projecting the 2023 existing peak hour traffic to the respective build year as discussed in section 3.1 and adding the adjacent

development trips. Refer to Figure 7a for an illustration of the 2032 no-build peak hour traffic volumes 7b for an illustration of the 2041 no-build peak hour traffic.

3.5. Analysis of No-Build Peak Hour Traffic Conditions

The 2032 and 2041 no-build AM and PM peak hour traffic volumes at the study intersections were analyzed with future geometric roadway conditions and traffic control, including improvements required to be provided by the aforementioned adjacent developments, as well as STIP W-5705AK. The analysis results are presented in Section 7 of this report.



LEGEND

- ○ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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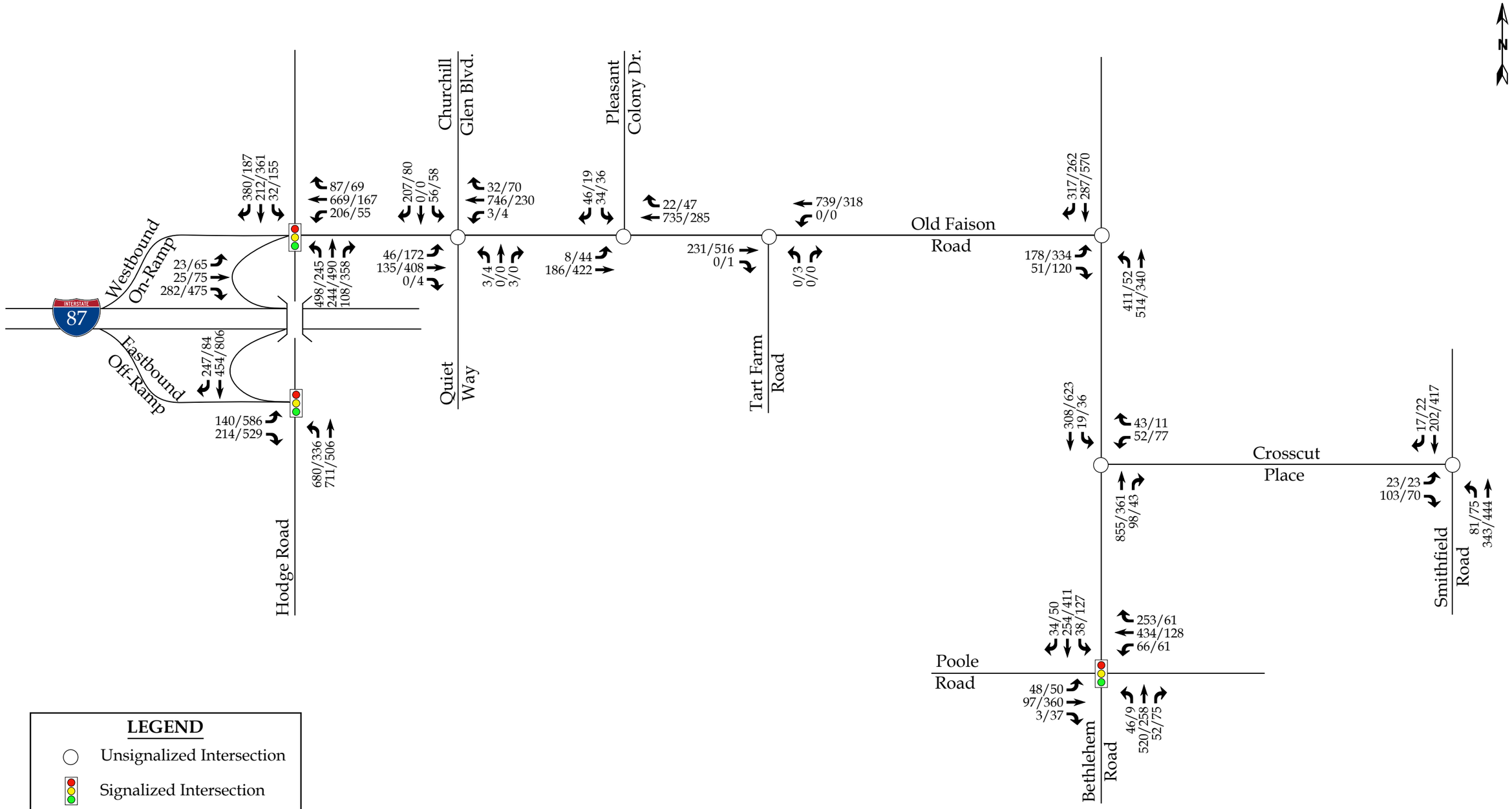
2032 Projected Peak Hour Traffic

Scale: Not to Scale | Figure 5a



LEGEND

- ○ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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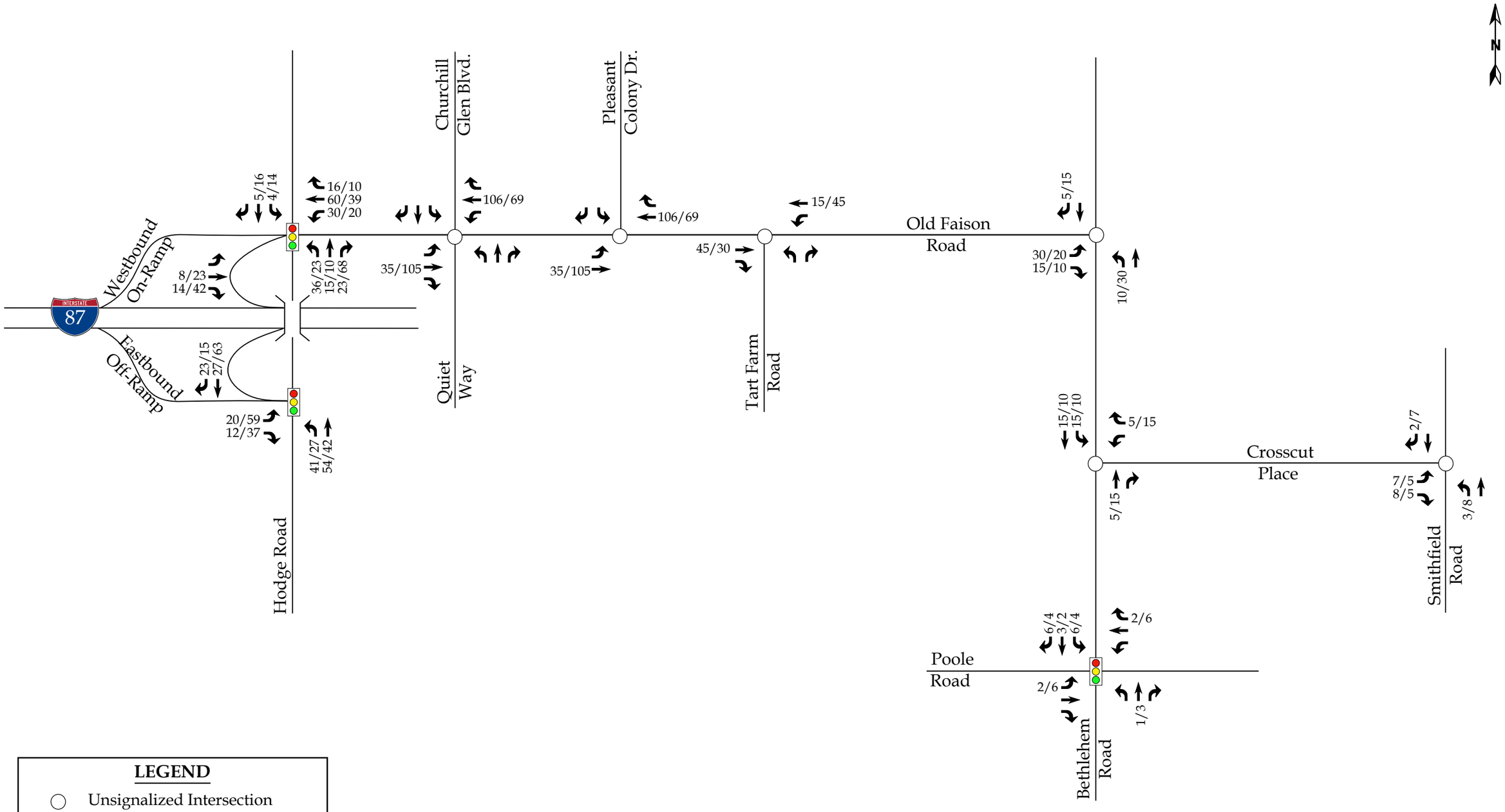
2041 Projected Peak Hour Traffic

Scale: Not to Scale | Figure 5b



LEGEND

- ○ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Adjacent Development Trips

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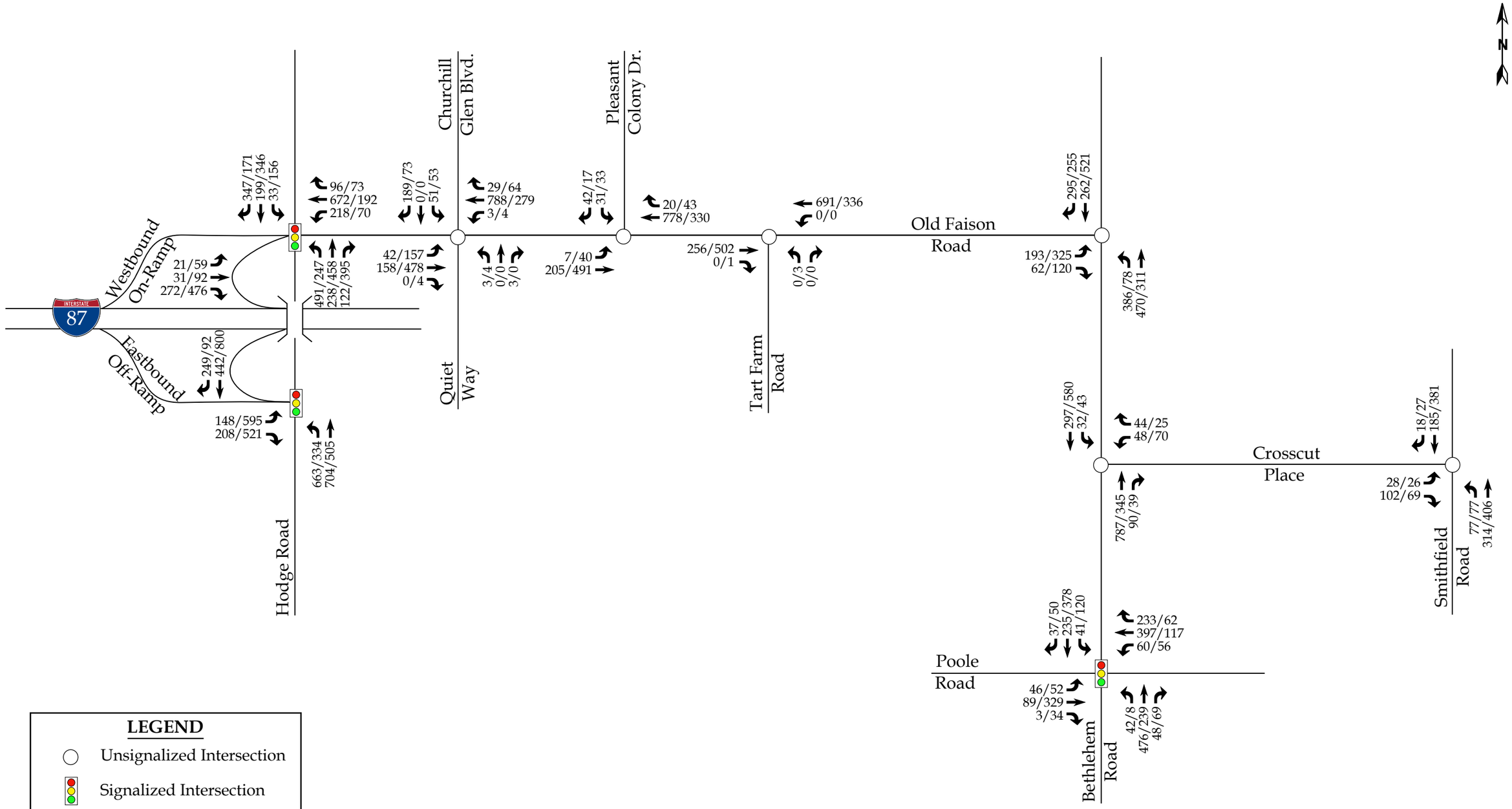
Peak Hour Adjacent Development Trips

Scale: Not to Scale | Figure 6



LEGEND

- ○ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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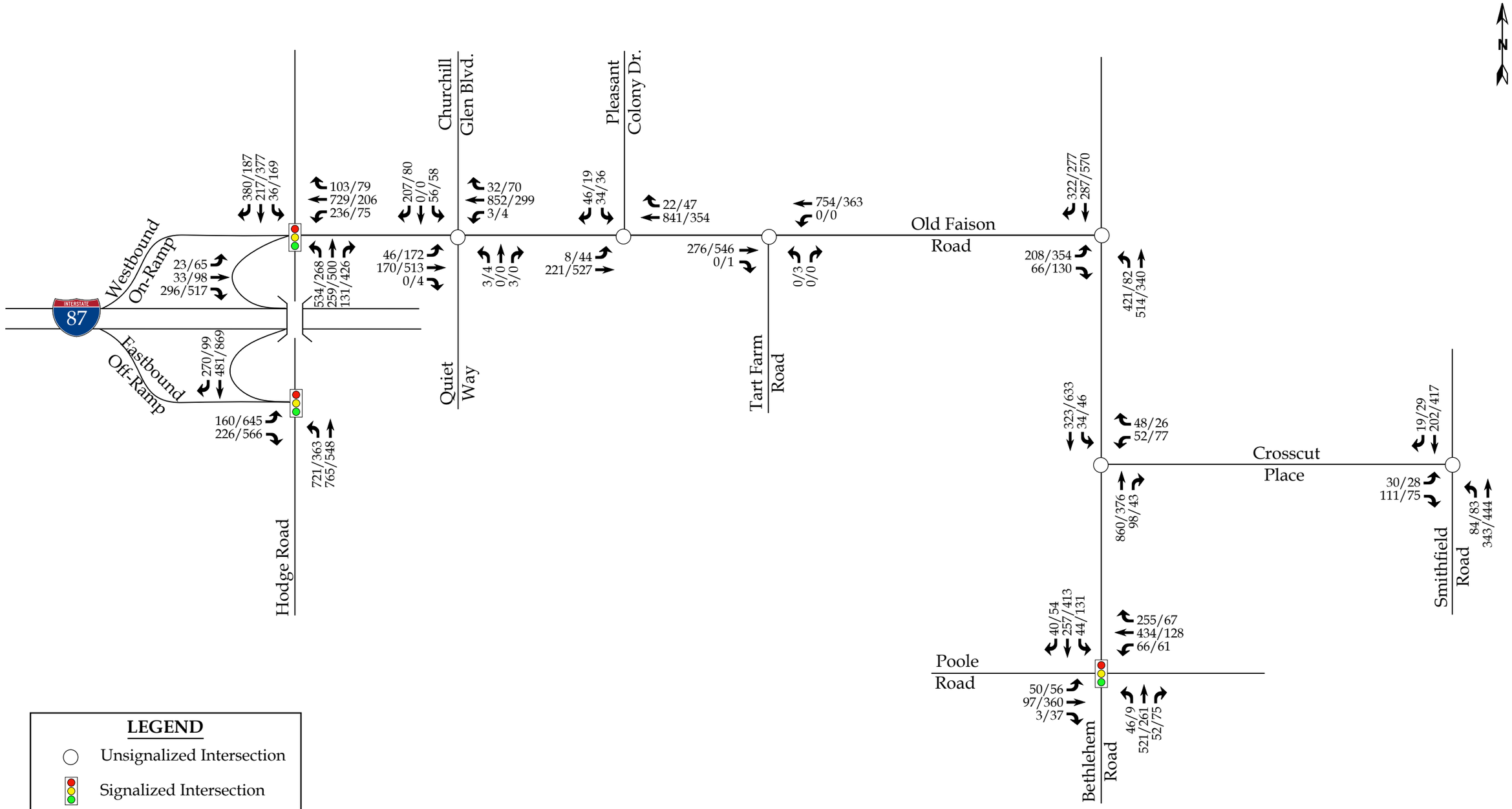
2032 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7a



LEGEND

- ○ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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2041 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7b

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 11th Edition. Table 3 provides a summary of the trip generation potential for the site.

Table 3: Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Detached (210)	308 DU	2,840	52	155	180	106
Townhomes (215)	192 DU	1,414	24	70	66	45
Strip Retail Plaza (822)	10 KSF	652	17	12	39	39
High-Turnover Restaurant (932)	5 KSF	536	26	22	28	17
Total Trips		5,442	119	259	313	207
*Internal Capture (7% AM & 6% PM)**			*-9*	*-17*	*-20*	*-13*
Total External Trips			110	242	293	194
Pass-By Trips			*-0*	*-0*	*-19*	*-19*
Total Primary (New) Trips			110	242	274	175

*Utilizing methodology contained in the NCHRP Report 684.

It is estimated that the proposed development will generate approximately 5,442 total site trips during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 378 trips (119 entering and 259 exiting) will occur during the weekday AM peak hour and 520 (313 entering and 207 exiting) will occur during the weekday PM peak hour. However, not all trips generated are expected to be 'new' trips. A portion of the trips are expected to be captured internally (i.e. internal capture), while some trips are expected to be pulled from traffic that is already utilizing the adjacent roadway network (i.e. pass-by).

Internal capture of trips between the residential, retail, and restaurant uses was considered in this study. Internal capture is the consideration for trips that will be made within the site between different land uses, so the vehicle technically never leaves the internal site but can still be considered as a trip to that specific land use. Based on the National Collaborative Highway Research Program (NCHRP) Report 684 methodology under full build conditions, a weekday AM peak hour internal capture rate of 7% and a weekday PM peak hour internal capture rate of 6% was applied to the total trips. The internal capture reductions are expected to account for approximately 26 trips (9 entering and 17 exiting) during the weekday AM peak hour and 33 trips (20 entering and 13 exiting) during the weekday PM peak hour. Refer to Appendix A for scoping documentation containing the NCHRP 684 sheets for each peak hour.

Pass-by trips were also taken into consideration in this study. Pass-by trips are made by the traffic already using the adjacent roadway, entering the site as an intermediate stop on their way to another destination. Pass-by percentages are applied to site trips after adjustments for internal capture. Pass-by trips are expected to account for approximately 38 trips (19 entering and 19 exiting) during the weekday PM peak hour. It should be noted that the pass-by trips were balanced, as it is likely that these trips would enter and exit in the same hour.

The total primary (new) site trips are the calculated site trips after the reduction for internal capture and pass-by trips. Primary site trips are expected to account for approximately 352 trips (110 entering and 242 exiting) during the weekday AM peak hour and 449 trips (274 entering and 175 exiting) during the weekday PM peak hour under full build conditions.

4.2. Site Trip Distribution and Assignment

Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, adjacent development traffic studies, and engineering judgment.

It is estimated that the residential site trips will be regionally distributed as follows:

- 40% to / from the west via I-87
- 15% to / from the east via I-87
- 10% to / from the north via Hodge Road
- 10% to / from the north via Bethlehem Road
- 5% to / from the north via Smithfield Road
- 5% to / from the south via Smithfield Road
- 5% to / from the south via Hodge Road
- 4% to / from the west via Poole Road
- 4% to / from the east via Poole Road
- 2% to / from the south via Bethlehem Road

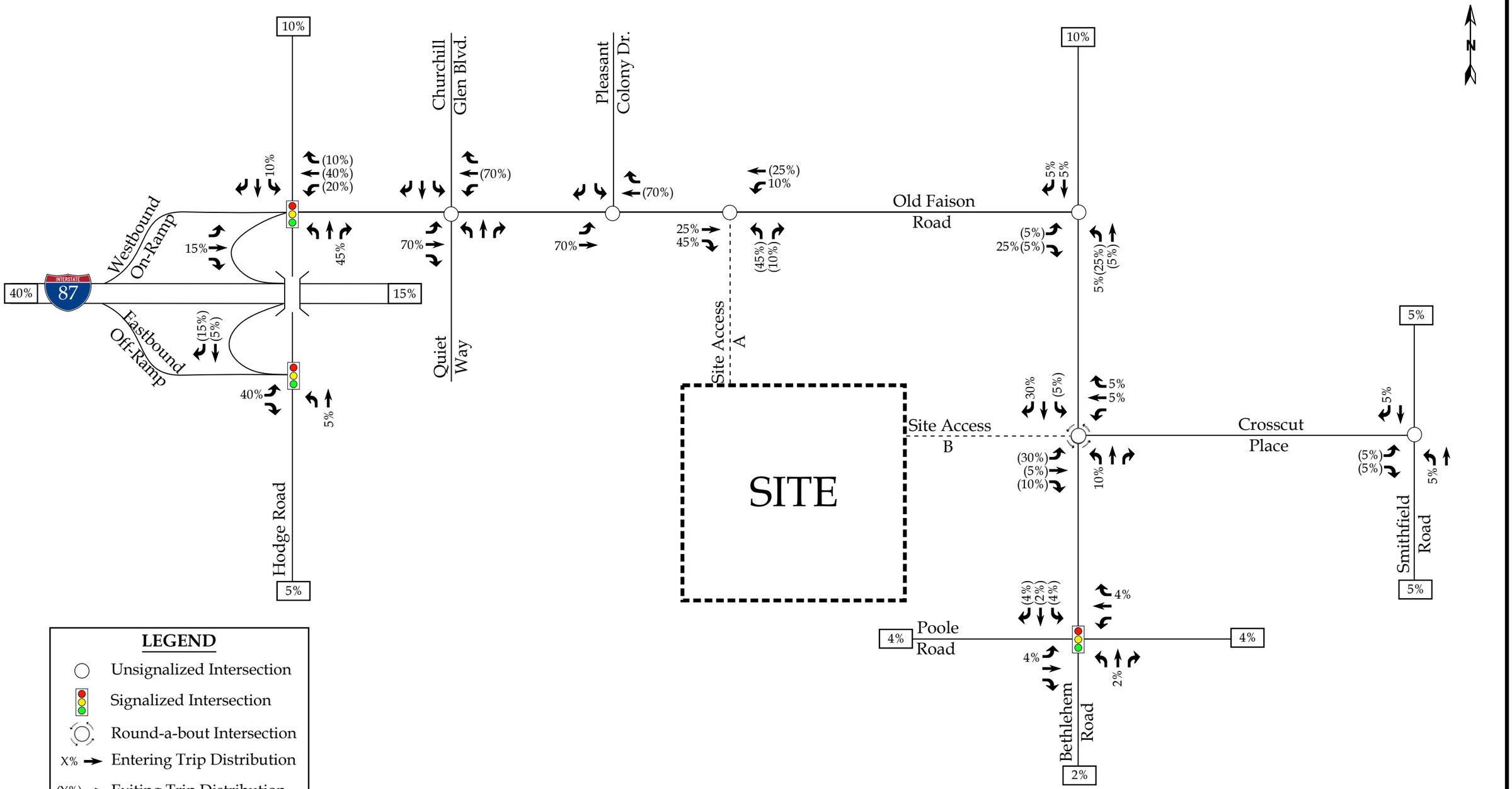
It is estimated that the commercial site trips will be regionally distributed as follows:

- 25% to / from the north via Bethlehem Road
- 20% to / from the west via I-87
- 15% to / from the east via I-87
- 10% to / from the north via Hodge Road
- 10% to / from the north via Smithfield Road
- 10% to / from the south via Smithfield Road
- 5% to / from the south via Hodge Road
- 2% to / from the west via Poole Road
- 2% to / from the east via Poole Road
- 1% to / from the south via Bethlehem Road

The residential site trip distribution is shown in Figure 8a, and the commercial site trip distribution is shown in Figure 8b. Refer to Figure 9a for the residential site trip assignment and Figure 9b for commercial site trip assignment.

The pass-by site trips were distributed based on existing traffic patterns with consideration given to the proposed driveway access and site layout. Refer to Figure 10 for the pass-by site trip distribution. Pass-by site trips are shown in Figure 11.

The total site trips were determined by adding the primary site trips and the pass-by site trips. Refer to Figure 12 for the total peak hour site trips at the study intersections.



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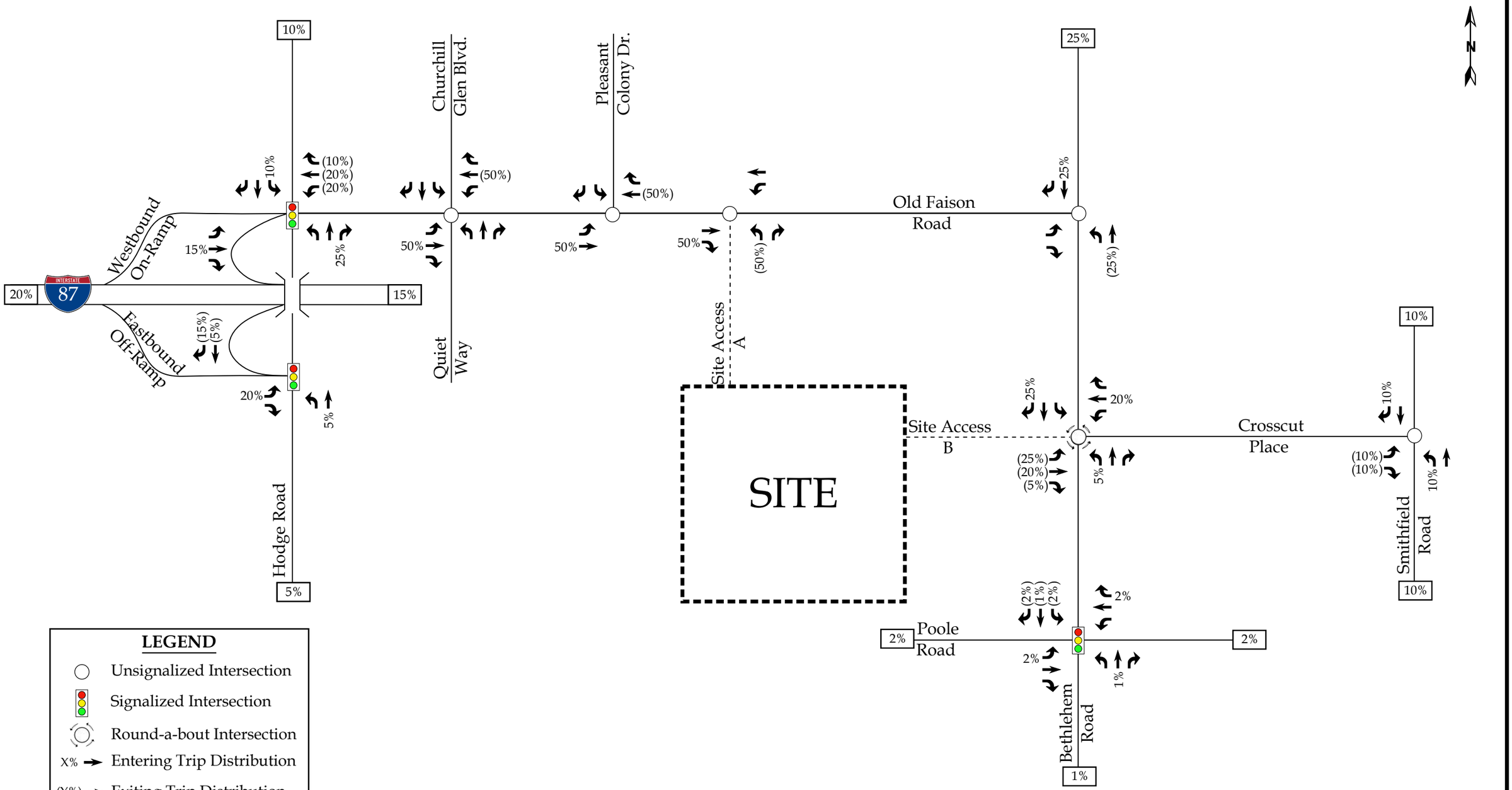
Site Trip Distribution
- Residential

Scale: Not to Scale | Figure 8a



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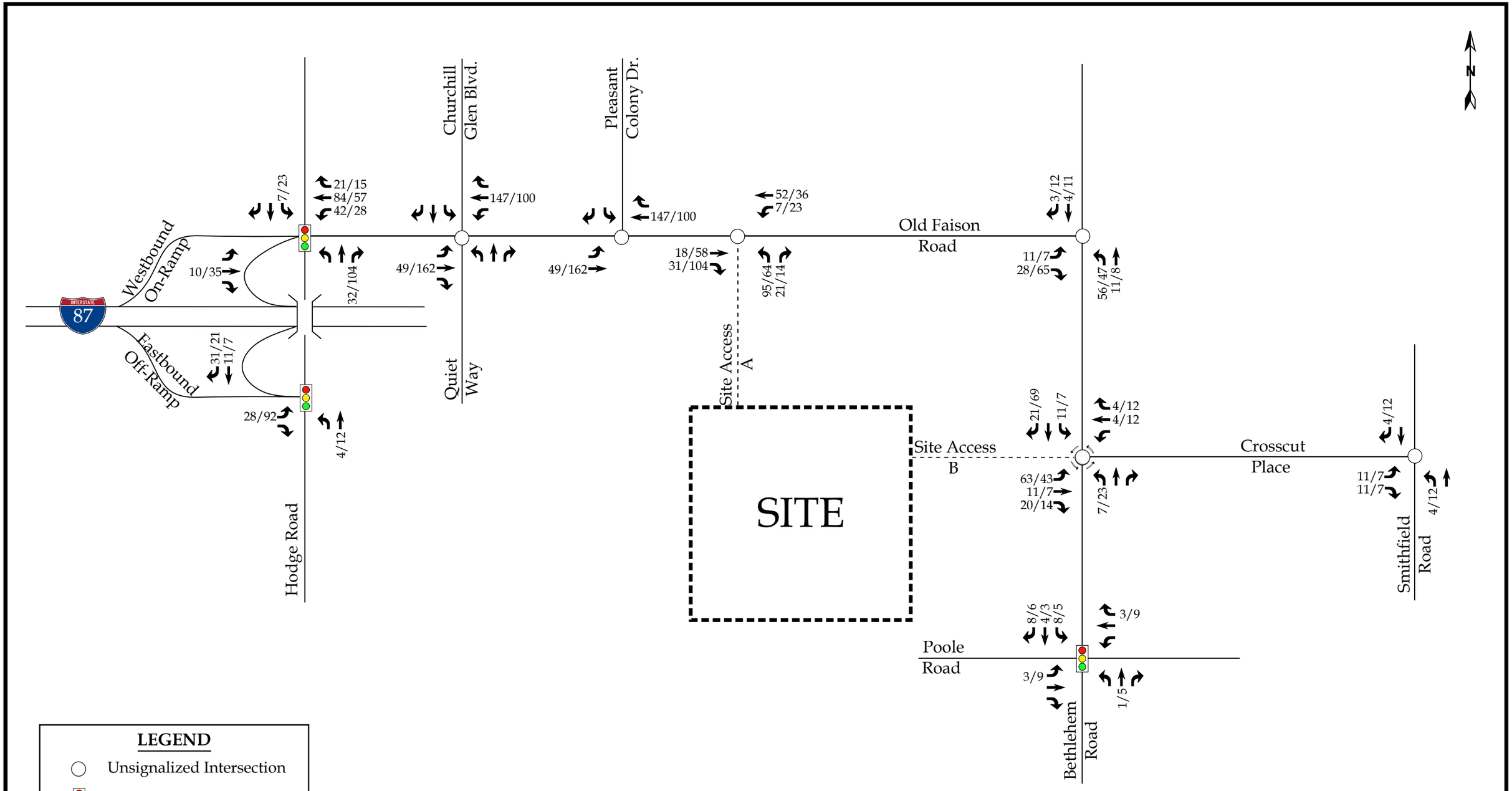
Site Trip Distribution
- Retail/Restaurant

Scale: Not to Scale | Figure 8b



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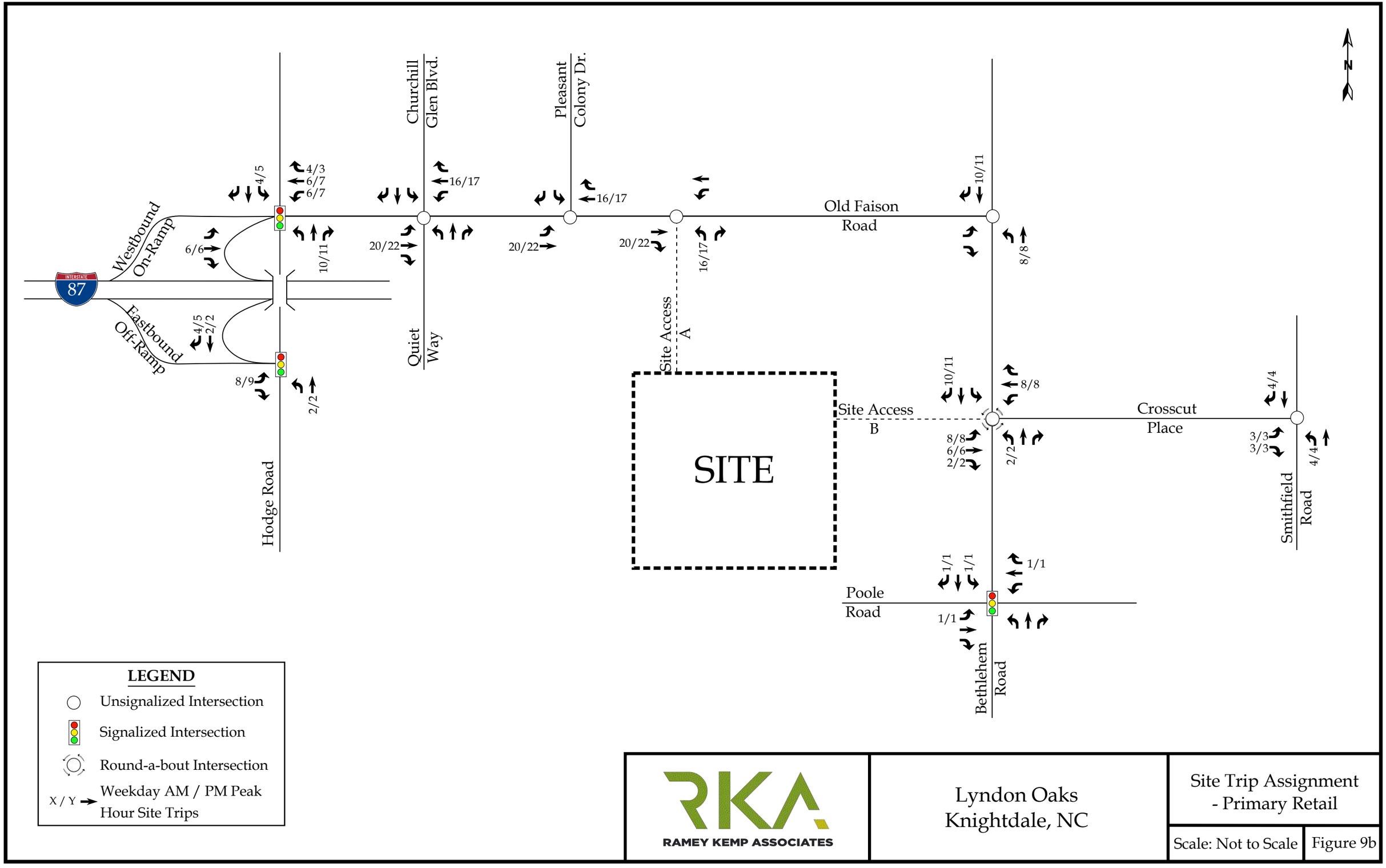
Site Trip Assignment
- Residential

Scale: Not to Scale | Figure 9a



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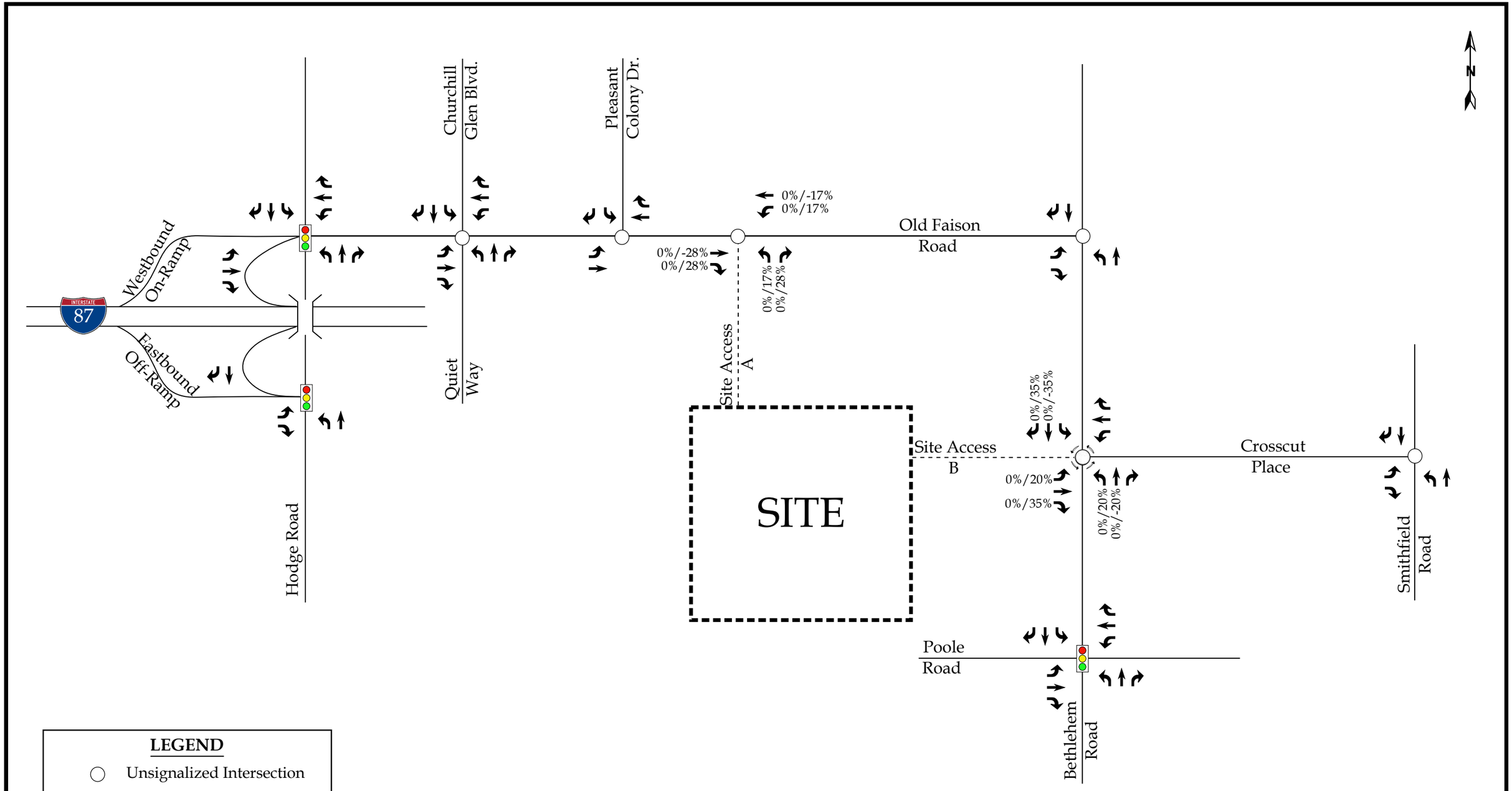
Site Trip Assignment
- Primary Retail

Scale: Not to Scale | Figure 9b



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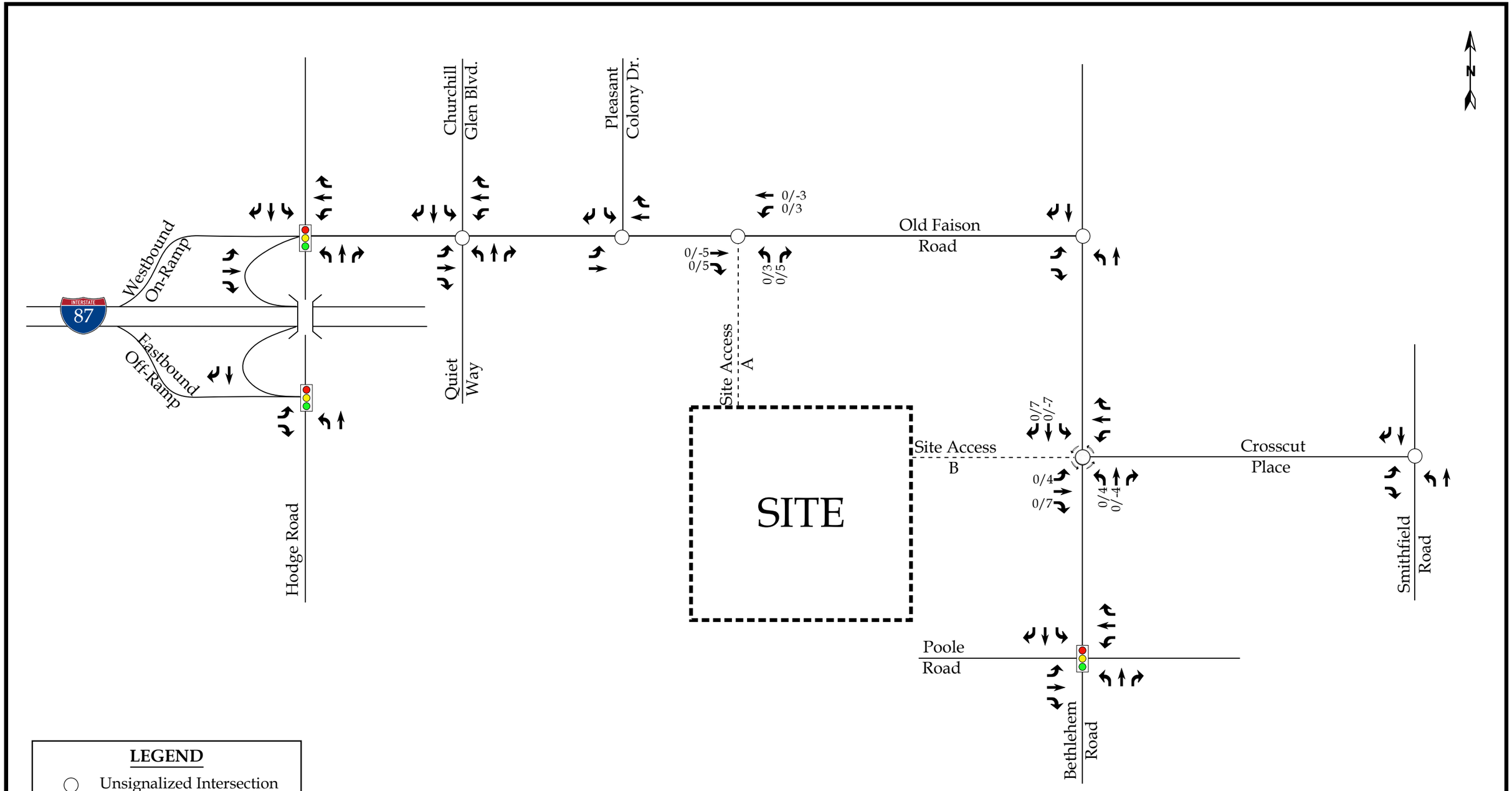
Pass-By Site Trip Distribution

Scale: Not to Scale | Figure 10



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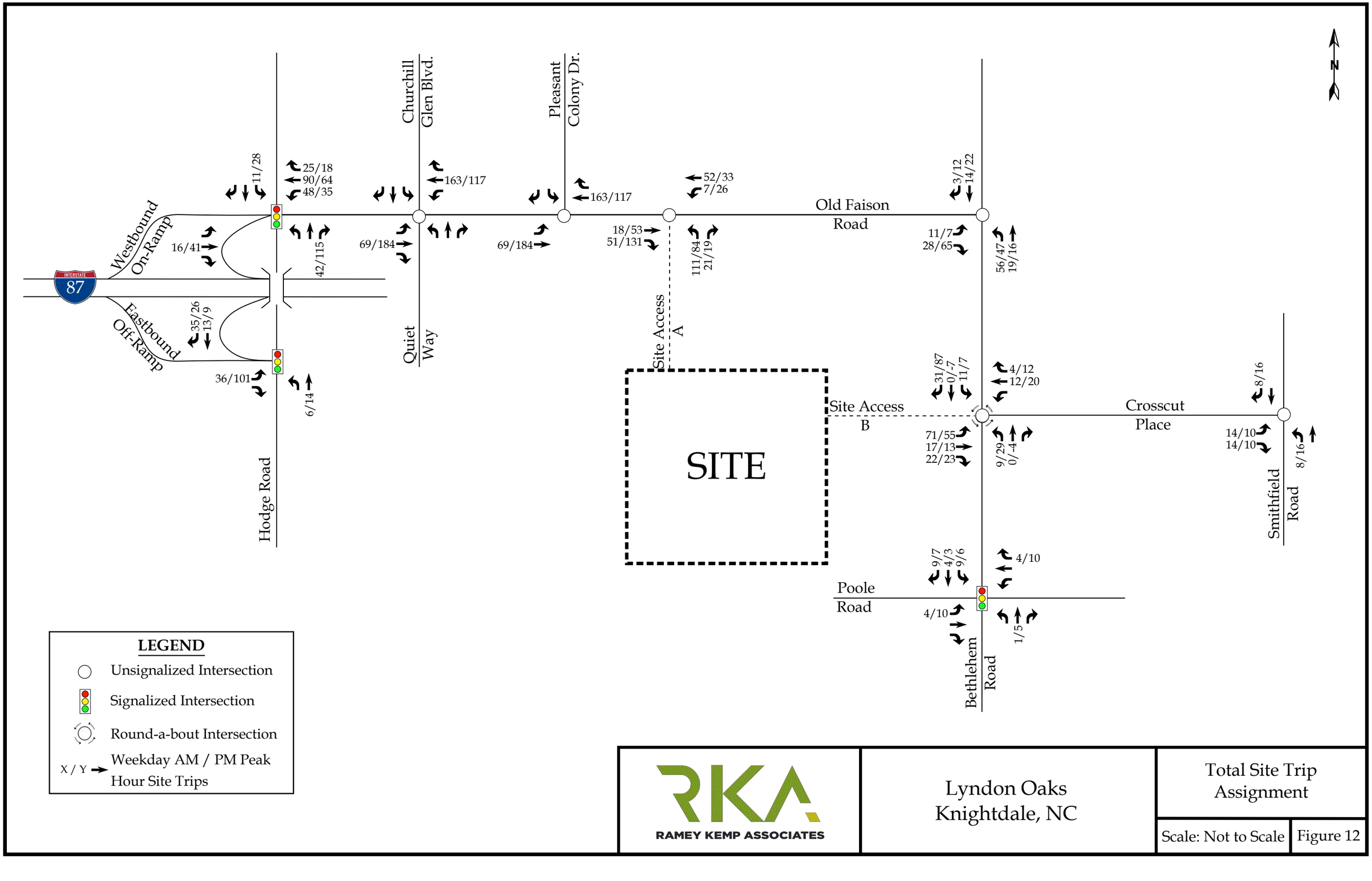
Pass-By Site
Trip Assignment

Scale: Not to Scale | Figure 11



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Total Site Trip Assignment

Scale: Not to Scale | Figure 12

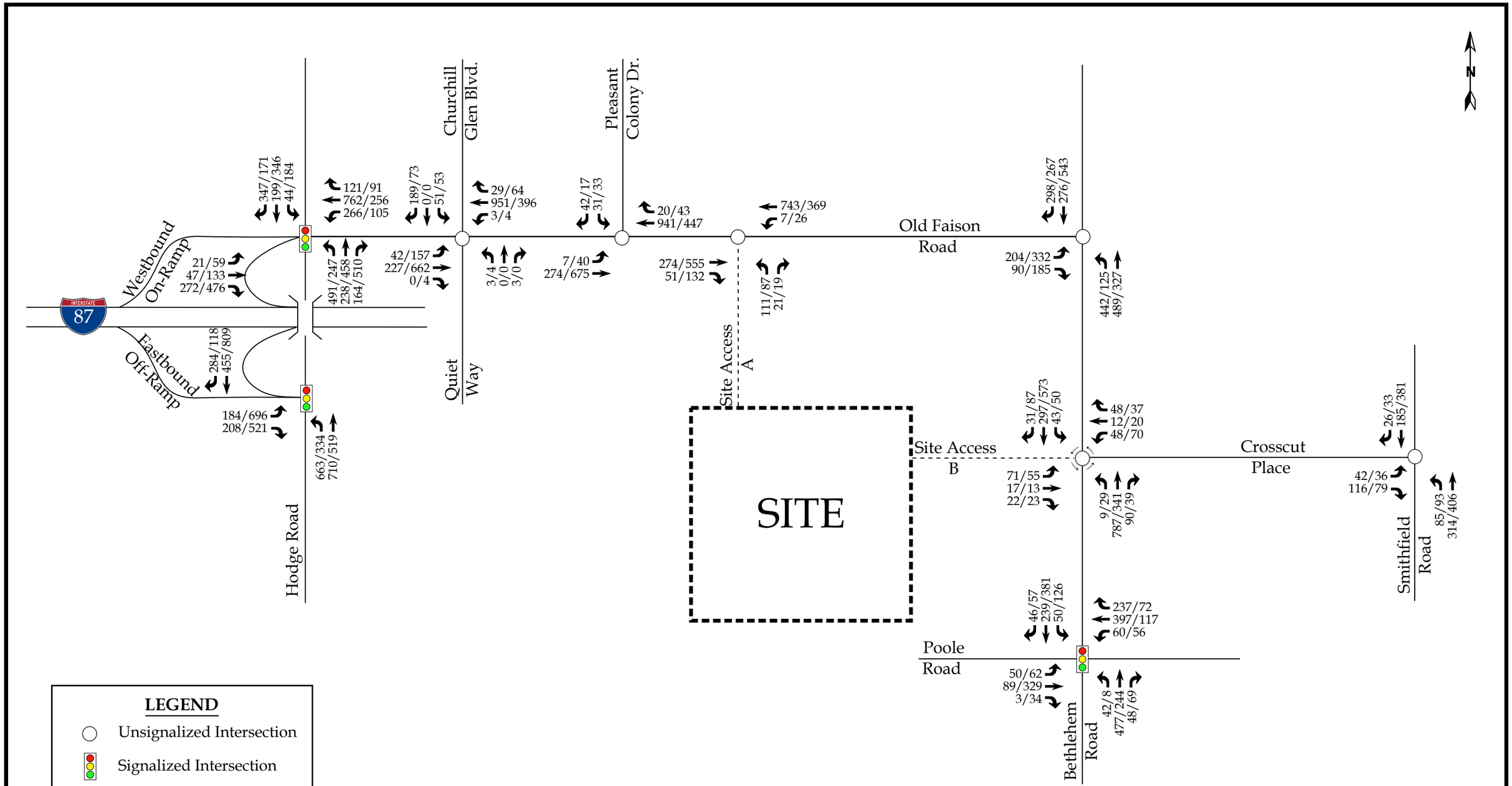
5. BUILD TRAFFIC CONDITIONS

5.1. Build Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the 2032 no-build traffic volumes and the 2041 no-build traffic volumes, respectively. Refer to Figure 13a for an illustration of the 2032 build peak hour traffic volumes with the proposed site fully developed and Figure 13b for an illustration of the 2041 build peak hour traffic volumes.

5.2. Analysis of Build Peak Hour Traffic Conditions

Study intersections were analyzed with the 2032/2041 build traffic volumes using the same methodology previously discussed for the no-build traffic conditions. Intersections were analyzed with improvements necessary to accommodate future traffic volumes. The results of the capacity analysis for each intersection are presented in Section 7 of this report.



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Round-a-bout Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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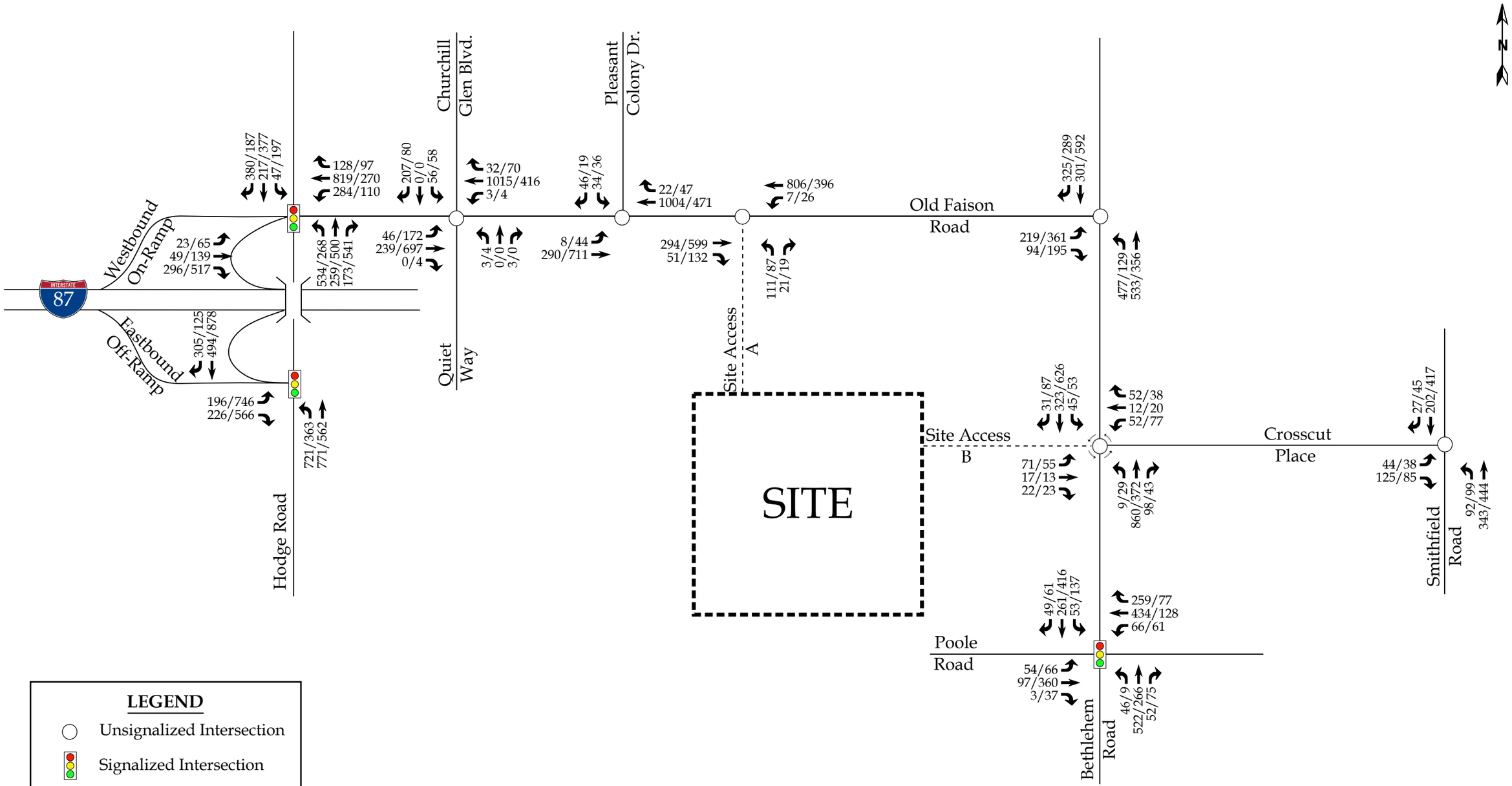
2032 Build
Peak Hour Traffic

Scale: Not to Scale | Figure 13a



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Round-a-bout Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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2041 Build
Peak Hour Traffic

Scale: Not to Scale | Figure 13b

6. TRAFFIC ANALYSIS PROCEDURE

Study intersections were analyzed using the methodology outlined in the *Highway Capacity Manual* (HCM), 6th Edition published by the Transportation Research Board. Capacity and level of service are the design criteria for this traffic study. A computer software package, Synchro (Version 10.3), was used to complete the analyses for the study area intersections. Please note that the unsignalized capacity analysis does not provide an overall level of service for an intersection; only delay for an approach with a conflicting movement. The software package SIDRA INTERSECTION 9 was utilized for all roundabout analysis. For roundabout intersections, Sidra provides LOS calculations for all approaches and an overall resulting LOS. Synchro capacity analysis results for unsignalized intersections do not provide an overall LOS, but rather a LOS for movements approaches that have a conflicting movement.

The HCM defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." Level of service (LOS) is a term used to represent different driving conditions, and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers." Level of service varies from Level "A" representing free flow, to Level "F" where breakdown conditions are evident. Refer to Table 4 for HCM levels of service and related average control delay per vehicle for both signalized and unsignalized intersections. Control delay as defined by the HCM includes "initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay". An average control delay of 50 seconds at a signalized intersection results in LOS "D" operation at the intersection.

Table 4: Highway Capacity Manual – Levels-of-Service and Delay

UNSIGNALIZED/ROUNDABOUT INTERSECTION		SIGNALIZED INTERSECTION	
LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)
A	0-10	A	0-10
B	10-15	B	10-20
C	15-25	C	20-35
D	25-35	D	35-55
E	35-50	E	55-80
F	>50	F	>80

6.1. Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the NCDOT Congestion Management Guidelines.

7. CAPACITY ANALYSIS

7.1. Old Faison Road and Bethlehem Road

The existing unsignalized intersection was analyzed under all traffic conditions with the lane configurations and traffic control shown in Table 5. Refer to Table 5 for a summary of the analysis results. Refer to Appendix E for the Synchro capacity analysis reports.

Table 5: Analysis Summary of Old Faison Road and Bethlehem Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	F[2] A[1] --	N / A	F[2] A[1] --	N / A
2032 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	F[2] B[1] --	N / A	F[2] B[1] --	N / A
2032 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	F[2] B[1] --	N / A	F[2] B[1] --	N / A
2032 Build – Scenario A	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[3] E[3] C[3]	D (29)	B[3] B[3] C[3]	B (14)
2032 Build – Scenario B	EB NB SB	1 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	D C C	C (29)	D B C	C (27)
2041 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	F[2] B[1] --	N / A	F[2] B[1] --	N / A
2041 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	F[2] B[1] --	N / A	F[2] B[1] --	N / A
2041 Build – Scenario A	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[3] F[3] D[3]	E (46)	E[3] B[3] C[3]	C (24)
2041 Build – Scenario B	EB NB SB	1 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	D C D	C (33)	D C C	C (30)

Improvements to lane configurations are shown in bold.

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.
3. Level of service for approaching a roundabout.

Capacity analysis of all traffic conditions (with the existing lane geometry and traffic control) indicates the major street left-turn movement on Bethlehem Road is expected to operate at LOS B or better during both weekday AM and PM peak hours. The minor-street approach of Old Faison Road is expected to operate at LOS F under all analysis scenarios during the AM and PM peak hours. Significant queuing is expected at the intersection on all approaches. Refer to Appendix O for SimTraffic queuing reports.

Based on information provided by the Town, the Town of Knightdale's Comprehensive Transportation Plan (CTP) calls for a roundabout at this intersection. Under Scenario A improvements, the intersection is modeled as a single-lane roundabout. Under 2032 build conditions, the roundabout is expected to operate at an overall LOS D during the AM peak hour and LOS B during the PM peak hour. All approaches are expected to operate at LOS D or better, except for the northbound approach during the AM peak hour. It should be noted that the v/c ratio of the roundabout is expected to have a vehicle to capacity ratio of 0.968 during the AM peak hour under 2032 build conditions. Under 2041 build conditions, the roundabout is expected to operate at an overall LOS E during the AM peak hour and LOS C during the PM peak hour. Increased approach delays are expected with the additional increase in traffic.

The intersection was also analyzed as a signalized intersection (under Scenario B) to compare the efficiency of the installation of signal to that of a roundabout. A peak hour signal warrant was analyzed to determine if a signal is warranted. The peak hour signal warrant is met under existing, no-build, and build conditions. Refer to Appendix O for additional signal warrant data. Under this scenario, lane configuration improvements are also necessary to accommodate queuing due to the stopping of movements on Bethlehem Road that are currently free-flow. An exclusive northbound left, southbound right, and eastbound left are considered in the analysis. Under Scenario B, the signalized intersection is expected to operate at an overall LOS C under 2032 build and 2041 build conditions.

Since the intersection operates at a lower delay and manageable queues with a signal, signalizing the intersection is recommended over the roundabout alternative. A fee-in-lieu

contribution towards improvements at this intersection is recommended by the developer as NCDOT turn lane warrants are met for both right and left turn lanes without the proposed development traffic and the intersection meets the peak hour signal warrants under existing conditions.

7.2. Old Faison Road and Tart Farm Road/Site Access A

The existing unsignalized intersection was analyzed under all traffic conditions with the lane configurations and traffic control shown in Table 6. Refer to Table 6 for a summary of the analysis results. Refer to Appendix F for the Synchro capacity analysis reports.

Table 6: Analysis Summary of Old Faison Road and Tart Farm Road/Site Access A

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] B[2]	N/A	-- A[1] B[2]	N/A
2032 No-Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] B[2]	N/A	-- A[1] B[2]	N/A
2032 Build	EB WB NB	1 TH, 1 RT 1 LT-TH 1 LT, 1 RT	-- A[1] D[2]	N/A	-- A[1] D[2]	N/A
2041 No-Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] C[2]	N/A	-- A[1] C[2]	N/A
2041 Build	EB WB NB	1 TH, 1 RT 1 LT-TH 1 LT, 1 RT	-- A[1] E[2]	N/A	-- A[1] D[2]	N/A

Improvements to lane configurations are shown in bold.
1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates the major street left-turn movement on Old Faison Road is expected to operate at LOS A during both weekday AM and PM peak hours. With a two-lane egress, the minor-street approach of existing Tart Farm Road (future Site Access A) is expected to operate at LOS D or better under all future build traffic conditions, with the exception of the AM peak hour under 2041 build conditions. No significant queuing is expected at the intersection.

Turn lane warrants on Old Faison Road were analyzed using the Policy On Street and Driveway Access to North Carolina Highways to determine if exclusive turn lanes were warranted. An eastbound right turn lane with 75 feet of storage and appropriate decel and taper is warranted at this intersection. Refer to Appendix P for the turn lane warrant charts.

No other improvements are recommended by the developer.

7.3. Old Faison Road and Pleasant Colony Drive

The existing unsignalized intersection was analyzed under all traffic conditions with the existing lane configurations and traffic control shown in Table 7. Refer to Table 7 for a summary of the analysis results. Refer to Appendix G for the Synchro capacity analysis reports.

Table 7: Analysis Summary of Old Faison Road and Pleasant Colony Drive

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB WB SB	1 LT, 1 TH 1 TH-RT 1 LT-RT	A[1] -- B[2]	N / A	A[1] -- B[2]	N / A
2032 No-Build	EB WB SB	1 LT, 1 TH 1 TH-RT 1 LT-RT	A[1] -- C[2]	N / A	A[1] -- C[2]	N / A
2032 Build	EB WB SB	1 LT, 1 TH 1 TH-RT 1 LT-RT	B[1] -- D[2]	N / A	A[1] -- D[2]	N / A
2041 No-Build	EB WB SB	1 LT, 1 TH 1 TH-RT 1 LT-RT	B[1] -- D[2]	N / A	A[1] -- C[2]	N / A
2041 Build	EB WB SB	1 LT, 1 TH 1 TH-RT 1 LT-RT	B[1] -- E[2]	N / A	A[1] -- D[2]	N / A

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates the major street left-turn movement on Old Faison Road is expected to operate at LOS B or better during both weekday AM and PM peak hours. The minor-street approach is expected to operate at LOS D or better with the exception of the AM peak hour under 2041 build conditions.

The proposed site is only expected to contribute trips to the major-street through volumes along Old Faison Road at the intersection. Due to the minimal impacts of the proposed development on the intersection, no improvements are recommended by the developer.

7.4. Old Faison Road and Churchill Glen Boulevard/Quiet Way

The existing unsignalized intersection was analyzed under all traffic conditions with the existing lane configurations and traffic control shown in Table 8. Refer to Table 8 for a summary of the analysis results. Refer to Appendix H for the Synchro capacity analysis reports.

Table 8: Analysis Summary of Old Faison Road and Churchill Glen Boulevard/Quiet Way

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB	1 LT, 1 TH-RT	A[1]	N/A	A[1]	N/A
	WB	1 LT, 1 TH-RT	A[1]		A[1]	
	NB	1 LT-TH-RT	C[2]		C[2]	
	SB	1 LT-TH-RT	C[2]		C[2]	
2032 No-Build	EB	1 LT, 1 TH-RT	B[1]	N/A	A[1]	N/A
	WB	1 LT, 1 TH-RT	A[1]		A[1]	
	NB	1 LT-TH-RT	E[2]		D[2]	
	SB	1 LT-TH-RT	F[2]		E[2]	
2032 Build	EB	1 LT, 1 TH-RT	B[1]	N/A	A[1]	N/A
	WB	1 LT, 1 TH-RT	A[1]		A[1]	
	NB	1 LT-TH-RT	F[2]		E[2]	
	SB	1 LT-TH-RT	F[2]		F[2]	
2041 No-Build	EB	1 LT, 1 TH-RT	B[1]	N/A	A[1]	N/A
	WB	1 LT, 1 TH-RT	A[1]		A[1]	
	NB	1 LT-TH-RT	F[2]		D[2]	
	SB	1 LT-TH-RT	F[2]		F[2]	
2041 Build	EB	1 LT, 1 TH-RT	B[1]	N/A	A[1]	N/A
	WB	1 LT, 1 TH-RT	A[1]		A[1]	
	NB	1 LT-TH-RT	F[2]		F[2]	
	SB	1 LT-TH-RT	F[2]		F[2]	

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates the major street left-turn movements on Old Faison Road are expected to operate at LOS B or better during both weekday AM and PM peak hours. The minor-street approaches are expected to experience heavier delays under all future traffic conditions, even without the proposed development. It should be noted that it is not uncommon for minor-street approaches at unsignalized intersections to experience

high delays, especially during the peak times of the day when mainline volumes are the heaviest.

The proposed site is only expected to contribute trips to the major-street through volumes at the intersection. Congestion management requires all turning movements to have a minimum of four vehicles. For this intersection, this rule was applied for several movements including the northbound and southbound through movements crossing from Churchill Glen Boulevard to Quiet Way and vice versa. This leads to inflated delays due to the difficulty of these movements (that are not currently being made) Additionally, exclusive turn lanes are already provided on Old Faison Road at this intersection. Due to the minimal impacts of the proposed development on the intersection, no improvements are recommended by the developer.

7.5. Bethlehem Road and Crosscut Place/Site Access B

The existing unsignalized intersection was analyzed under existing and no-build traffic conditions with the existing lane configurations and traffic control shown in Table 9. With the addition proposed Site Access B as the fourth leg to the intersection, the Town is requiring the installation of a roundabout. Therefore, the intersection was analyzed as a single lane roundabout under all future build traffic conditions. Refer to Table 9 for a summary of the analysis results. Refer to Appendix I for the Synchro capacity analysis reports.

Table 9: Analysis Summary of Bethlehem Road/Crosscut Place (Site Access B)

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N / A	C[2] -- A[1]	N / A
2032 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	E[2] -- B[1]	N / A	D[2] -- A[1]	N / A
2032 Build Roundabout	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[3] B[3] C[3] A[3]	C (16)	A[3] A[3] A[3] B[3]	A (10)
2041 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- B[1]	N / A	E[2] -- A[1]	N / A
2041 Build Roundabout	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[3] B[3] D[3] A[3]	C (22)	A[3] A[3] A[3] B[3]	B (11)

Improvements to lane configurations and traffic control are shown in bold.

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.
3. Level of service for approaching the proposed roundabout improvement.

Capacity analysis of existing and no-build conditions indicates the major street left-turn movement on Bethlehem Road is expected to operate at LOS B or better during both weekday AM and PM peak hours.

Through coordination with NCDOT and the Town, a roundabout intersection is required to be constructed with the addition of proposed Site Access B as the fourth leg to the intersection. Under all future build conditions, the roundabout is expected to operate at an overall LOS C or better during the AM and PM peak hours under build and future conditions.

Other than the installation of a single lane roundabout, no other improvements are recommended by the developer.

7.6. I-87 Eastbound Ramps and Hodge Road

The existing signalized intersection was analyzed under all traffic conditions with the existing lane configurations and traffic control shown in Table 10. Refer to Table 10 for a summary of the analysis results. Refer to Appendix J for the Synchro capacity analysis reports.

Table 10: Analysis Summary of I-87 Eastbound Ramps and Hodge Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB NB SB	2 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	A A B	A (10)	B B C	B (17)
2032 No-Build	EB NB SB	2 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	C C C	C (27)	D D E	D (49)
2032 Build	EB NB SB	2 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	C C C	C (29)	E D E	E (56)
2032 Build – *Field Conditions*	EB NB SB	2 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	C B C	C (23)	D D D	D (50)
2041 No-Build	EB NB SB	2 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	C C D	C (32)	E D E	E (62)
2041 Build	EB NB SB	2 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	D C D	C (34)	E E F	E (72)
2041 Build – *Field Conditions*	EB NB SB	2 LT, 1 RT 1 LT, 1 TH 1 TH, 1 RT	C C D	C (28)	E E E	E (64)

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of all future traffic conditions indicates the signalized intersection is expected to operate at an overall LOS C during the weekday AM peak hour and LOS E during

and the weekday PM peak hour. Significant queuing is expected at the intersection under all future traffic conditions.

Congestion Management capacity analysis guidelines require all permitted / protected phases to be changed to protected only which results in a higher delay at the study intersection. An alternative analysis showing how the intersection operates in the field was performed to better simulate how the intersection functions. The protected phase was changed back to permitted / protected and signal splits were optimized for the intersection. Right-turn-on-red (RTOR) was also permitted in the field conditions analysis.

Due to the proposed site's minimal impacts on the intersection, no improvements are recommended.

7.7. I-87 Westbound Ramps/Old Faison Road and Hodge Road

The existing signalized intersection was analyzed under all traffic conditions with lane configurations and traffic control shown in Table 11. Refer to Table 11 for a summary of the analysis results. Refer to Appendix K for the Synchro capacity analysis reports.

Table 11: Analysis Summary of I-87 Westbound Ramps/Old Faison Road and Hodge Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB WB NB SB	1 LT-TH, 1 RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH, 1 RT	A D C B	C (29)	B C C B	B (19)
2032 No-Build	EB WB NB SB	1 LT-TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH-RT 1 LT, 1 TH, 1 RT	B E E B	E (56)	D D D D	D (40)
2032 Build	EB WB NB SB	1 LT-TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH-RT 1 LT, 1 TH, 1 RT	B F E C	E (70)	D D F D	E (65)
2032 Build – *Field Conditions*	EB WB NB SB	1 LT-TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH-RT 1 LT, 1 TH, 1 RT	B E D B	D (47)	C D E D	D (52)
2041 No-Build	EB WB NB SB	1 LT-TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH-RT 1 LT, 1 TH, 1 RT	B F F B	E (76)	C D D F	E (71)
2041 Build	EB WB NB SB	1 LT-TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH-RT 1 LT, 1 TH, 1 RT	B F F C	F (91)	D D F F	F (112)
2041 Build – *Field Conditions*	EB WB NB SB	1 LT-TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH-RT 1 LT, 1 TH, 1 RT	B F D B	E (61)	D D F D	E (70)

Lane modifications by STIP W-5705AK are underlined.

Even with the improvements associated with NCDOT STIP W-5705AK, capacity analysis of all future traffic conditions indicates that the intersection is expected to operate at an overall E or better, with the exception of the 2041 build conditions. Significant queuing is expected under all future scenarios.

As mentioned previously, Congestion Management capacity analysis guidelines, require all permitted/protected movements at future intersections to be changed to protected phasing only. This would change some of the signal improvements installed by the STIP. An alternative analysis was performed to include the improvements by the STIP and more accurately model field conditions. RTOR was also permitted under the field conditions analysis. Signal timings were optimized for the purposes of this analysis.

Under the field conditions scenario, the intersection is expected to operate at LOS D or better under 2032 build conditions. To mitigate queue lengths exceeding storage lengths, turn lane extensions are recommended by the developer based on 95th percentile queuing. The westbound left-turn lane should be extended to contain 175 feet of storage with appropriate decel and taper. The eastbound left-through lane should be extended to contain 275 feet of storage. The southbound left turn lane should be extended to contain 275 feet of storage.

7.8. Smithfield Road and Old Ferrell Road

The existing unsignalized intersection was analyzed under all traffic conditions with existing lane configurations and traffic control shown in Table 12. Refer to Table 12 for a summary of the analysis results. Refer to Appendix L for the Synchro capacity analysis reports.

Table 12: Analysis Summary of Smithfield Road and Old Ferrell Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N / A	B[2] A[1] --	N / A
2032 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N / A	C[2] A[1] --	N / A
2032 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N / A	C[2] A[1] --	N / A
2041 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N / A	C[2] A[1] --	N / A
2041 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N / A	C[2] A[1] --	N / A

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates that the major street left turn movement on Smithfield Road is expected to operate at LOS A during the AM and PM peak hour. The minor street approach is expected to operate at LOS C or better during the AM and PM peak hour under all conditions. No significant queuing is expected.

No improvements are recommended by the developer.

7.9. Bethlehem Road and Poole Road

The existing signalized intersection was analyzed under all traffic conditions with the existing lane configurations and traffic control shown in Table 13. Refer to Table 13 for a summary of the analysis results. Refer to Appendix M for the Synchro capacity analysis reports.

Table 13: Analysis Summary of Bethlehem Road and Poole Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2023 Existing	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A B E C	D (36)	A A B E	C (34)
2032 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A B F F	F (152)	B A C F	F (104)
2032 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A B F F	F (153)	B A C F	F (109)
2041 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A B F F	F (226)	B A C F	F (142)
2041 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A B F F	F (246)	B A C F	F (156)

Capacity analysis of all future traffic conditions indicates that the intersection is expected to operate at LOS F during the AM and PM peak hour. Significant queuing is expected under all future traffic conditions.

The proposed development is expected to account for less than 2 percent of the total traffic at the intersection during the AM peak hour and less than 3 percent during the PM peak hour. Therefore, due to the proposed site's minimal impacts on the intersection, no improvements are recommended by the developer.

8. CONCLUSIONS

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Lyndon Oaks subdivision development to be located south of Old Faison Road and to the west of Bethlehem Road in Knightdale, North Carolina. The proposed development is proposed to consist of 308 single-family homes, 192 townhomes, and 15,000 square feet of commercial space and be built out in 2031. Site access is proposed via one (1) full-movement driveway at the existing location of Old Faison Road and Tart Farm Road and one roundabout at the existing intersection of Bethlehem Road and Crosscut Place.

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2023 Existing Traffic Conditions
- 2031+1 No-Build Traffic Conditions
- 2031+1 Build Traffic Conditions
- 2031+10 No-Build Traffic Conditions
- 2031+10 Build Traffic Conditions

Trip Generation

It is estimated that the proposed development will generate approximately 5,442 total site trips during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 378 trips (119 entering and 259 exiting) will occur during the weekday AM peak hour and 520 trips (313 entering and 207 exiting) will occur during the weekday PM peak hour. Not all trips are expected to occur as new trips as some are expected to be captured internally to the site, while others are expected to be drawn from traffic that is already on the adjacent roadway network.

Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to NCDOT Congestion Management Guidelines. Refer to section 6.1 of this report for a detailed description of any adjustments to these guidelines made throughout the analysis.

9. RECOMMENDATIONS

Based on the findings of this study, specific geometric improvements have been identified and are recommended to accommodate future traffic conditions. See a more detailed description of the recommended improvements below. Refer to Figure 14 for an illustration of the recommended lane configuration for the proposed development.

Recommended Improvements by STIP W-5705AK

Westbound I-87 Ramps and Hodge Road

- Construct westbound right turn lane with 100 feet of storage and appropriate decel and taper.
- Construct westbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Modify signal timings and signal phasing

Recommended Improvements by Developer

Old Faison Road and Bethlehem Road

- Coordinate with Town on desired improvements. Provide fee in lieu contribution as necessary

Old Faison Road and Tart Farm Road/Site Access A

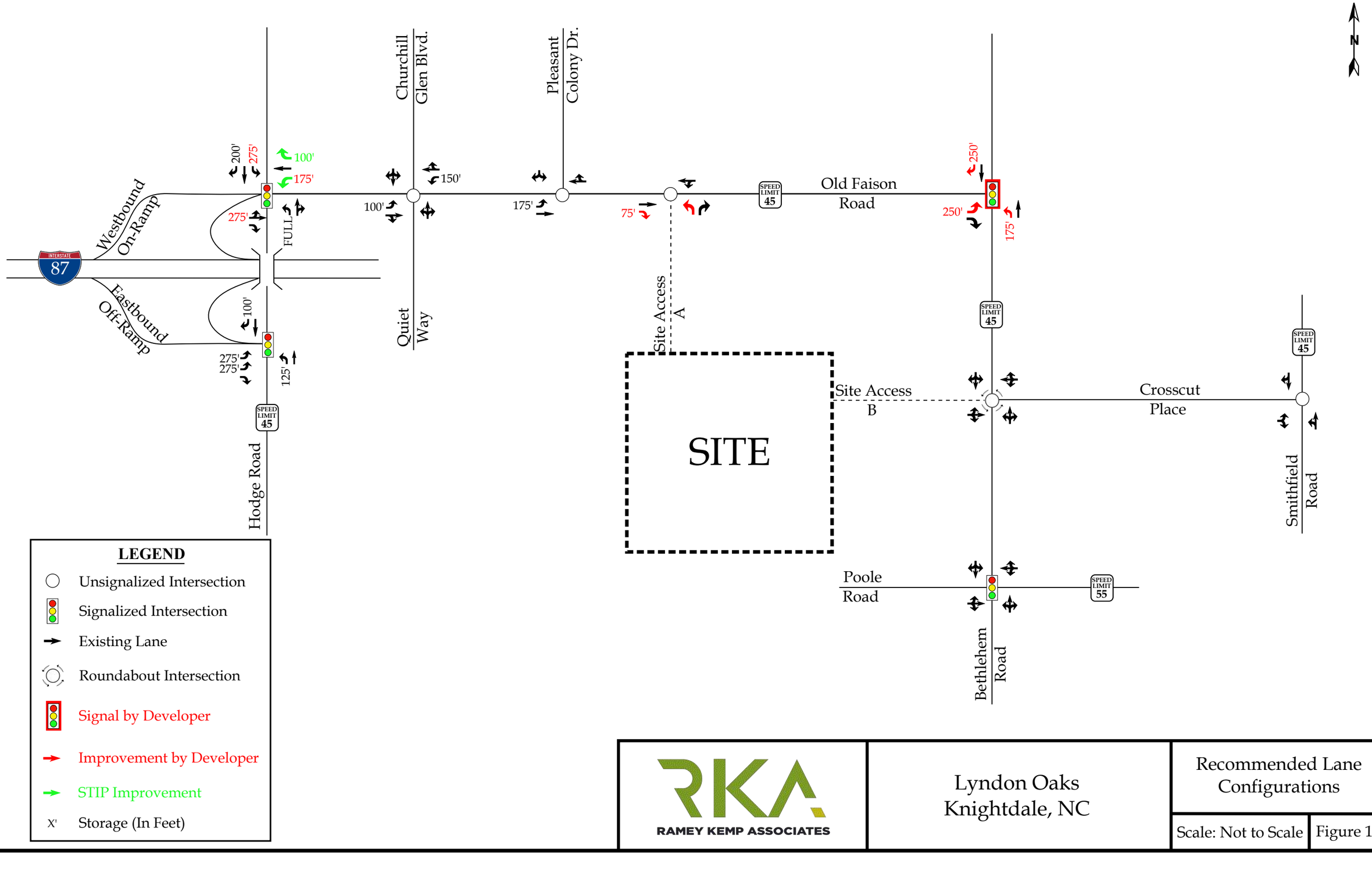
- Construct an eastbound right turn lane with 75 feet of storage and appropriate decel and taper.
- Construct exclusive northbound left turn lane with full storage.
- Provide stop control for northbound approach.

Bethlehem Road and Crosscut Place/Site Access B

- Construct a single-lane roundabout.
- Construct eastbound approach with one ingress and one egress lane.
- Provide yield control for eastbound approach.

Westbound I-87 Ramps and Hodge Road

- Extend westbound left turn lane to contain 175 feet of storage and appropriate decel and taper.
- Extend southbound left turn lane to contain 275 feet of storage and appropriate decel and taper.
- Extend eastbound left-through lane to contain 275 feet of storage and appropriate decel and taper.



RAMEY KEMP ASSOCIATES

Lyndon Oaks
Knightdale, NC

Recommended Lane Configurations

Scale: Not to Scale | Figure 14

Memorandum

TO:	Andrew Spiliotis – Town of Knightdale
FROM:	Samuel MacDonald, P.E. Anirban Das
RE:	Bethlehem Road at Old Faison Road Roundabout Analysis
DATE:	June 5, 2024 (*Revision to the February 20, 2024 memo)*

As requested by the Town of Knightdale, AMT has conducted a roundabout analysis of the intersection of Bethlehem Road and Old Faison Road. Based on the Lyndon Oaks TIA report submitted to the Town in November 2023, a single lane roundabout at this intersection is expected to fail during the 2032 Build conditions. However, the Town CTP identifies a roundabout at this location and the Town Council has also expressed a strong interest in the intersection control being a roundabout. A memorandum documenting the traffic analysis and the results obtained from the different roundabout options studied at this intersection was submitted on February 20, 2024.

Assuming the completion of the I-540 project, AMT deduced revised turning movement volumes at the study intersection based on the Regional Triangle Travel Demand Model (TDM). This revised memorandum documents the additional traffic analysis conducted and the results obtained and is documented in the section on Page 6.

Introduction

The roundabout analysis at the Bethlehem Road and Old Faison Road intersection was conducted based on the 2032 Build traffic volumes obtained from the Lyndon Oaks TIA report. The analysis was conducted based on the SIDRA software (Version 9.0). The Level of Service (LOS), Delay, v/c ratio (volume to capacity ratio) and the 95th percentile queues were considered as the study parameters. Different options studied were:

- Option 1: Single-lane roundabout (for comparison purpose only)
- Option 2: Single-lane roundabout with SBR and EBR turn lanes
- Option 3: Double-lane roundabout with turn lanes
- Option 4: Hybrid roundabout with SBR and EBR turn lanes and NBT bypass lane

Option 1: Single-lane roundabout

A single lane roundabout was considered at this intersection with one lane at each approach. The concept design is shown in Figure 1 and the traffic analysis results are shown in Table 1.

Figure 1: Option 1 Concept Plan

Option 1: Single Lane Roundabout						
Bethlehem Road at Old Faison Road	2032 AM			2032 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	E (37.2)	0.953	1206	B (11.0)	0.536	111
Southbound Approach (Bethlehem Road)	C (21.6)	0.771	293	C (15.9)	0.758	273
Eastbound Approach (Old Faison Road)	A (7.1)	0.327	42	C (24.2)	0.780	261

Table 1: Option 1 Traffic Analysis

Table 1 traffic analysis results show that:

- In the AM peak hour, the northbound approach is expected to operate at unacceptable conditions with LOS E and v/c ratio 0.953. The queue along the northbound approach is also expected to exceed 1200 ft.
- In the AM peak hour, the southbound approach is also expected to have a queue of approximately 300 ft.
- In the PM peak hour, the v/c ratio at the southbound and eastbound approaches are also very close to the threshold value of 0.85. The southbound and the eastbound approaches are expected to have queues of approximately 300 ft.

Option 2: Single-lane roundabout w/ SBR and EBR turn lanes

A single lane roundabout was considered at this intersection with the southbound right turn lane and the eastbound right turn lane as slip lanes at the roundabout. The concept design is shown in Figure 2 and the traffic analysis results are shown in Table 2.

Figure 2: Option 2 Concept Plan

Option 2: Single Lane Roundabout w/ SBR & EBR turn lanes						
Bethlehem Road at Old Faison Road	2032 AM			2032 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	E (37.2)	0.953	1206	B (11.0)	0.536	111
Southbound Approach (Bethlehem Road)	A (8.1)	0.369	43	A (7.2)	0.486	79
Eastbound Approach (Old Faison Road)	A (5.1)	0.213	23	A (9.4)	0.455	68

Table 2: Option 2 Traffic Analysis

Table 2 traffic analysis results show that:

- In the AM peak hour, the northbound approach is expected to continue to operate at unacceptable conditions with LOS E and v/c ratio 0.953. The queue along the northbound approach is also expected to exceed 1200 ft.
- In the AM peak hour, the southbound approach is expected to operate acceptably with a queue of 43 ft. since a separate right turn slip lane has been provided.
- In the PM peak hour, the southbound and the eastbound approaches are expected to operate acceptably with queues of 79 ft. and 68 ft. respectively since separate right turn slip lanes have been provided.

Option 3: Double Lane roundabout with turn lanes

A double lane roundabout was considered at this intersection with turn lanes at each approach at the roundabout. The concept design is shown in Figure 3 and the traffic analysis results are shown in Table 3a.

Figure 3: Option 3 Concept Plan

Option 3: Double Lane Roundabout w/ turn lanes						
Bethlehem Road at Old Faison Road	2032 AM			2032 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	A (8.1)	0.475	71	A (6.8)	0.362	44
Southbound Approach (Bethlehem Road)	A (8.1)	0.369	43	A (7.2)	0.486	79
Eastbound Approach (Old Faison Road)	A (5.1)	0.213	23	A (9.4)	0.455	68

Table 3a: Option 3 Build Year 2032 Traffic Analysis

Table 3a traffic analysis results show that the roundabout is expected to operate acceptably during the 2032 AM and PM peak hours. Since this roundabout option is expected to operate acceptably during 2032, this roundabout was also studied for the 2041 conditions based on the 2041 AM and PM peak hour traffic volumes obtained from the Lyndon Oaks Traffic Impact Analysis report. The results are shown in Table 3b.

Option 3: Double Lane Roundabout w/ turn lanes						
Bethlehem Road at Old Faison Road	2041 AM			2041 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	A (9.0)	0.525	83	A (7.5)	0.405	51
Southbound Approach (Bethlehem Road)	A (9.1)	0.417	57	A (7.8)	0.532	92
Eastbound Approach (Old Faison Road)	A (5.4)	0.235	26	B (10.9)	0.520	88

Table 3b: Option 3 2041 Traffic Analysis

Table 3b traffic analysis results show that the roundabout is expected to continue to operate acceptably during the 2041 AM and PM peak hours.

Option 4: Hybrid roundabout w/ SBR and EBR turn lanes and NBT bypass lane

A hybrid roundabout was considered at this intersection with turn lanes at each approach at the roundabout and the northbound through movement as a bypass lane which does not enter the roundabout. The concept design is shown in Figure 4 and the traffic analysis results are shown in Table 4a.

Figure 4: Option 4 Concept Plan

Option 4: Hybrid Roundabout w/ SBR & EBR turn lanes & NBT bypass lane						
Bethlehem Road at Old Faison Road	2032 AM			2032 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	A (6.4)	0.429	61	A (4.6)	0.185	14
Southbound Approach (Bethlehem Road)	B (12.3)	0.369	43	B (12.2)	0.486	79
Eastbound Approach (Old Faison Road)	A (6.2)	0.213	23	B (11.5)	0.455	68

Table 4a: Option 4 Build Year 2032 Traffic Analysis

Table 4a traffic analysis results show that the roundabout is expected to operate acceptably during the 2032 AM and PM peak hours. Since this roundabout option is expected to operate acceptably during 2032, this roundabout was also studied for the 2041 conditions based on the 2041 AM and PM peak hour traffic volumes obtained from the Lyndon Oaks Traffic Impact Analysis report. The results are shown in Table 4b.

Option 4: Hybrid Roundabout w/ SBR & EBR lanes & NBT bypass lane						
Bethlehem Road at Old Faison Road	2041 AM			2041 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	A (6.9)	0.470	69	A (4.9)	0.202	15
Southbound Approach (Bethlehem Road)	B (13.5)	0.417	57	B (13.1)	0.532	92
Eastbound Approach (Old Faison Road)	A (6.5)	0.235	26	B (13.1)	0.520	88

Table 4b: Option 4 2041 Traffic Analysis

Table 4b traffic analysis results show that the roundabout is expected to continue to operate acceptably during the 2041 AM and PM peak hours.

Additional Roundabout Analysis based on the I-540 Project Completion:

AMT has been tasked with providing additional roundabout analyses for the study intersection assuming that the I-540 Project is completed. The I-540 project extends the Triangle Expressway from NC 55 in the Town of Apex to I-87/US 64/US 264 in the Town of Knightdale, providing an alternative travel route for many commuters in the area and therefore, reducing traffic volumes on existing local roadways. It is assumed that with the I-540 extension in place, traffic volumes at the study intersection will be reduced as less motorists will need to access the I 87/Hodge Road/Old Faison Road interchange, and alternatively, access I-540 via Poole Road and Auburn Knightdale Road.

The revised study intersection peak hour turning movement volumes for year 2041 are based on the Regional Triangle Travel Demand Model (TDM) and is shown in Figure 5.

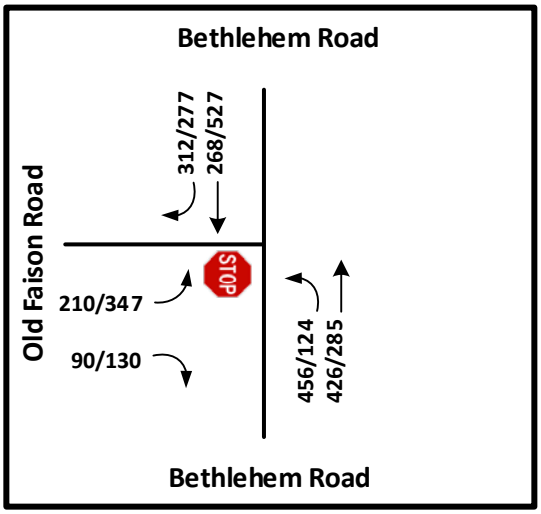


Figure 5: Revised 2041 Intersection Peak Hour Volumes

Based on the above traffic volumes, the analysis was conducted by the SIDRA software (Version 9.0). The Level of Service (LOS), Delay, v/c ratio (volume to capacity ratio) and the 95th percentile queues were considered as the study parameters. The different options studied were:

- Option 1: Single-lane roundabout (See Figure 1 for concept plan)
- Option 2: Single-lane roundabout with SBR and EBR turn lanes (See Figure 2 for concept plan)

The traffic analysis results for Option 1 (Single-lane roundabout) are shown in Table 5.

Option 1: Revised 2041 Single Lane Roundabout						
Bethlehem Road at Old Faison Road	2032 AM			2032 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	D (30.2)	0.909	939	B (10.3)	0.493	89
Southbound Approach (Bethlehem Road)	C (23.3)	0.792	314	C (15.5)	0.751	246
Eastbound Approach (Old Faison Road)	A (7.1)	0.331	43	C (19.3)	0.706	196

Table 5: Option 1 Revised 2041 Traffic Analysis

Table 5 traffic analysis results show that:

- In the AM peak hour, the northbound approach is expected to operate at unacceptable conditions with v/c ratio 0.909. The queue along the northbound approach is also expected to exceed 900 ft.
- In the AM peak hour, the queue along the southbound approach is also expected to exceed 300 ft.
- In the PM peak hour, the southbound and the eastbound approaches are expected to have queues of approximately 300 ft.

The traffic analysis results for Option 2 (Single-lane roundabout with SBR and EBR turn lanes) are shown in Table 6.

Option 2: Revised 2041 Single Lane Roundabout w/ SBR & EBR turn lanes						
Bethlehem Road at Old Faison Road	2032 AM			2032 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	D (30.2)	0.909	939	B (10.3)	0.493	89
Southbound Approach (Bethlehem Road)	A (8.4)	0.391	50	A (7.0)	0.471	75
Eastbound Approach (Old Faison Road)	A (5.1)	0.218	24	A (9.5)	0.468	73

Table 6: Option 2 Revised 2041 Traffic Analysis

Table 6 traffic analysis results show that:

- In the AM peak hour, the northbound approach is expected to operate at unacceptable conditions with v/c ratio 0.909. The queue along the northbound approach is also expected to exceed 900 ft.
- In the PM peak hour, all approaches are expected to operate with acceptable v/c ratio and the queues are expected to be less than 100 ft.

Since the northbound approach is expected to operate at unacceptable conditions in the AM peak hour, an additional roundabout option was considered where the northbound approach has a separate left turn lane and a through lane approaching the roundabout. A concept plan is shown in Figure 6.

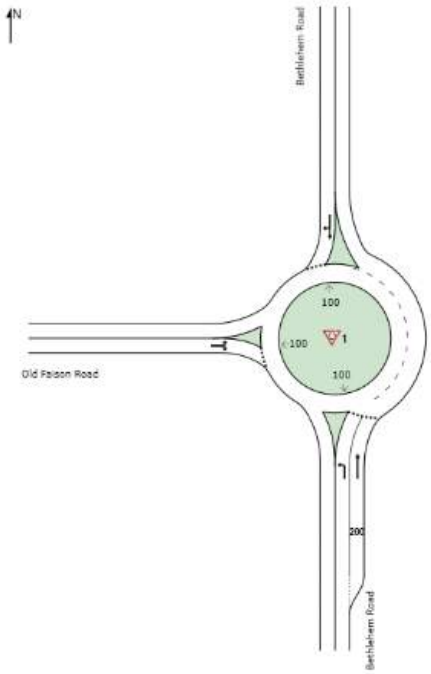


Figure 6: Hybrid roundabout with 2 lanes for Northbound approach

The traffic analysis results for this option are shown in Table 7.

Revised 2041 Single Lane Roundabout w/ NBL and NBT lanes						
Bethlehem Road at Old Faison Road	2032 AM			2032 PM		
	LOS (Delay)	v/c	Queue (ft.)	LOS (Delay)	v/c	Queue (ft.)
Northbound Approach (Bethlehem Road)	A (7.8)	0.445	64	A (6.4)	0.320	38
Southbound Approach (Bethlehem Road)	C (23.3)	0.792	314	C (15.5)	0.751	246
Eastbound Approach (Old Faison Road)	A (7.1)	0.331	43	C (19.3)	0.706	196

Table 7: NB 2 lanes roundabout Revised 2041 Traffic Analysis

Table 7 traffic analysis results show that:

- In the AM peak hour, all approaches are expected to operate at acceptable v/c ratio. The queue along the southbound approach is also expected to exceed 300 ft.
- In the PM peak hour, all approaches are expected to operate with acceptable v/c ratio. The queue along the southbound approach is expected to be approximately 250 ft. and the queue along the eastbound approach is expected to be approximately 200 ft.

The additional roundabout analysis show that once the I-540 project is expected to be completed and the traffic volumes at the study intersection is expected to be lower, a single lane roundabout or a single lane roundabout with southbound right turn and eastbound right turn lanes are still not expected to operate acceptably.

A hybrid roundabout option with single southbound and eastbound approaches and a separate left turn lane and through lane for the northbound approach is preferable for the intersection to operate acceptably (acceptable v/c ratio) even though long queues are still expected.

Option 3 (double lane roundabout) and Option 4 (Hybrid roundabout with SB and EB turns and NBT bypass lane) are also proposed if a roundabout is preferable at this intersection.

SIDRA REPORTS

LANE SUMMARY

Site: 1 [Option 1-2032 AM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	1012	3.0	1061	0.953	100	37.2	LOS E	47.1	1205.8	Full	1600	0.0	0.0
Approach	1012	3.0		0.953		37.2	LOS E	47.1	1205.8				
North: Bethlehem Road													
Lane 1[d]	624	3.0	809	0.771	100	21.6	LOS C	11.4	292.6	Full	1600	0.0	0.0
Approach	624	3.0		0.771		21.6	LOS C	11.4	292.6				
West: Old Faison Road													
Lane 1[d]	320	3.0	978	0.327	100	7.1	LOS A	1.7	42.3	Full	1600	0.0	0.0
Approach	320	3.0		0.327		7.1	LOS A	1.7	42.3				
Intersection	1955	3.0		0.953		27.3	LOS D	47.1	1205.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	480	532	1012	3.0	1061	0.953	100	NA	NA
Approach	480	532	1012	3.0		0.953			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	300	324	624	3.0	809	0.771	100	NA	NA
Approach	300	324	624	3.0		0.771			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	222	98	320	3.0	978	0.327	100	NA	NA
Approach	222	98	320	3.0		0.327			

	Total	%HV	Deg.Satn (v/c)
Intersection	1955	3.0	0.953

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 1-2032 PM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	491	3.0	917	0.536	100	11.0	LOS B	4.4	111.4	Full	1600	0.0	0.0
Approach	491	3.0		0.536		11.0	LOS B	4.4	111.4				
North: Bethlehem Road													
Lane 1[d]	880	3.0	1162	0.758	100	15.9	LOS C	10.6	272.6	Full	1600	0.0	0.0
Approach	880	3.0		0.758		15.9	LOS C	10.6	272.6				
West: Old Faison Road													
Lane 1[d]	562	3.0	721	0.780	100	24.2	LOS C	10.2	260.7	Full	1600	0.0	0.0
Approach	562	3.0		0.780		24.2	LOS C	10.2	260.7				
Intersection	1934	3.0		0.780		17.1	LOS C	10.6	272.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	136	355	491	3.0	917	0.536	100	NA	NA
Approach	136	355	491	3.0		0.536			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	590	290	880	3.0	1162	0.758	100	NA	NA
Approach	590	290	880	3.0		0.758			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	361	201	562	3.0	721	0.780	100	NA	NA
Approach	361	201	562	3.0		0.780			

	Total	%HV	Deg.Satn (v/c)
Intersection	1934	3.0	0.780

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 2-2032 AM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 2
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	1012	3.0	1061	0.953	100	37.2	LOS E	47.1	1205.8	Full	1600	0.0	0.0
Approach	1012	3.0		0.953		37.2	LOS E	47.1	1205.8				
North: Bethlehem Road													
Lane 1	300	3.0	879	0.341	100	7.9	LOS A	1.5	39.2	Full	1600	0.0	0.0
Lane 2[d]	324	3.0	879	0.369	100	8.3	LOS A	1.7	43.2	Short	200	0.0	NA
Approach	624	3.0		0.369		8.1	LOS A	1.7	43.2				
West: Old Faison Road													
Lane 1[d]	222	3.0	1041	0.213	100	5.5	LOS A	0.9	23.4	Full	1600	0.0	0.0
Lane 2	98	3.0	1041	0.094	100	4.3	LOS A	0.4	9.3	Short	200	0.0	NA
Approach	320	3.0		0.213		5.1	LOS A	0.9	23.4				
Intersection	1955	3.0		0.953		22.7	LOS C	47.1	1205.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	480	532	1012	3.0	1061	0.953	100	NA	NA
Approach	480	532	1012	3.0		0.953			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	300	-	300	3.0	879	0.341	100	NA	NA
Lane 2	-	324	324	3.0	879	0.369	100	0.0	1
Approach	300	324	624	3.0		0.369			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	222	-	222	3.0	1041	0.213	100	NA	NA
Lane 2	-	98	98	3.0	1041	0.094	100	0.0	1
Approach	222	98	320	3.0		0.213			

	Total	%HV	Deg.Satn (v/c)
Intersection	1955	3.0	0.953

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 2-2032 PM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 2
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	491	3.0	917	0.536	100	11.0	LOS B	4.4	111.4	Full	1600	0.0	0.0
Approach	491	3.0		0.536		11.0	LOS B	4.4	111.4				
North: Bethlehem Road													
Lane 1[d]	590	3.0	1214	0.486	100	8.2	LOS A	3.1	78.5	Full	1600	0.0	0.0
Lane 2	290	3.0	1214	0.239	100	5.1	LOS A	1.1	28.4	Short	200	0.0	NA
Approach	880	3.0		0.486		7.2	LOS A	3.1	78.5				
West: Old Faison Road													
Lane 1[d]	361	3.0	793	0.455	100	10.6	LOS B	2.7	68.2	Full	1600	0.0	0.0
Lane 2	201	3.0	793	0.254	100	7.3	LOS A	1.0	26.4	Short	200	0.0	NA
Approach	562	3.0		0.455		9.4	LOS A	2.7	68.2				
Intersection	1934	3.0		0.536		8.8	LOS A	4.4	111.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	136	355	491	3.0	917	0.536	100	NA	NA
Approach	136	355	491	3.0		0.536			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	590	-	590	3.0	1214	0.486	100	NA	NA
Lane 2	-	290	290	3.0	1214	0.239	100	0.0	1
Approach	590	290	880	3.0		0.486			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	361	-	361	3.0	793	0.455	100	NA	NA
Lane 2	-	201	201	3.0	793	0.254	100	0.0	1
Approach	361	201	562	3.0		0.455			

	Total	%HV	Deg.Satn (v/c)
Intersection	1934	3.0	0.536

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 3-2032 AM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1	480	3.0	1120	0.429	100	7.8	LOS A	2.4	60.6	Full	1600	0.0	0.0
Lane 2[d]	532	3.0	1120	0.475	100	8.5	LOS A	2.8	70.9	Short	200	0.0	NA
Approach	1012	3.0		0.475		8.1	LOS A	2.8	70.9				
North: Bethlehem Road													
Lane 1	300	3.0	879	0.341	100	7.9	LOS A	1.5	39.2	Full	1600	0.0	0.0
Lane 2[d]	324	3.0	879	0.369	100	8.3	LOS A	1.7	43.2	Short	200	0.0	NA
Approach	624	3.0		0.369		8.1	LOS A	1.7	43.2				
West: Old Faison Road													
Lane 1[d]	222	3.0	1041	0.213	100	5.5	LOS A	0.9	23.4	Full	1600	0.0	0.0
Lane 2	98	3.0	1041	0.094	100	4.3	LOS A	0.4	9.3	Short	200	0.0	NA
Approach	320	3.0		0.213		5.1	LOS A	0.9	23.4				
Intersection	1955	3.0		0.475		7.6	LOS A	2.8	70.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	480	-	480	3.0	1120	0.429	100	NA	NA
Lane 2	-	532	532	3.0	1120	0.475	100	0.0	1
Approach	480	532	1012	3.0		0.475			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	300	-	300	3.0	879	0.341	100	NA	NA
Lane 2	-	324	324	3.0	879	0.369	100	0.0	1
Approach	300	324	624	3.0		0.369			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	222	-	222	3.0	1041	0.213	100	NA	NA
Lane 2	-	98	98	3.0	1041	0.094	100	0.0	1
Approach	222	98	320	3.0		0.213			

	Total	%HV	Deg.Satn (v/c)
Intersection	1955	3.0	0.475

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 3-2032 PM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1	136	3.0	983	0.138	100	4.9	LOS A	0.5	14.0	Full	1600	0.0	0.0
Lane 2[d]	355	3.0	983	0.362	100	7.5	LOS A	1.7	44.3	Short	200	0.0	NA
Approach	491	3.0		0.362		6.8	LOS A	1.7	44.3				
North: Bethlehem Road													
Lane 1[d]	590	3.0	1214	0.486	100	8.2	LOS A	3.1	78.5	Full	1600	0.0	0.0
Lane 2	290	3.0	1214	0.239	100	5.1	LOS A	1.1	28.4	Short	200	0.0	NA
Approach	880	3.0		0.486		7.2	LOS A	3.1	78.5				
West: Old Faison Road													
Lane 1[d]	361	3.0	793	0.455	100	10.6	LOS B	2.7	68.2	Full	1600	0.0	0.0
Lane 2	201	3.0	793	0.254	100	7.3	LOS A	1.0	26.4	Short	200	0.0	NA
Approach	562	3.0		0.455		9.4	LOS A	2.7	68.2				
Intersection	1934	3.0		0.486		7.7	LOS A	3.1	78.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	136	-	136	3.0	983	0.138	100	NA	NA
Lane 2	-	355	355	3.0	983	0.362	100	0.0	1
Approach	136	355	491	3.0		0.362			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	590	-	590	3.0	1214	0.486	100	NA	NA
Lane 2	-	290	290	3.0	1214	0.239	100	0.0	1
Approach	590	290	880	3.0		0.486			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	361	-	361	3.0	793	0.455	100	NA	NA
Lane 2	-	201	201	3.0	793	0.254	100	0.0	1
Approach	361	201	562	3.0		0.455			

	Total	%HV	Deg.Satn (v/c)
Intersection	1934	3.0	0.486

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 4-2032 AM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	480	3.0	1120	0.429	100	7.8	LOS A	2.4	60.6	Full	1600	0.0	0.0
Lane 2	532	3.0	1918	0.277	100	5.2	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	1012	3.0		0.429		6.4	LOS A	2.4	60.6				
North: Bethlehem Road													
Lane 1	300	3.0	879	0.341	100	11.6	LOS B	1.5	39.2	Full	1600	0.0	0.0
Lane 2[d]	324	3.0	879	0.369	100	13.0	LOS B	1.7	43.2	Short	200	0.0	NA
Approach	624	3.0		0.369		12.3	LOS B	1.7	43.2				
West: Old Faison Road													
Lane 1[d]	222	3.0	1041	0.213	100	5.5	LOS A	0.9	23.4	Full	1600	0.0	0.0
Lane 2	98	3.0	1041	0.094	100	8.0	LOS A	0.4	9.3	Short	200	0.0	NA
Approach	320	3.0		0.213		6.2	LOS A	0.9	23.4				
Intersection	1955	3.0		0.429		8.2	LOS A	2.4	60.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	480	-	480	3.0	1120	0.429	100	NA	NA
Lane 2	-	532	532	3.0	1918	0.277	100	0.0	1
Approach	480	532	1012	3.0		0.429			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	300	-	300	3.0	879	0.341	100	NA	NA
Lane 2	-	324	324	3.0	879	0.369	100	0.0	1
Approach	300	324	624	3.0		0.369			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	222	-	222	3.0	1041	0.213	100	NA	NA
Lane 2	-	98	98	3.0	1041	0.094	100	0.0	1
Approach	222	98	320	3.0		0.213			

	Total	%HV	Deg.Satn (v/c)
Intersection	1955	3.0	0.429

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	0	0	3.00	2.00	398	1800	0.221	2.0	3.7
Merge Lane	1	-	100.0	Merge Lane is not Opposed				0	1800	0.000	0.0	0.0
North Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	222	228	3.00	2.00	532	1584	0.335	2.3	5.1
Merge Lane	1	-	100.0	Merge Lane is not Opposed				222	1800	0.123	0.0	0.0
West Exit: Old Faison Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	480	495	3.00	2.00	324	1363	0.238	2.6	4.7
Merge Lane	1	-	100.0	Merge Lane is not Opposed				480	1800	0.267	0.0	0.0

LANE SUMMARY

Site: 1 [Option 4-2032 PM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	136	3.0	983	0.138	100	4.9	LOS A	0.5	14.0	Full	1600	0.0	0.0
Lane 2	355	3.0	1918	0.185	100	4.5	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	491	3.0		0.185		4.6	LOS A	0.5	14.0				
North: Bethlehem Road													
Lane 1[d]	590	3.0	1214	0.486	100	13.9	LOS B	3.1	78.5	Full	1600	0.0	0.0
Lane 2	290	3.0	1214	0.239	100	8.6	LOS A	1.1	28.4	Short	200	0.0	NA
Approach	880	3.0		0.486		12.2	LOS B	3.1	78.5				
West: Old Faison Road													
Lane 1[d]	361	3.0	793	0.455	100	10.6	LOS B	2.7	68.2	Full	1600	0.0	0.0
Lane 2	201	3.0	793	0.254	100	13.1	LOS B	1.0	26.4	Short	200	0.0	NA
Approach	562	3.0		0.455		11.5	LOS B	2.7	68.2				
Intersection	1934	3.0		0.486		10.0	LOS B	3.1	78.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	136	-	136	3.0	983	0.138	100	NA	NA
Lane 2	-	355	355	3.0	1918	0.185	100	0.0	1
Approach	136	355	491	3.0		0.185			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	590	-	590	3.0	1214	0.486	100	NA	NA
Lane 2	-	290	290	3.0	1214	0.239	100	0.0	1
Approach	590	290	880	3.0		0.486			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	361	-	361	3.0	793	0.455	100	NA	NA
Lane 2	-	201	201	3.0	793	0.254	100	0.0	1
Approach	361	201	562	3.0		0.455			

	Total	%HV	Deg.Satn (v/c)
Intersection	1934	3.0	0.486

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	0	0	3.00	2.00	791	1800	0.440	2.0	5.8
Merge Lane	1	-	100.0	Merge Lane is not Opposed				0	1800	0.000	0.0	0.0
North Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	361	372	3.00	2.00	355	1462	0.243	2.5	4.5
Merge Lane	1	-	100.0	Merge Lane is not Opposed				361	1800	0.200	0.0	0.0
West Exit: Old Faison Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	136	140	3.00	2.00	290	1665	0.174	2.2	3.5
Merge Lane	1	-	100.0	Merge Lane is not Opposed				136	1800	0.075	0.0	0.0

LANE SUMMARY

Site: 1 [Option 3-2041 AM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1	518	3.0	1103	0.470	100	8.5	LOS A	2.7	69.1	Full	1600	0.0	0.0
Lane 2[d]	579	3.0	1103	0.525	100	9.4	LOS A	3.2	82.8	Short	200	0.0	NA
Approach	1098	3.0		0.525		9.0	LOS A	3.2	82.8				
North: Bethlehem Road													
Lane 1	327	3.0	848	0.386	100	8.8	LOS A	1.9	48.3	Full	1600	0.0	0.0
Lane 2[d]	353	3.0	848	0.417	100	9.3	LOS A	2.2	57.2	Short	200	0.0	NA
Approach	680	3.0		0.417		9.1	LOS A	2.2	57.2				
West: Old Faison Road													
Lane 1[d]	238	3.0	1015	0.235	100	5.8	LOS A	1.0	26.0	Full	1600	0.0	0.0
Lane 2	102	3.0	1015	0.101	100	4.4	LOS A	0.4	10.0	Short	200	0.0	NA
Approach	340	3.0		0.235		5.4	LOS A	1.0	26.0				
Intersection	2118	3.0		0.525		8.4	LOS A	3.2	82.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	518	-	518	3.0	1103	0.470	100	NA	NA
Lane 2	-	579	579	3.0	1103	0.525	100	0.0	1
Approach	518	579	1098	3.0		0.525			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	327	-	327	3.0	848	0.386	100	NA	NA
Lane 2	-	353	353	3.0	848	0.417	100	0.0	1
Approach	327	353	680	3.0		0.417			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	238	-	238	3.0	1015	0.235	100	NA	NA
Lane 2	-	102	102	3.0	1015	0.101	100	0.0	1
Approach	238	102	340	3.0		0.235			

	Total	%HV	Deg.Satn (v/c)
Intersection	2118	3.0	0.525

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 3-2041 PM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1	140	3.0	954	0.147	100	5.2	LOS A	0.6	14.9	Full	1600	0.0	0.0
Lane 2[d]	387	3.0	954	0.405	100	8.3	LOS A	2.0	51.0	Short	200	0.0	NA
Approach	527	3.0		0.405		7.5	LOS A	2.0	51.0				
North: Bethlehem Road													
Lane 1[d]	643	3.0	1209	0.532	100	9.0	LOS A	3.6	91.8	Full	1600	0.0	0.0
Lane 2	314	3.0	1209	0.260	100	5.3	LOS A	1.2	31.5	Short	200	0.0	NA
Approach	958	3.0		0.532		7.8	LOS A	3.6	91.8				
West: Old Faison Road													
Lane 1[d]	392	3.0	754	0.520	100	12.4	LOS B	3.4	88.0	Full	1600	0.0	0.0
Lane 2	212	3.0	754	0.281	100	8.0	LOS A	1.1	29.3	Short	200	0.0	NA
Approach	604	3.0		0.520		10.9	LOS B	3.4	88.0				
Intersection	2089	3.0		0.532		8.6	LOS A	3.6	91.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	140	-	140	3.0	954	0.147	100	NA	NA
Lane 2	-	387	387	3.0	954	0.405	100	0.0	1
Approach	140	387	527	3.0		0.405			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	643	-	643	3.0	1209	0.532	100	NA	NA
Lane 2	-	314	314	3.0	1209	0.260	100	0.0	1
Approach	643	314	958	3.0		0.532			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	392	-	392	3.0	754	0.520	100	NA	NA
Lane 2	-	212	212	3.0	754	0.281	100	0.0	1
Approach	392	212	604	3.0		0.520			

	Total	%HV	Deg.Satn (v/c)
Intersection	2089	3.0	0.532

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 4-2041 AM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	518	3.0	1103	0.470	100	8.5	LOS A	2.7	69.1	Full	1600	0.0	0.0
Lane 2	579	3.0	1918	0.302	100	5.6	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	1098	3.0		0.470		6.9	LOS A	2.7	69.1				
North: Bethlehem Road													
Lane 1	327	3.0	848	0.386	100	12.6	LOS B	1.9	48.3	Full	1600	0.0	0.0
Lane 2[d]	353	3.0	848	0.417	100	14.3	LOS B	2.2	57.2	Short	200	0.0	NA
Approach	680	3.0		0.417		13.5	LOS B	2.2	57.2				
West: Old Faison Road													
Lane 1[d]	238	3.0	1015	0.235	100	5.8	LOS A	1.0	26.0	Full	1600	0.0	0.0
Lane 2	102	3.0	1015	0.101	100	8.3	LOS A	0.4	10.0	Short	200	0.0	NA
Approach	340	3.0		0.235		6.5	LOS A	1.0	26.0				
Intersection	2118	3.0		0.470		9.0	LOS A	2.7	69.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	518	-	518	3.0	1103	0.470	100	NA	NA
Lane 2	-	579	579	3.0	1918	0.302	100	0.0	1
Approach	518	579	1098	3.0		0.470			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	327	-	327	3.0	848	0.386	100	NA	NA
Lane 2	-	353	353	3.0	848	0.417	100	0.0	1
Approach	327	353	680	3.0		0.417			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	238	-	238	3.0	1015	0.235	100	NA	NA
Lane 2	-	102	102	3.0	1015	0.101	100	0.0	1
Approach	238	102	340	3.0		0.235			
	Total	%HV	Deg.Satn (v/c)						
Intersection	2118	3.0	0.470						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	0	0	3.00	2.00	429	1800	0.239	2.0	3.8
Merge Lane	1	-	100.0	Merge Lane is not Opposed				0	1800	0.000	0.0	0.0
North Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	238	245	3.00	2.00	579	1570	0.369	2.3	5.5
Merge Lane	1	-	100.0	Merge Lane is not Opposed				238	1800	0.132	0.0	0.0
West Exit: Old Faison Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	518	534	3.00	2.00	353	1333	0.265	2.7	5.0
Merge Lane	1	-	100.0	Merge Lane is not Opposed				518	1800	0.288	0.0	0.0

LANE SUMMARY

Site: 1 [Option 4-2041 PM (Site Folder: Bethlehem Rd at Old Faison Rd - 2)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 3
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	140	3.0	954	0.147	100	5.2	LOS A	0.6	14.9	Full	1600	0.0	0.0
Lane 2	387	3.0	1918	0.202	100	4.8	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	527	3.0		0.202		4.9	LOS A	0.6	14.9				
North: Bethlehem Road													
Lane 1[d]	643	3.0	1209	0.532	100	15.1	LOS C	3.6	91.8	Full	1600	0.0	0.0
Lane 2	314	3.0	1209	0.260	100	8.9	LOS A	1.2	31.5	Short	200	0.0	NA
Approach	958	3.0		0.532		13.1	LOS B	3.6	91.8				
West: Old Faison Road													
Lane 1[d]	392	3.0	754	0.520	100	12.4	LOS B	3.4	88.0	Full	1600	0.0	0.0
Lane 2	212	3.0	754	0.281	100	14.2	LOS B	1.1	29.3	Short	200	0.0	NA
Approach	604	3.0		0.520		13.1	LOS B	3.4	88.0				
Intersection	2089	3.0		0.532		11.0	LOS B	3.6	91.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	140	-	140	3.0	954	0.147	100	NA	NA
Lane 2	-	387	387	3.0	1918	0.202	100	0.0	1
Approach	140	387	527	3.0		0.202			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	643	-	643	3.0	1209	0.532	100	NA	NA
Lane 2	-	314	314	3.0	1209	0.260	100	0.0	1
Approach	643	314	958	3.0		0.532			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	392	-	392	3.0	754	0.520	100	NA	NA
Lane 2	-	212	212	3.0	754	0.281	100	0.0	1
Approach	392	212	604	3.0		0.520			
	Total	%HV	Deg.Satn (v/c)						
Intersection	2089	3.0	0.532						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	0	0	3.00	2.00	855	1800	0.475	2.0	6.2
Merge Lane	1	-	100.0	Merge Lane is not Opposed				0	1800	0.000	0.0	0.0
North Exit: Bethlehem Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	392	404	3.00	2.00	387	1435	0.270	2.5	4.8
Merge Lane	1	-	100.0	Merge Lane is not Opposed				392	1800	0.218	0.0	0.0
West Exit: Old Faison Road Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	140	144	3.00	2.00	314	1661	0.189	2.2	3.6
Merge Lane	1	-	100.0	Merge Lane is not Opposed				140	1800	0.078	0.0	0.0

LANE SUMMARY

Site: 1 [Option 1 - 2041 Revised AM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	959	3.0	1054	0.909	100	30.2	LOS D	36.7	939.1	Full	1600	0.0	0.0
Approach	959	3.0		0.909		30.2	LOS D	36.7	939.1				
North: Bethlehem Road													
Lane 1[d]	630	3.0	796	0.792	100	23.3	LOS C	12.3	314.0	Full	1600	0.0	0.0
Approach	630	3.0		0.792		23.3	LOS C	12.3	314.0				
West: Old Faison Road													
Lane 1[d]	326	3.0	987	0.331	100	7.1	LOS A	1.7	43.1	Full	1600	0.0	0.0
Approach	326	3.0		0.331		7.1	LOS A	1.7	43.1				
Intersection	1915	3.0		0.909		24.0	LOS C	36.7	939.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	496	463	959	3.0	1054	0.909	100	NA	NA
Approach	496	463	959	3.0		0.909			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	291	339	630	3.0	796	0.792	100	NA	NA
Approach	291	339	630	3.0		0.792			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	228	98	326	3.0	987	0.331	100	NA	NA
Approach	228	98	326	3.0		0.331			

	Total	%HV	Deg.Satn (v/c)
Intersection	1915	3.0	0.909

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 1-2041 Revised PM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	445	3.0	901	0.493	100	10.3	LOS B	3.5	88.7	Full	1600	0.0	0.0
Approach	445	3.0		0.493		10.3	LOS B	3.5	88.7				
North: Bethlehem Road													
Lane 1[d]	874	3.0	1163	0.751	100	15.5	LOS C	9.6	245.5	Full	1600	0.0	0.0
Approach	874	3.0		0.751		15.5	LOS C	9.6	245.5				
West: Old Faison Road													
Lane 1[d]	518	3.0	734	0.706	100	19.3	LOS C	7.7	196.4	Full	1600	0.0	0.0
Approach	518	3.0		0.706		19.3	LOS C	7.7	196.4				
Intersection	1837	3.0		0.751		15.3	LOS C	9.6	245.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	135	310	445	3.0	901	0.493	100	NA	NA
Approach	135	310	445	3.0		0.493			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	573	301	874	3.0	1163	0.751	100	NA	NA
Approach	573	301	874	3.0		0.751			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	377	141	518	3.0	734	0.706	100	NA	NA
Approach	377	141	518	3.0		0.706			

	Total	%HV	Deg.Satn (v/c)
Intersection	1837	3.0	0.751

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 2- 2041 Revised AM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 2
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	959	3.0	1054	0.909	100	30.2	LOS D	36.7	939.1	Full	1600	0.0	0.0
Approach	959	3.0		0.909		30.2	LOS D	36.7	939.1				
North: Bethlehem Road													
Lane 1	291	3.0	866	0.336	100	7.9	LOS A	1.5	38.2	Full	1600	0.0	0.0
Lane 2[d]	339	3.0	866	0.391	100	8.8	LOS A	1.9	49.5	Short	200	0.0	NA
Approach	630	3.0		0.391		8.4	LOS A	1.9	49.5				
West: Old Faison Road													
Lane 1[d]	228	3.0	1049	0.218	100	5.5	LOS A	0.9	24.0	Full	1600	0.0	0.0
Lane 2	98	3.0	1049	0.093	100	4.2	LOS A	0.4	9.3	Short	200	0.0	NA
Approach	326	3.0		0.218		5.1	LOS A	0.9	24.0				
Intersection	1915	3.0		0.909		18.7	LOS C	36.7	939.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	496	463	959	3.0	1054	0.909	100	NA	NA
Approach	496	463	959	3.0		0.909			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	291	-	291	3.0	866	0.336	100	NA	NA
Lane 2	-	339	339	3.0	866	0.391	100	0.0	1
Approach	291	339	630	3.0		0.391			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	228	-	228	3.0	1049	0.218	100	NA	NA
Lane 2	-	98	98	3.0	1049	0.093	100	0.0	1
Approach	228	98	326	3.0		0.218			

	Total	%HV	Deg.Satn (v/c)
Intersection	1915	3.0	0.909

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 2-2041 Revised PM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 2
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	445	3.0	901	0.493	100	10.3	LOS B	3.5	88.7	Full	1600	0.0	0.0
Approach	445	3.0		0.493		10.3	LOS B	3.5	88.7				
North: Bethlehem Road													
Lane 1[d]	573	3.0	1215	0.471	100	7.9	LOS A	2.9	74.6	Full	1600	0.0	0.0
Lane 2	301	3.0	1215	0.248	100	5.2	LOS A	1.2	29.7	Short	200	0.0	NA
Approach	874	3.0		0.471		7.0	LOS A	2.9	74.6				
West: Old Faison Road													
Lane 1[d]	377	3.0	806	0.468	100	10.7	LOS B	2.8	72.8	Full	1600	0.0	0.0
Lane 2	141	3.0	806	0.175	100	6.3	LOS A	0.7	17.4	Short	200	0.0	NA
Approach	518	3.0		0.468		9.5	LOS A	2.8	72.8				
Intersection	1837	3.0		0.493		8.5	LOS A	3.5	88.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	135	310	445	3.0	901	0.493	100	NA	NA
Approach	135	310	445	3.0		0.493			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	573	-	573	3.0	1215	0.471	100	NA	NA
Lane 2	-	301	301	3.0	1215	0.248	100	0.0	1
Approach	573	301	874	3.0		0.471			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	377	-	377	3.0	806	0.468	100	NA	NA
Lane 2	-	141	141	3.0	806	0.175	100	0.0	1
Approach	377	141	518	3.0		0.468			

	Total	%HV	Deg.Satn (v/c)
Intersection	1837	3.0	0.493

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 1 - 2041 Revised AM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1[d]	496	3.0	1113	0.445	100	8.0	LOS A	2.5	63.9	Full	1600	0.0	0.0
Lane 2	463	3.0	1113	0.416	100	7.6	LOS A	2.3	57.6	Short	200	0.0	NA
Approach	959	3.0		0.445		7.8	LOS A	2.5	63.9				
North: Bethlehem Road													
Lane 1[d]	630	3.0	796	0.792	100	23.3	LOS C	12.3	314.0	Full	1600	0.0	0.0
Approach	630	3.0		0.792		23.3	LOS C	12.3	314.0				
West: Old Faison Road													
Lane 1[d]	326	3.0	987	0.331	100	7.1	LOS A	1.7	43.1	Full	1600	0.0	0.0
Approach	326	3.0		0.331		7.1	LOS A	1.7	43.1				
Intersection	1915	3.0		0.792		12.8	LOS B	12.3	314.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	496	-	496	3.0	1113	0.445	100	NA	NA
Lane 2	-	463	463	3.0	1113	0.416	100	0.0	1
Approach	496	463	959	3.0		0.445			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	291	339	630	3.0	796	0.792	100	NA	NA
Approach	291	339	630	3.0		0.792			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	228	98	326	3.0	987	0.331	100	NA	NA

Approach	228	98	326	3.0	0.331
	Total	%HV	Deg.Satn (v/c)		
Intersection	1915	3.0	0.792		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Bethlehem Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Old Faison Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 1 [Option 1-2041 Revised PM (Site Folder: Bethlehem Rd at Old Faison Rd)]

Bethlehem Rd at Old Faison Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Bethlehem Road													
Lane 1	135	3.0	968	0.139	100	5.0	LOS A	0.6	14.1	Full	1600	0.0	0.0
Lane 2[d]	310	3.0	968	0.320	100	7.1	LOS A	1.5	37.5	Short	200	0.0	NA
Approach	445	3.0		0.320		6.4	LOS A	1.5	37.5				
North: Bethlehem Road													
Lane 1[d]	874	3.0	1163	0.751	100	15.5	LOS C	9.6	245.5	Full	1600	0.0	0.0
Approach	874	3.0		0.751		15.5	LOS C	9.6	245.5				
West: Old Faison Road													
Lane 1[d]	518	3.0	734	0.706	100	19.3	LOS C	7.7	196.4	Full	1600	0.0	0.0
Approach	518	3.0		0.706		19.3	LOS C	7.7	196.4				
Intersection	1837	3.0		0.751		14.4	LOS B	9.6	245.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
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Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Bethlehem Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	135	-	135	3.0	968	0.139	100	NA	NA
Lane 2	-	310	310	3.0	968	0.320	100	0.0	1
Approach	135	310	445	3.0		0.320			

North: Bethlehem Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	573	301	874	3.0	1163	0.751	100	NA	NA
Approach	573	301	874	3.0		0.751			

West: Old Faison Road

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	377	141	518	3.0	734	0.706	100	NA	NA

Approach	377	141	518	3.0	0.706
	Total	%HV	Deg.Satn (v/c)		
Intersection	1837	3.0	0.751		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Bethlehem Road Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
North Exit: Bethlehem Road Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: Old Faison Road Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									

May 16, 2024 Joint Public Hearing Comments

Applicant Responses

1. How are the study intersections for the TIA established?

The parameters for the TIA are coordinated with both NCDOT and Town staff through a scoping process in which many things are determined, including but not limited to, study intersections, background traffic growth, and other area developments.

2. Why wasn't the N. First Avenue/Smithfield Road intersection studied in the TIA?

This particular intersection was not included as NCDOT and Town staff determined during the aforementioned scoping process that the development traffic would not be expected to have as great an impact at this intersection. It was determined that the majority of the proposed development traffic would likely travel to/from the west on Old Faison Road (away from the N First Ave/Smithfield Road intersection). In addition, as staff stated during the public hearing, other developments in the area will already be providing improvements to this intersection.

3. How will the intersection of Tart Farm/Old Faison Road be designed? Will a full movement intersection be safe considering the amount of traffic generated at full build-out? Will this intersection be monitored for needed improvements as the site is built out?

Site Access A will have a 75-ft right turn lane and a 100-ft left turn lane on Old Faison, and the northbound approach will be stop-controlled. The TIA did not recommend an all-way stop control at this intersection because of the potential for traffic to back up along Old Faison including into the adjacent intersection of Bethlehem/Old Faison creating an unsafe condition. Additionally, based on the expected volumes at this intersection, the TIA did not show that a signal would meet all of NCDOT's required warrants. As development continues in the area, then it is likely that the intersection would continue to be analyzed to determine if additional improvements would be needed. However, based on the projected impacts of this development, additional improvements are unlikely to be warranted.

4. What is the status of the I-87 pedestrian bridge design? Is there a design?

There is not a design at this time, and the Town does not yet control land on the other side of I-87 for the other side of a bridge, but a future pedestrian bridge over I-87 is shown on the Sidepaths & Greenways Plan in this approximate location. Thus, we will dedicate and show on its plat a minimum 100 sf easement for a future pedestrian bridge over I-87 so that when the Town is prepared to install this bridge, it will control enough land to install bridge footings on the northern side. We will work with staff on the exact area shown on the plat for the easement area.

5. The intersection of Old Faison/Bethlehem Road is currently failing. To improve the travel conditions in the vicinity, Council would like to see this off-site improvement tied to Phase 1. Council asked if this would be memorialized in the future Development Agreement.

We plan to work out phasing of all off-site improvements through the Development Agreement process. We understand that the project cannot be built without a schedule that the Town Council

agrees to during that process, and that the improvement of the Old Faison/Bethlehem Rd intersection is a priority for the Town Council.

6. Overall, the proposed design of the intersection of WW Pkwy and Tart Farm Road is supported by Town Council; however, they asked if a mini-roundabout could be considered here? If not a mini-roundabout, would the Development Team entertain a raised intersection, in additional to the proposed improvements already included?

We would like to further explain all of the unique features of the intersection design in the context of the larger development:

It will be the only all-way stop control intersection in Lyndon Oaks. This was intentional, as all drivers will have to stop and look for pedestrians and cyclists before proceeding through the intersection. All-way stop control is a form of traffic calming. Vehicles will have to come to a complete stop, vs. at roundabouts where they are in a yield condition.

The additional elements added to this intersection will ensure safety for pedestrians and cyclists as well. Stamped concrete/asphalt provides better visibility for the drivers and pedestrians, as do the RRFBs at the pedestrian crossing to warn drivers to look for pedestrians, and pedestrian refuges in the median in the center of the wider Widewaters Parkway.

This design should not need as much maintenance as either a roundabout or a raised intersection. With a roundabout, the center island would need to be traversable and would need to be repaired more often. A raised intersection would also require more physical maintenance for the Town and will make drainage design and maintenance more difficult and costly.

In sum, we do believe that the all-way stop design with stamped concrete, RRFBs, pedestrian refuges in the medians, and high visibility crosswalks that we worked on with staff will create a safe environment for pedestrians and cyclists and prioritizes those users, without additional long-term maintenance and drainage concerns.

7. How will the areas without formal on-street parking spaces be enforced? One Council Member would like to see a design that strictly does not allow a vehicle to be parked on the side of the road, rather than striping or a sign saying no parking.

Travel lanes will be striped and will be narrow enough that drivers should not feel that they are able to park in the designated travel lanes; however recognizing the concern that some drivers might be tempted to park in front of front-loaded homes, the Applicant will commit to "No Parking" signage in these locations. The Town should be able to enforce "No Parking" areas on Town-owned streets for future residents.

8. One Council Member asked the Development Team to be cognizant of tree canopy around and over sidewalks and pedestrian corridors. Providing shade for pedestrians is important.

We will add canopy trees to lots in areas where on-street parking is provided, at the same planting rate as street trees, to maintain the tree canopy adjacent to on-street parking spaces.

9. How can trees, benches, etc. be incorporated into the public alley rights-of-way? Look for ways to make the public alleys usable space that adds to the quality of life, rather than only providing stretches of impervious surface behind units.

The public alleys will look just like the private alleys but will have wider ROW to accommodate utility easements. We have not been able to plant trees in public utility easements in the past. Also, we have chosen to provide benches in improved open space areas, such as the common greens between the townhomes in the southern portion of the project, where there is pedestrian infrastructure, and we expect pedestrians and residents to enjoy open areas. Alleys do not have sidewalks or other pedestrian infrastructure and are provided so that owners of rear-loaded homes can have vehicular access.

But we understand the importance of tree canopy and will look for areas to add trees adjacent to private alleys to provide additional tree canopy in these areas.

10. Town Council can be flexible with the routing of the public greenway trail but expects an earnest effort to make Option A a reality. Staff will prioritize Option A but will remain cognizant of environmental impacts.

Understood. This is the Applicant's intention as well, and the "Environmental Impacts and Permitting" zoning condition on page 12 of the PUD book would only allow an alternative alignment (or other minor site design adjustments to reduce the environmental impact of the project) if the developer demonstrates to Town staff that the USACE has determined that the project will have over .5 acres of environmental impacts.

11. How will the public and private portions of the greenway trails be designated and how will future elected officials and staff know which is which?

These will be designated on a plat.

12. What is the proposed speed limit on WW Pkwy? Should lower speeds be considered?

Our understanding is that the speed limit would be around 30-35 MPH. Widewaters Parkway will be a Town-owned road, and the portion on Lyndon Oaks has been designed not to include any residential driveways to reduce impacts to future residents and give the Town flexibility on the appropriate speed limit on what will one day be an important connector avenue to US 64 Business.

13. Consider alternative SCM designs, such as bioswales, bioretention, construction wetlands, etc. One Council Member would like to see these other options explored rather than defaulting to a standard stormwater pond design.

These SCM designs typically cannot treat as much stormwater and have more long-term maintenance costs for the HOA, but we are proposing to incorporate green SCM features, such as cisterns, bioswales, or planted wetlands, into the stormwater control design in and around the main amenity where they can be a visible feature of the community.

14. Is there an opportunity to add a physical barrier at the end of cul-de-sacs to prevent motorists from entering the SCMs? A guard rail was a provided example. Staff prefers vegetative materials over guard rails. Further discussions can be had before changes are made.

As discussed with staff, we will provide additional plantings at the end of cul-de-sacs to address this concern.

15. Why weren't the Silverstone or Stoneriver residential projects considered in the TIA? What is the radius of study for TIAs? How do those residential developments affect trip distribution around the subject site?

Only developments that have been approved (but are not being built) at the time of traffic study scoping are studied separately outside of background traffic in the TIA. If a nearby development is 'underway' than it is typically assumed that the traffic associated with that development is captured in the background growth rate (3% per year). Because Silverstone and Stoneriver were already underway when the TIA was scoped last year, they weren't considered as separate "approved" (but not built/underway) developments, like Riverview Commons.

16. One LURB Member is supportive of the no on-street parking when residential driveways are present.

"No parking" signage will be incorporated.

17. Where are the duplexes located? (No response needed)

18. How does on-street parking affect fire access?

The travel lanes adjacent to on-street parking are the same width as all other travel lanes, so emergency vehicles will be able to travel by on-street parking without issue. If there were an emergency situation in a home adjacent to on-street parking, a fire truck would still be able to park nearby and access the home.

19. Are bicycle racks shown at the amenity center?

They are not shown on the plans, but the Applicant understands that, under UDO 7.1.F.2, at least two bicycle parking spaces would be required here.

20. How will the HOA be established, how will the amenities be funded at the beginning, and how will the development be transferred to the HOA?

The developer typically records HOA covenants before selling any homes and funds the maintenance of the community while it is being built out. When the community is fully built, the developer turns the HOA over to the owners, who manage and fund community maintenance with their HOA dues.

21. At least one Council Member supports the proposed smaller homes. It was noted that outside living space and porches are important for all homes, but special emphasis should be put on the smaller homes.

We did not highlight this during the JPH, but under the updated architectural commitments, there will be 5' minimum front porches on all rear-loaded homes, including the smaller single-family detached homes.

22. One Council Member suggested additional stone and/or masonry for larger homes.

Noted. Consistent with other recent cases, in addition to the menu of front façade materials and architectural features have committed to, we have added a commitment to "A minimum of 33% of

homes shall include stone or brick as a front façade material" for the larger front-loaded single-family detached homes.

23. One Council Member specifically mentioned that the mix of housing types and lot widths are supported and appreciates the proposed design to afford future homeowners various housing options.

Thank you, we have worked hard on this design with Town staff.

24. Has the public art been designed yet?

No, not yet. We have committed to public art adjacent to the on-site roundabout and the commercial parcel, but it has not been designed. The PUD book includes some representative imagery of public art design in other areas.

25. General question about how roundabouts can fail.

Like any other intersection, they can reach capacity and have delays that result in extended queuing and wait times. The TIA ultimately recommended a signal at the Old Faison/Bethlehem Rd intersection because the analysis showed that, based on the expected traffic patterns at that intersection, the signal and turn lanes had more favorable long-term capacity and queuing results.

26. General question on how the maximum unit count would be implemented if additional land area is available for additional units.

During the next phase of the design process, when the project's lots and grading are fully designed, there may be opportunities to include a few additional residential lots, but, as stated by staff, the overall design will have to be consistent with the approved rezoning master plan. The final lot count will likely be more definite during the UAA process, when we will further along in this design process.