

The background features large, abstract, rounded shapes in shades of red and blue on a white background. The red shapes are located in the top right and bottom right, while the blue shapes are on the left side.

Traffic Impact Analysis

Knightdale Gateway Knightdale, NC

Prepared for:
Beacon Partners

Kimley»Horn

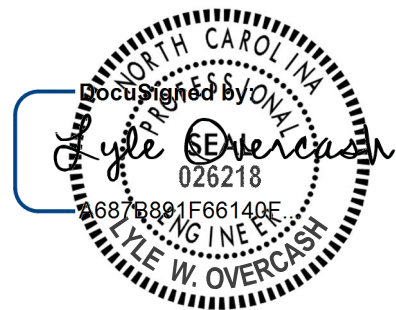
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Traffic Impact Analysis for
Knightdale Gateway
Knightdale, North Carolina

Prepared for:
Beacon Partners
Charlotte, NC

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May 2022
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5/19/2022

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Executive Summary

Kimley-Horn and Associates, Inc. has performed a Traffic Impact Analysis for the Knightdale Gateway development, which is proposed to be located on the northwest quadrant of the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road in Knightdale, NC. The site is currently occupied by the May-Mak Plant Farm, and as currently envisioned, the site will include approximately 450,000 square feet of warehousing space, 60,000 square feet of general office space, and 25,000 square feet of strip retail plaza space. The site is proposed to be accessed by two full-movement driveways onto a new roadway that forms the north leg of Farmwell Road at US 64 (Knightdale Boulevard). Build-out of the development is anticipated in 2024.

This report presents trip generation, distribution, traffic analyses, and recommendations for transportation improvements required to meet anticipated traffic demands in conjunction with the development. The traffic conditions studied include the existing (2021) traffic condition, the projected background and build-out +1 (2025) traffic conditions, and the projected background and build-out +10 (2034) traffic conditions per the Town of Knightdale’s UDO. The weekday AM and PM peak hours were studied.

As shown in Table ES-1, the proposed development has the potential to generate 2,156 new daily trips, 229 new trips during the AM peak hour, and 274 trips during the PM peak hour on a typical weekday.

Table ES-1 ITE Traffic Generation (Vehicles)									
Land Use Code	Land Use	Intensity		Daily		AM Peak Hour		PM Peak Hour	
				In	Out	In	Out	In	Out
150	Warehousing	450,000	s.f.	375	375	60	18	22	58
710	General Office Building	60,000	s.f.	372	372	95	13	19	90
822	Strip Retail Plaza (<40k SF)	25,000	s.f.	681	681	35	24	83	82
<i>Internal Capture Reduction</i>				97	97	8	8	9	9
<i>Pass-By Reduction</i>				253	253	0	0	31	31
Total Net New Trips		535,000	s.f.	1,078	1,078	182	47	84	190

Capacity analyses were performed using Synchro Version 11 software. Table ES-2 summarizes the operation of the study intersections for the AM and PM peak hour traffic conditions.

Table ES-2 - Level of Service Summary

Intersection and Approach/Movement	Traffic Control	Existing (2021) Traffic		Background (2025) Traffic		Build-out (2025) Traffic		Build-out (2025) Traffic - Improved		Background (2034) Traffic		Build-out (2034) Traffic	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		US 64 Bus (Knightdale Blvd) at Old Milburnie Rd	Signalized	C (21.7)	C (25.1)	C (27.3)	C (33.6)	C (27.3)	C (34.3)	C (25.9)	C (30.5)	C (33.8)	D (51.7)
US 64 Bus (Knightdale Blvd) at Westover Dr/Farmwell Rd	Unsignalized/ Signalized	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	B (10.0)	B (18.0)	A (6.3)	A (9.8)	B (11.6)	C (21.1)
Eastbound*		B (13.2)	C (16.8)	C (15.4)	C (20.9)	C (19.0)	B (10.2)	A (6.3)	B (14.3)	A (4.4)	A (6.6)	A (6.4)	B (12.4)
Westbound*		A (9.9)	C (15.9)	B (10.7)	C (19.9)	B (10.7)	C (19.6)	A (9.1)	B (16.6)	A (5.5)	B (12.8)	B (11.9)	C (21.3)
Northbound		F (99.6)	F (622.0)	F (372.1)	F (3488.7)	F (969.2)	F (80.1)	D (45.0)	D (36.5)	D (45.8)	D (51.1)	D (43.9)	D (37.6)
Southbound		F (193.5)	F (445.9)	F (625.0)	F (2695.2)	F (+)	F (421.4)	E (56.3)	E (58.2)	D (49.0)	D (47.8)	E (59.8)	F (104.6)
US 64 Bus (Knightdale Blvd) at Hodge Rd	Signalized	B (19.0)	C (26.9)	C (23.7)	D (37.7)	C (23.3)	D (38.1)	C (23.7)	D (35.8)	C (26.2)	D (40.0)	C (25.9)	D (40.6)
US 64 Bus (Knightdale Blvd) at I-540 EB Ramps	Signalized	A (1.6)	A (4.0)	A (3.9)	A (6.2)	A (4.0)	A (6.3)	A (4.0)	A (6.3)	A (5.4)	A (8.0)	A (5.4)	A (8.1)
US 64 Bus (Knightdale Blvd) at I-540 WB Ramps	Signalized	B (13.6)	B (18.0)	B (18.7)	C (20.0)	B (19.2)	C (20.1)	B (19.1)	C (20.1)	C (22.7)	C (22.0)	C (23.1)	C (22.3)
Old Milburnie Rd at Farmwell Rd	Unsignalized	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
Westbound		B (11.7)	B (11.9)	B (12.3)	B (12.5)	B (11.4)	B (12.9)	B (11.4)	B (12.9)	B (13.8)	C (15.7)	B (12.5)	C (16.5)
Southbound*		A (7.6)	A (8.3)	A (7.7)	A (8.5)	A (7.7)	A (8.5)	A (7.7)	A (8.5)	A (7.8)	A (9.2)	A (7.9)	A (9.2)
Farmwell Rd at Site Access ¹	Unsignalized	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
Eastbound		A (8.6)	A (9.0)	A (8.6)	A (8.9)	F (141.4)	F (616.5)	C (21.1)	D (25.7)	A (8.6)	A (8.9)	C (15.4)	E (36.5)
Westbound		A (9.1)	A (9.1)	A (9.1)	A (9.1)	F (79.4)	F (858.7)	B (13.8)	E (46.4)	A (9.1)	A (9.2)	A (8.6)	E (39.2)
Northbound*		A (3.6)	A (2.7)	A (3.6)	A (2.8)	N/A		N/A		A (3.6)	A (2.9)	N/A	

¹LOS and Delay reported for the left-turn movement for unsignalized scenarios

²SimTraffic delays are reported for the build-out traffic conditions at this intersection due to HCM delays not reported for this intersection configuration. Additionally, the southbound approach delays at this intersection are shown within the intersection of US 64 Bus (Knightdale Blvd) at Westover Dr/Farmwell Rd

As part of an area development identified in the Allen Park Development TIA (Timmons Group, 2021), the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road is expected to undergo the following improvements by the projected (2034) background and build-out +10 traffic conditions:

- Construct an exclusive eastbound right-turn lane with a minimum of 375 feet of storage and appropriate taper
- Extend the exclusive westbound left-turn lane to provide a minimum of 500 feet of storage and appropriate taper

Based on discussions with the Town of Knightdale, the following additional improvements were identified to be included in this analysis for the projected background and build-out +10 (2034) traffic conditions at the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road:

- Extend the exclusive westbound right-turn lane to provide a minimum of 100 feet of storage and appropriate taper
- Construct an exclusive northbound left-turn lane

It should be noted that with these listed improvements in place at the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road, the signal was optimized in the analysis of the projected (2034) background and build-out +10 traffic conditions and signal operations were adjusted to match the 2020 signal plan.

It should also be noted that, per the KnightdaleNext 2035 Comprehensive Plan, Old Milburnie Road is planned to be realigned to connect with Hodge Road north of the proposed Knightdale Gateway location. Ultimately, the new roadway that is to be constructed as the proposed site access is planned to be extended by others and connect to the new realigned Old Milburnie Road.

The following improvements are recommended to be performed to accommodate projected Knightdale Gateway site traffic based on the capacity analysis presented herein:

US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive:

- Install a traffic signal
- Restripe the southbound approach to provide an exclusive left-turn lane and a shared through/right-turn lane

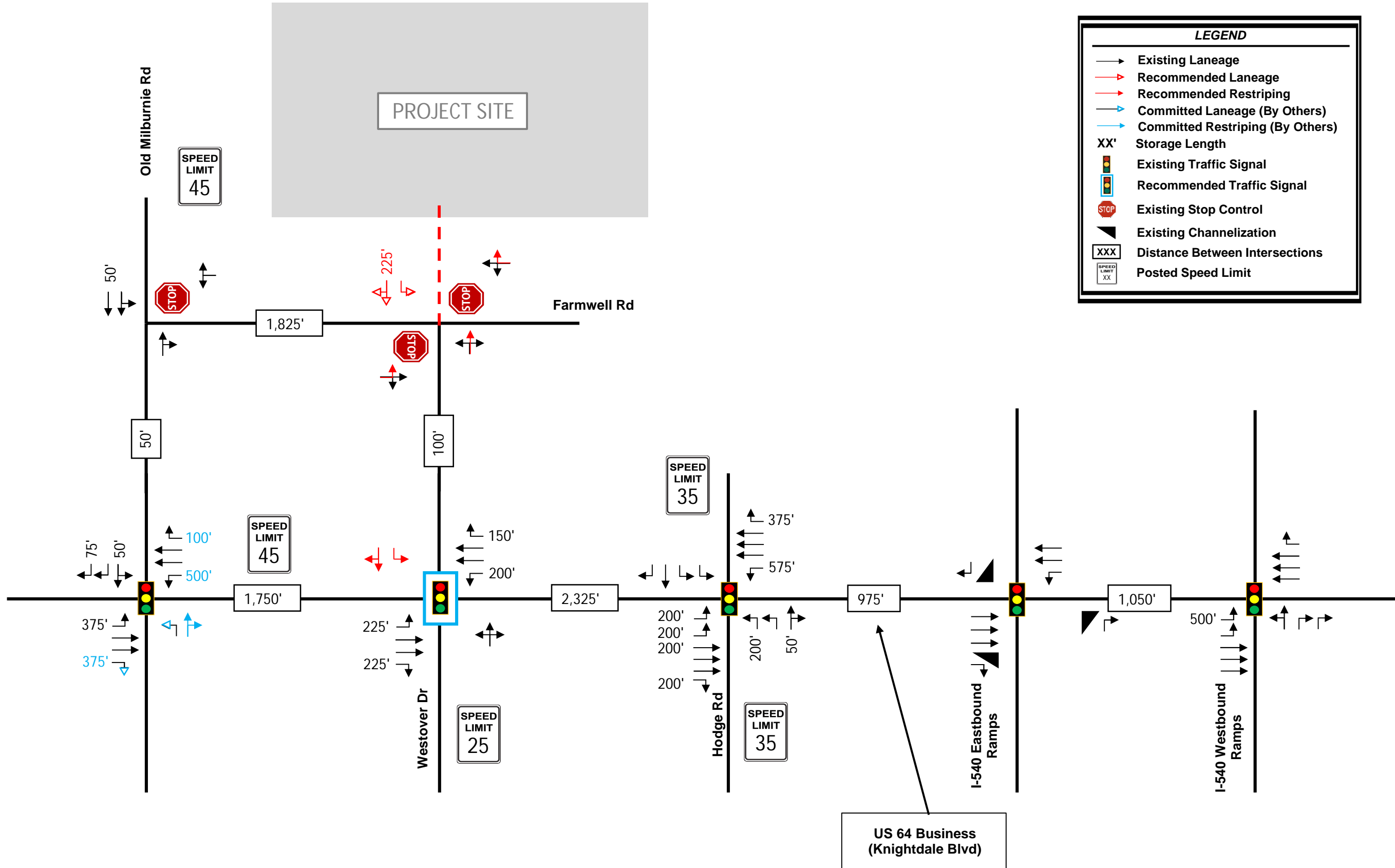
Farmwell Road at Site Access

- Construct the proposed site access as the north leg of the intersection of Farmwell Road at US 64 Business (Knightdale Boulevard). The north leg shall contain one ingress lane and two egress lanes striped as an exclusive left-turn lane and a shared through/right-turn lane. The shared through/right-turn lane should provide a minimum of 225 feet of storage.

- Configure the intersection to be stop-controlled on the eastbound and westbound approaches, with a stop bar, as well as a signage, on the southbound approach instructing southbound traffic to not block the intersection. The northbound approach from US 64 Business (Knightdale Boulevard) will be free-flow.

All of the signalized study intersections are expected to operate at an acceptable LOS in the projected (2025) build-out +1 and projected (2034) build-out +10 traffic conditions.

The committed and recommended laneage is shown on **Figure ES-1**.



LEGEND

- Existing Laneage
- Recommended Laneage
- Recommended Restriping
- Committed Laneage (By Others)
- Committed Restriping (By Others)
- XX' Storage Length
- Existing Traffic Signal
- Recommended Traffic Signal
- Existing Stop Control
- Existing Channelization
- XXX Distance Between Intersections
- XX Posted Speed Limit

Recommended Roadway Laneage
(2025)

Knightdale Gateway
Traffic Impact Analysis
Knightdale, NC



Figure ES-1

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1.0 Introduction

Kimley-Horn and Associates, Inc. has performed a Traffic Impact Analysis for the Knightdale Gateway development, which is proposed to be located on the northwest quadrant of the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road in Knightdale, NC. The site is currently occupied by the May-Mak Plant Farm, and as currently envisioned, the site will include approximately 450,000 square feet of warehousing space, 60,000 square feet of general office space, and 25,000 square feet of strip retail plaza space. The site is proposed to be accessed by two full-movement driveways onto a new roadway that forms the north leg of Farmwell Road at Farmwell Road. Build-out of the development is anticipated in 2024.

This report presents trip generation, distribution, traffic analyses, and recommendations for transportation improvements required to meet anticipated traffic demands in conjunction with the development. The traffic conditions studied include the existing (2021) traffic condition, the projected background and build-out +1 (2025) traffic conditions, and the projected background and build-out +10 (2034) traffic conditions per the Town of Knightdale's UDO. The weekday AM and PM peak hours were studied.

North Carolina Department of Transportation (NCDOT) and Town of Knightdale staff provided background data and were consulted regarding the elements to be covered in this analysis. The approved Memorandum of Understanding is included in **Appendix A**.

2.0 Inventory

2.1 Study Area

The study area for this development includes the following intersections:

- US 64 Business (Knightdale Boulevard) at Old Milburnie Road
- US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive
- US 64 Business (Knightdale Boulevard) at Hodge Road
- US 64 Business (Knightdale Boulevard) at I-540 Eastbound Ramps
- US 64 Business (Knightdale Boulevard) at I-540 Westbound Ramps
- Old Milburnie Road at Farmwell Road
- Farmwell Road at Site Access

Figure 2.1 shows the site location. The preliminary site plan is shown on **Figure 2.2**.

2.2 Existing Conditions

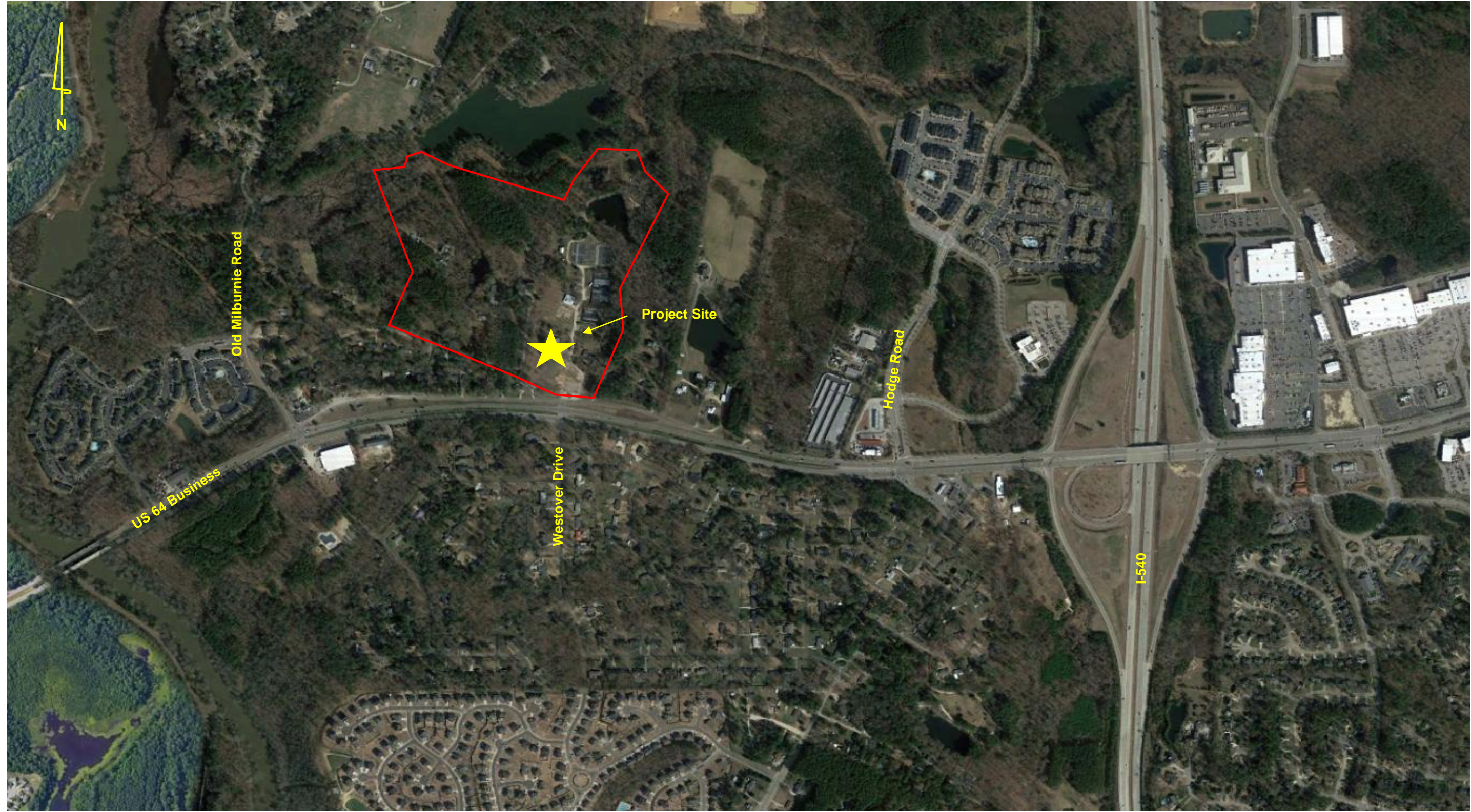
The proposed Knightdale Gateway project is located on the northwest quadrant of the intersection of Farmwell Road at US 64 Business (Knightdale Boulevard) in Knightdale, NC. Roadways in the study area include I-540, US 64 Business (Knightdale Boulevard), Hodge Road, and Old Milburnie Road. The existing roadway laneage is shown in **Figure 2.3**.

I-540 is a six-lane divided freeway with a posted speed limit of 70 miles per hour (mph). Per the Town of Knightdale 2035 Comprehensive Plan, this roadway is classified as a limited access facility. The reported 2019 annual average daily traffic (AADT) volume was approximately 62,500 vehicles per day (vpd) north of US 64 Business (Knightdale Boulevard) and 55,000 vpd south of US 64 Business (Knightdale Boulevard).

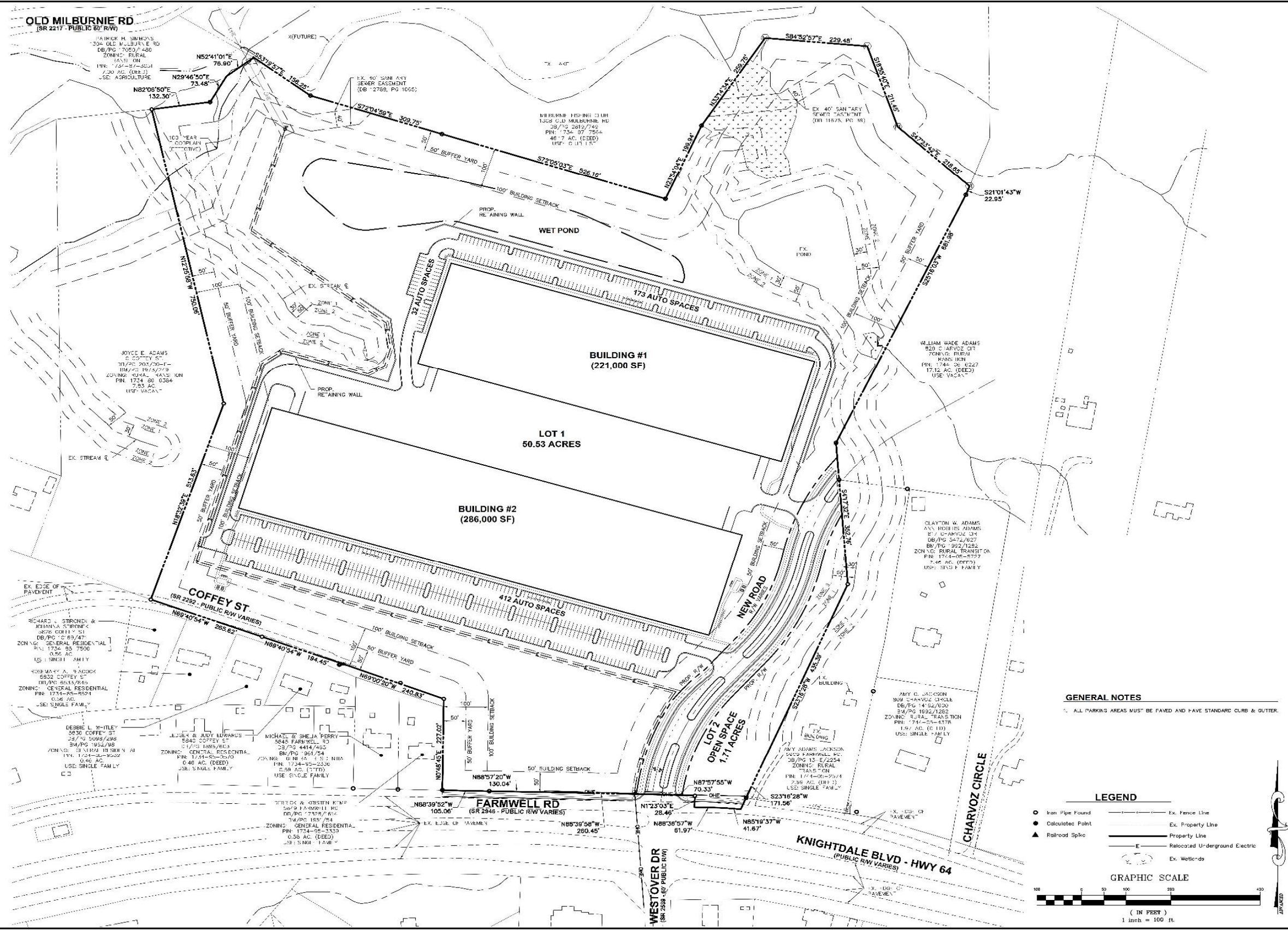
US 64 Business (Knightdale Boulevard) is a six-lane divided roadway with a posted speed limit of 45 mph. Per the Town of Knightdale 2035 Comprehensive Plan, this roadway is classified as a state-maintained arterial. The reported 2019 AADT volume was approximately 29,500 vpd east of Old Milburnie Road and 31,500 vpd west of I-540.

Hodge Road has a variable section but is generally a two-lane divided roadway north of US 64 Business (Knightdale Boulevard) and a two-lane undivided roadway south of US 64 Business (Knightdale Boulevard). Hodge Road has a posted speed limit of 35 mph. Per the Town of Knightdale 2035 Comprehensive Plan, this roadway is classified as a town-maintained arterial north of US 64 Business (Knightdale Boulevard) and a state-maintained arterial south of US 64 Business (Knightdale Boulevard).

Old Milburnie Road is a two-lane undivided roadway with a posted speed limit of 45 mph. The Town of Knightdale 2035 Comprehensive Plan classifies this roadway as a state-maintained collector north of US 64 Business (Knightdale Boulevard).

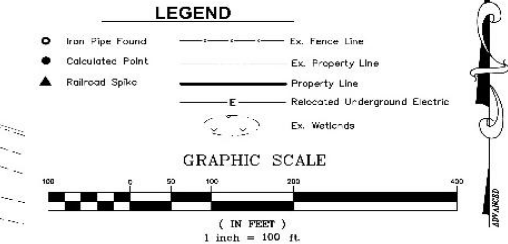


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GENERAL NOTES

- ALL PARKING AREAS MUST BE PAVED AND HAVE STANDARD CURB & GUTTER.



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KNIGHTDALE GATEWAY
SKETCH PLAN
FOR
BEACON PARTNERS
OVERALL SKETCH PLAN

St. Matthews, Township - 5901, Farmwell Road, Knightdale, NC 27510 - Wake County

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JAMES D. WHITFIELD

03/30/2022

Issue Date: 11/20/2021 - Town Submittal #1
01/10/2022 - Town Submittal #2
07/11/2022 - Town Submittal #3
03/30/2022 - Town Submittal #4

Date: 03/30/2022
Scale: 1" = 100'

Drawn By: JBR
Checked By: JCW

Project Number:
21-0011-504

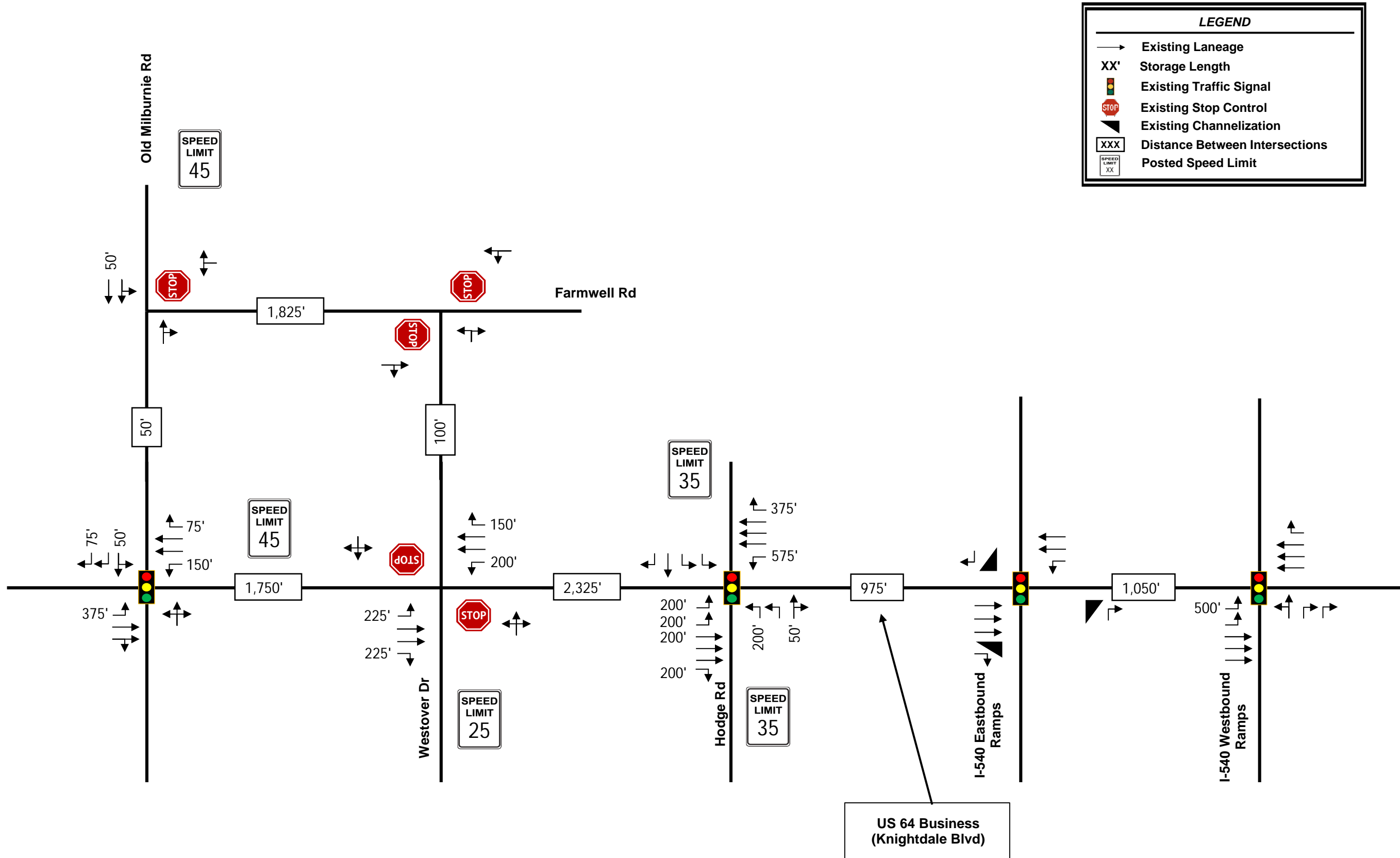
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Conceptual Site Plan

Knightsdale Gateway
Traffic Impact Analysis
Knightsdale, NC



Figure 2.2
Page 4



Existing Roadway Laneage

Knightdale Gateway
Traffic Impact Analysis
Knightdale, NC



Figure 2.3

3.0 Traffic Generation

The traffic generation potential of the proposed development was determined using the traffic generation rates published in *Trip Generation* (Institute of Transportation Engineers, 11th Edition, 2021). As currently envisioned, the site will include approximately 450,000 square feet of warehousing space, 60,000 square feet of general office space, and 25,000 square feet of strip retail plaza space.

Table 3.0 ITE Traffic Generation (Vehicles)									
Land Use Code	Land Use	Intensity		Daily		AM Peak Hour		PM Peak Hour	
				In	Out	In	Out	In	Out
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<i>Internal Capture Reduction</i>				97	97	8	8	9	9
<i>Pass-By Reduction</i>				253	253	0	0	31	31
Total Net New Trips		535,000	s.f.	1,078	1,078	182	47	84	190

Table 3.0 shows that the proposed development has the potential to generate 2,156 new trips during a typical weekday with 229 new trips during the AM peak hour and 274 new trips during the PM peak hour. Note that the trip generation in the approved Memorandum of Understanding reflected higher trip totals, however while the project expanded, the revised land use mix resulted in lower trip generation for the TIA.

Detailed trip generation calculations are included in **Appendix B**.

4.0 Site Traffic Distribution

The proposed generated trips for the build-out scenarios were assigned to the surrounding roadway network. The directional distribution and assignment are based on existing travel patterns.

The following distribution will be used for site passenger vehicle trips:

- 40% to/from the east on US 64 Business (Knightdale Boulevard)
- 25% to/from the west on US 64 Business (Knightdale Boulevard)
- 15% to/from the south on I-540
- 10% to/from the north on I-540
- 5% to/from the north on Old Milburnie Road
- 5% to/from the south on Westover Drive

The following distribution will be used for the site truck trips:

- 35% to/from the north on I-540
- 35% to/from the south on I-540
- 20% to/from the east on US 64 Business (Knightdale Boulevard)
- 10% to/from the west on US 64 Business (Knightdale Boulevard)

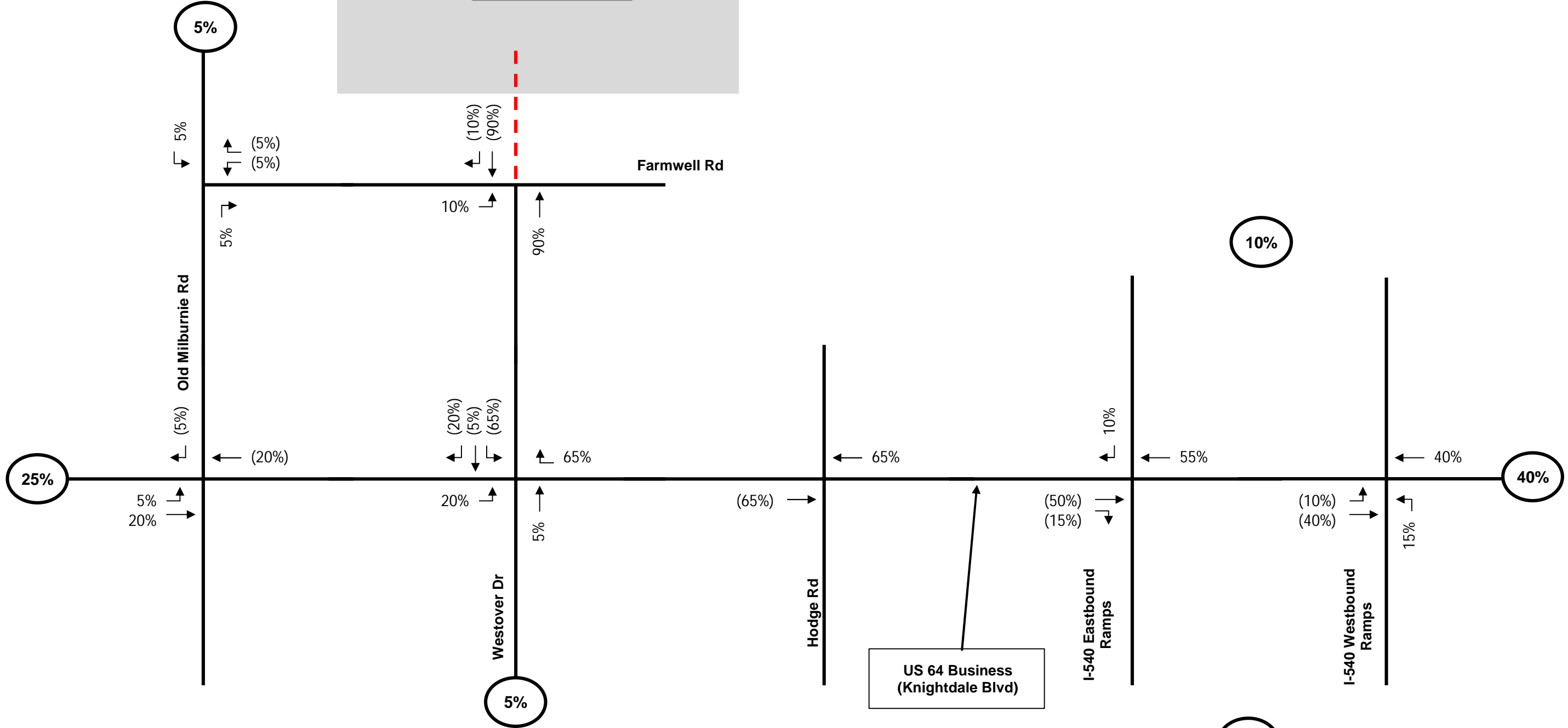
The site traffic distribution and percent assignment for the net new site trips for passenger vehicles and trucks are shown on **Figures 4.1 and 4.2**, respectively.



PROJECT SITE

LEGEND

- Turning Movement
- XX% % Entering Traffic
- (XX%) % Exiting Traffic
- (x%) Overall Distribution

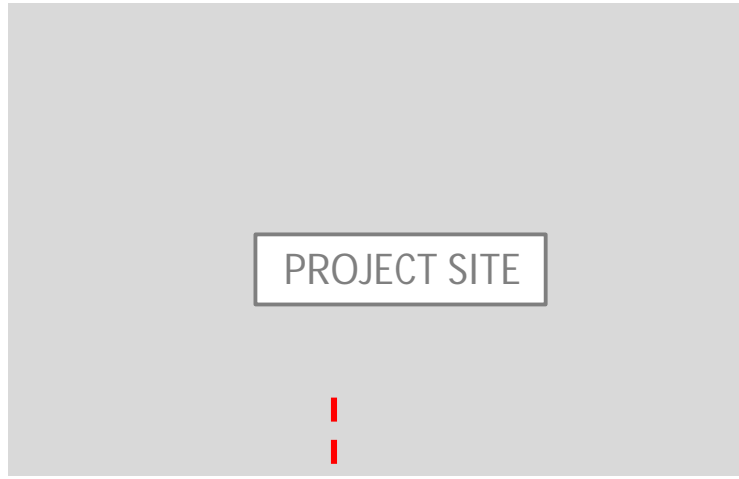


Trip Distribution & Assignment - Passenger Vehicles

Knightdale Gateway Traffic Impact Analysis Knightdale, NC

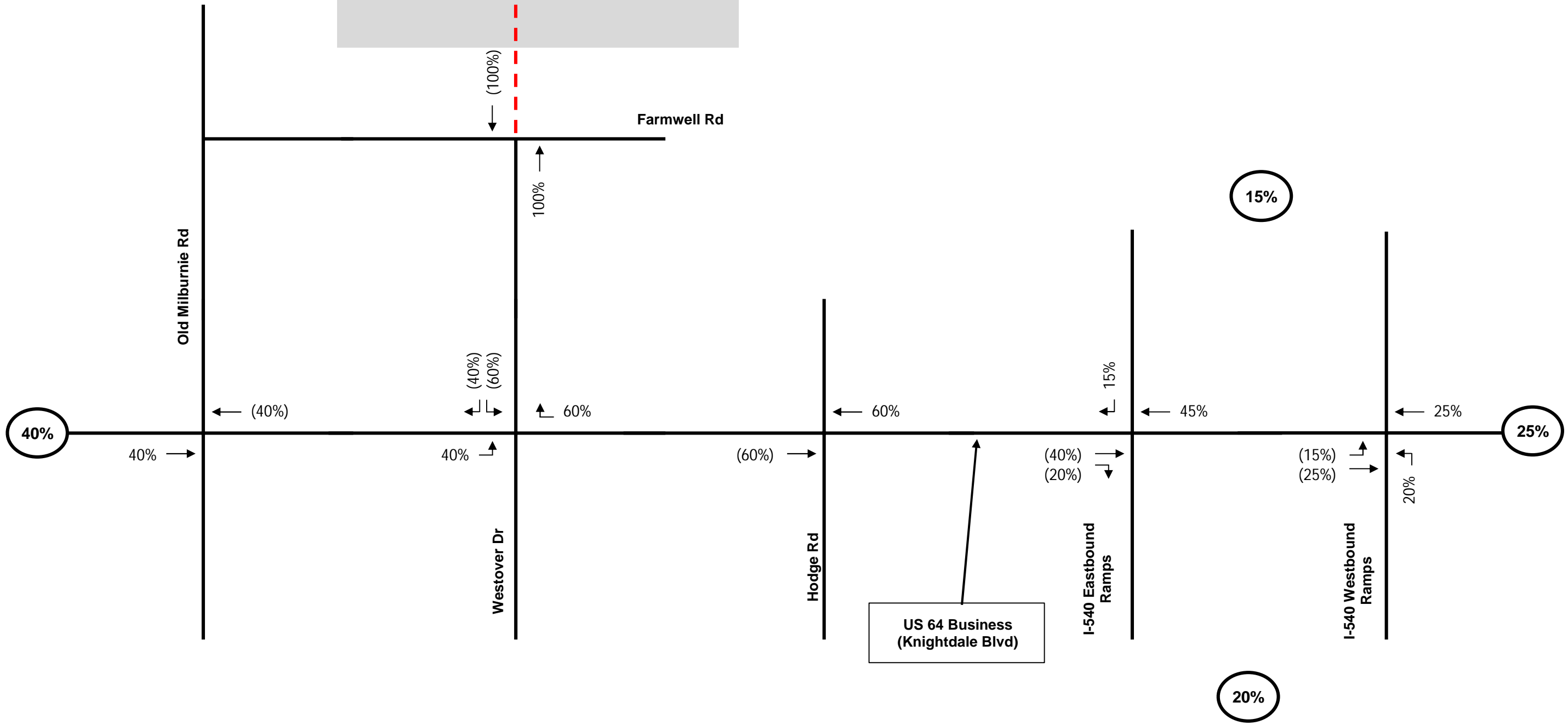


Figure 4.1



LEGEND

- Turning Movement
- XX% % Entering Traffic
- (XX%) % Exiting Traffic
- (x%) Overall Distribution



Trip Distribution & Assignment - Trucks

Knightdale Gateway Traffic Impact Analysis Knightdale, NC



Figure 4.2

5.0 Projected Traffic Volumes

5.1 Existing Traffic

AM peak hour (7:00 to 9:00 AM) and PM peak hour (4:00 to 6:00 PM) turning movement counts were performed at the following intersections:

- US 64 Business (Knightdale Boulevard) at Old Milburnie Road December 1, 2021
- US 64 Business (Knightdale Boulevard) at Farmwell Road /
Westover Drive December 1, 2021
- US 64 Business (Knightdale Boulevard) at Hodge Road December 1, 2021
- US 64 Business (Knightdale Boulevard)
at I-540 Eastbound Ramps December 1, 2021
- US 64 Business (Knightdale Boulevard)
at I-540 Westbound Ramps December 1, 2021
- Old Milburnie Road at Farmwell Road December 1, 2021
- Farmwell Road at Farmwell Road / Site Access December 1, 2021

The existing AM and PM peak hour traffic volumes are shown on **Figure 5.1**. The traffic count data are included in **Appendix C**.

5.2 Historic Growth Traffic

Historic growth traffic is the increase in traffic due to usage increases and non-specific growth throughout the area. To be conservative, an annual growth rate of 3% was applied to the existing volumes up to the proposed build-out year + 1 (2025) and a 1% annual growth rate was applied to the proposed build-out year +1 (2025) volumes up to the proposed build-out year +10 (2034). Background growth calculations are detailed on intersection spreadsheets in the Appendix of this report.

5.3 Approved Development Traffic

Approved development traffic is generated by approved but not yet constructed projects in the vicinity of the proposed project. There are three approved developments in the study area identified for inclusion as background traffic. Those are the Legacy Oaks, Allen Park, and River's Edge developments. Based on discussions with the Town of Knightdale, site traffic associated with Legacy Oaks was included in the projected background and build-out +1 (2025) and +10 (2034) traffic conditions whereas site traffic associated with Allen Park and River's Edge was only included in the projected background and build-out +10 (2034) traffic conditions.

- Legacy Oaks (NW Quadrant of US 64 Business at I-540)
 - Proposed: Approximately 217 single family dwelling units, 165 multifamily dwelling units, a 130-room hotel, and 16,000 square feet of retail space

- Existing: 4,069 square foot Sam’s Xpress with 10 fuel pumps, 544 mid-rise apartments, and a 40,560 square foot urgent care (Kimley-Horn & Associates, 2020)
- Allen Park
 - Location: Southwest quadrant of Old Milburnie Road at Forestville Road, adjacent to I-540
 - Proposed: Approximately 447 single family dwelling units and 173 multifamily dwelling units (Timmons Group, 2021)
- River’s Edge
 - Location: Southwest quadrant of US 64 Business (Knightdale Boulevard) at Old Milburnie Road
 - Proposed: Approximately 306 multifamily dwelling units and a 5,000 square foot fast food restaurant with a drive-thru window (WSP, 2014).

Approved development traffic and background traffic volumes for the analysis year 2025 are shown on **Figures 5.2 and 5.3**, respectively, for the AM and PM peak hours.

Approved development traffic and background traffic volumes for the analysis year 2034 are shown on **Figures 5.4 and 5.5**, respectively, for the AM and PM peak hours.

Approved development data used in this analysis can be found in **Appendix D**.

5.4 *Site Traffic*

The proposed site traffic was generated and assigned to the adjacent roadway network according to the distribution discussed previously in Section 4.0. The site traffic volumes for the AM and PM peak hours are shown for passenger vehicles and trucks on **Figures 5.6 and 5.7**, respectively.

5.5 *Build-Out Traffic*

To obtain the projected (2025) build-out +1 traffic volumes, the projected site traffic volumes were added to the projected (2025) background traffic. To obtain the projected (2034) build-out +10 traffic volumes, the projected site traffic volumes were added the projected (2034) background traffic. Traffic volume calculations are detailed in intersection spreadsheets in the Appendix of this report. **Figure 5.8** shows the projected (2025) build-out +1 AM and PM peak hour traffic volumes. **Figure 5.9** shows the projected (2034) build-out +10 AM and PM peak hour traffic volumes.

Volume development spreadsheets can be found in **Appendix E**.

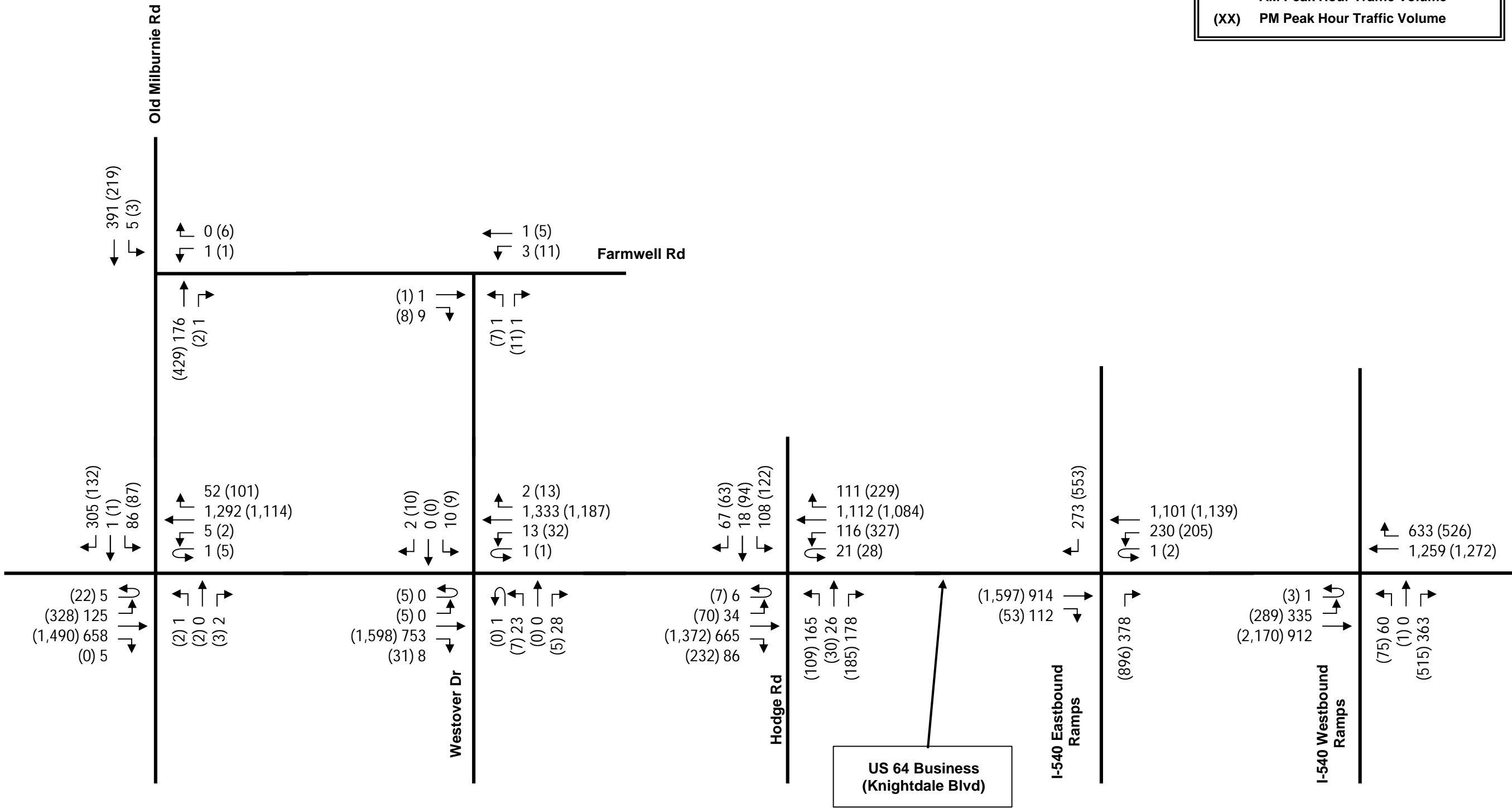


LEGEND

→ Turning Movement

XX AM Peak Hour Traffic Volume

(XX) PM Peak Hour Traffic Volume



Existing (2021) Traffic Volumes

Knightdale Gateway
Traffic Impact Analysis
Knightdale, NC



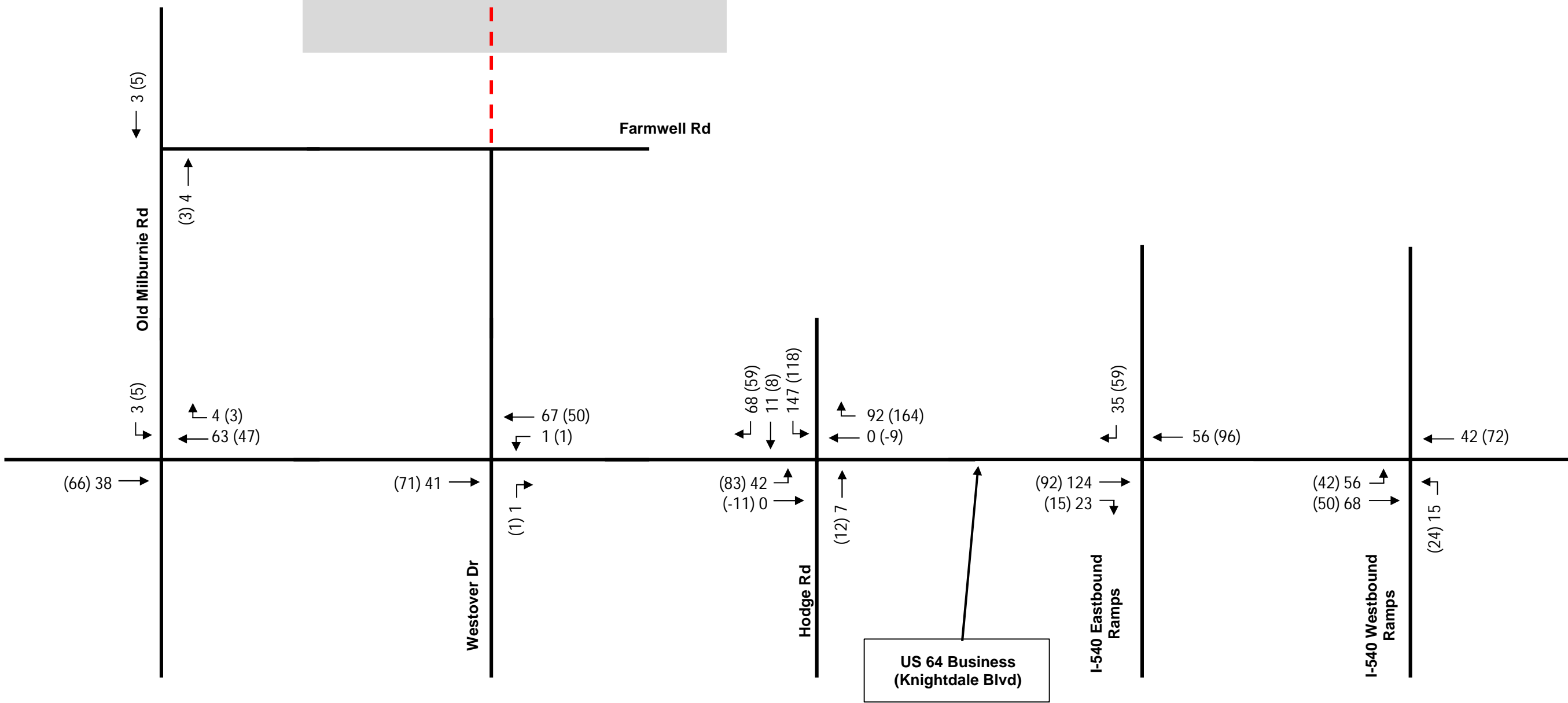
Figure 5.1



PROJECT SITE

LEGEND

- Turning Movement
- XX AM Peak Hour Traffic Volume
- (XX) PM Peak Hour Traffic Volume



Approved Development Traffic Volumes (2025)

Knightdale Gateway Traffic Impact Analysis Knightdale, NC

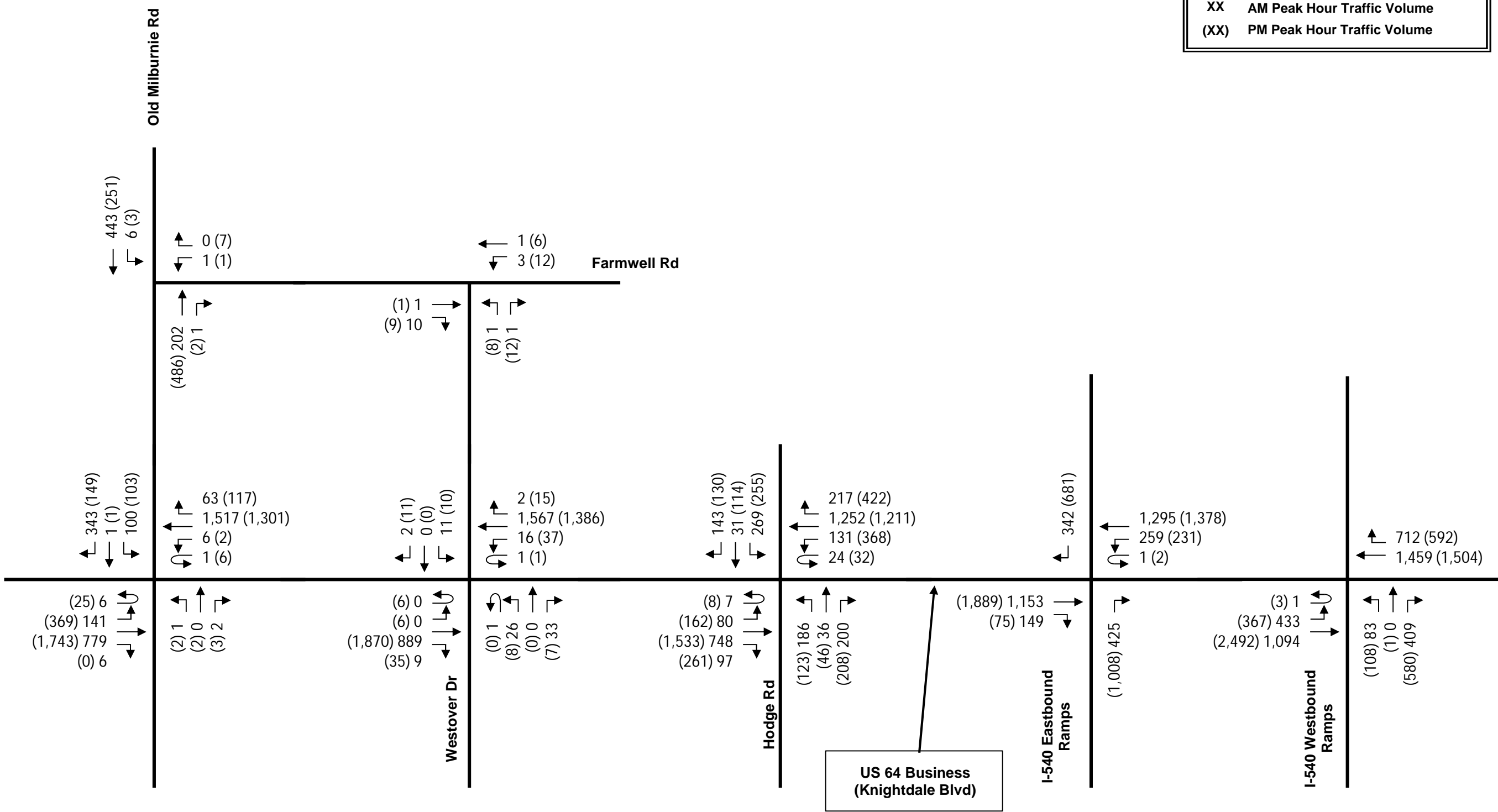


Figure 5.2



LEGEND

→ Turning Movement
 XX AM Peak Hour Traffic Volume
 (XX) PM Peak Hour Traffic Volume



Projected (2025) Background Traffic Volumes

Knightdale Gateway Traffic Impact Analysis Knightdale, NC



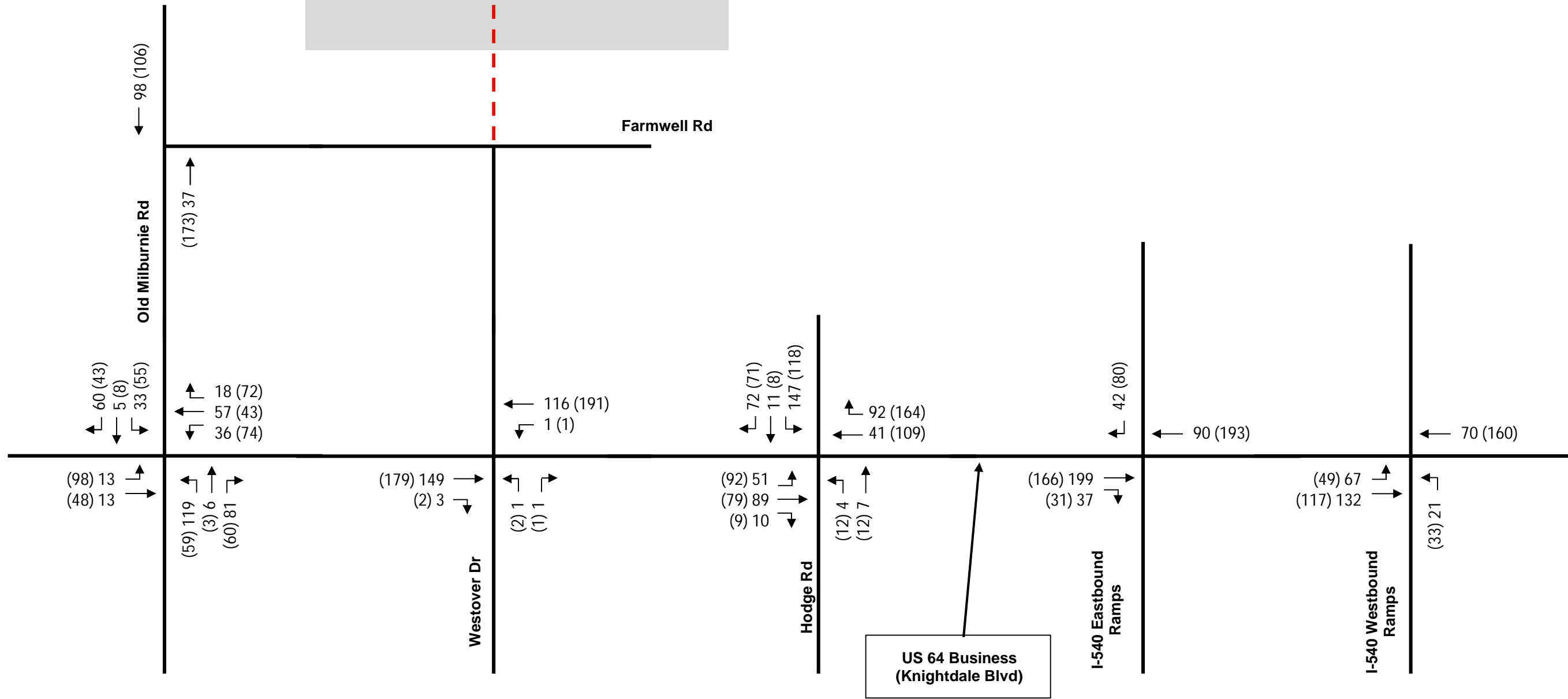
Figure 5.3



PROJECT SITE

LEGEND

- Turning Movement
- XX AM Peak Hour Traffic Volume
- (XX) PM Peak Hour Traffic Volume



Approved Development Traffic Volumes (2034)

Knightdale Gateway Traffic Impact Analysis Knightdale, NC

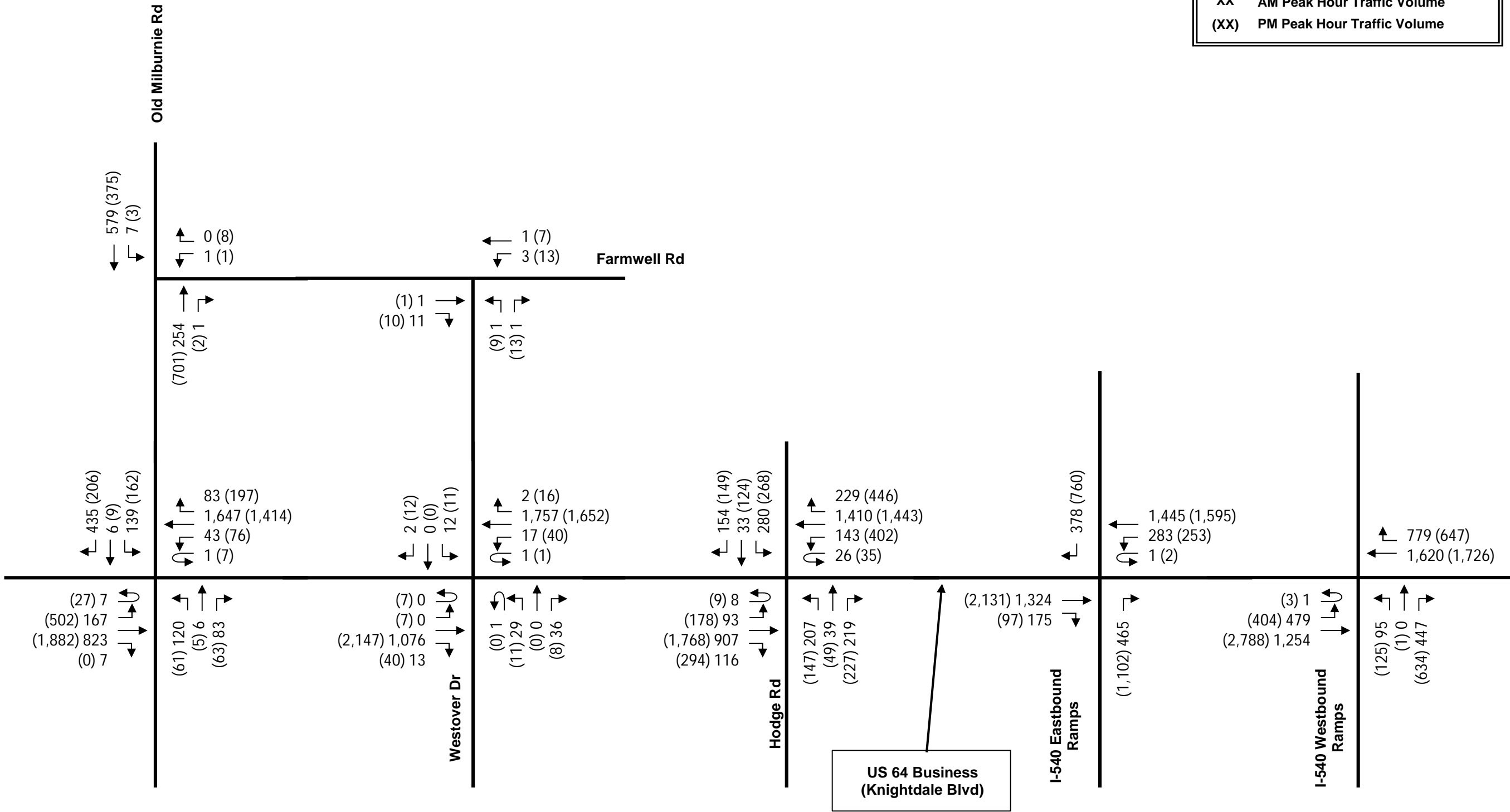


Figure 5.4



LEGEND

→ Turning Movement
 XX AM Peak Hour Traffic Volume
 (XX) PM Peak Hour Traffic Volume

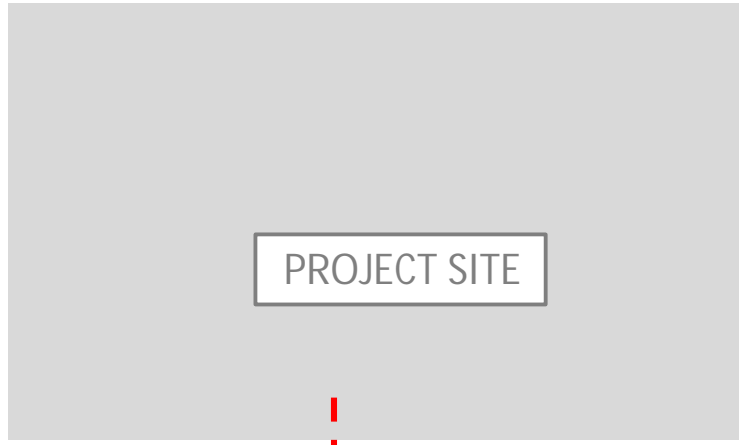


Projected (2034) Background Traffic Volumes

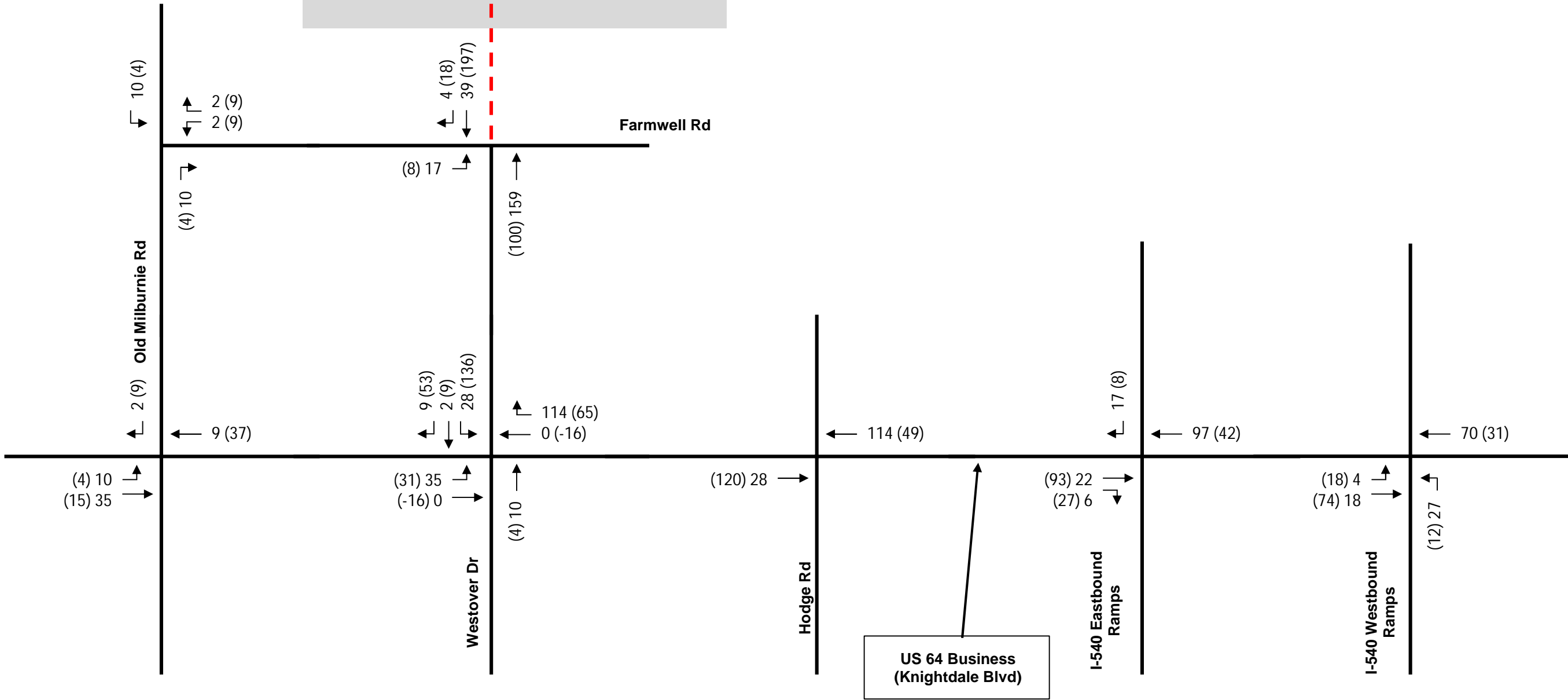
Knightdale Gateway Traffic Impact Analysis
 Knightdale, NC



Figure 5.5



LEGEND	
→	Turning Movement
XX	AM Peak Hour Project Trips
(XX)	PM Peak Hour Project Trips



Site Traffic Volumes - Passenger Vehicles

Knightdale Gateway Traffic Impact Analysis Knightdale, NC



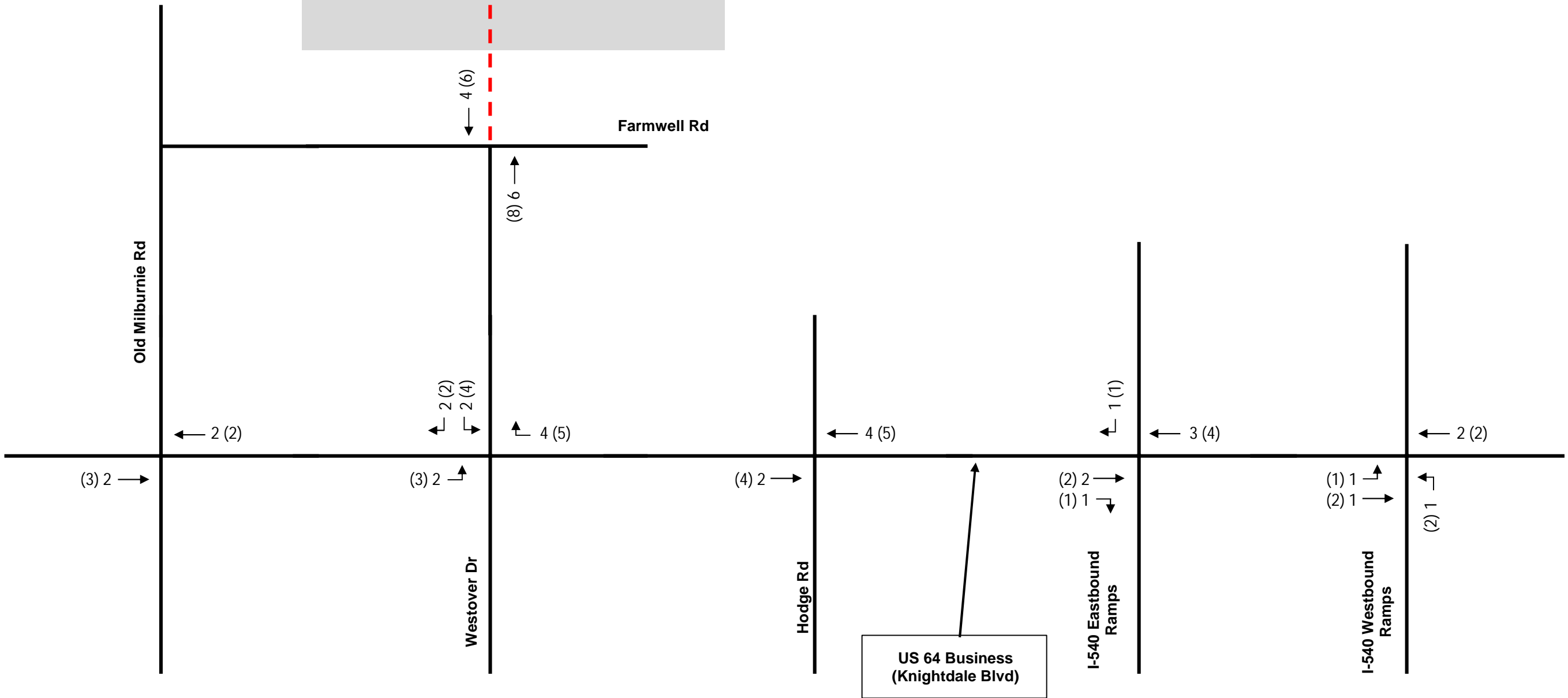
Figure 5.6



PROJECT SITE

LEGEND

- Turning Movement
- XX AM Peak Hour Project Trips
- (XX) PM Peak Hour Project Trips



Site Traffic Volumes - Trucks

Knightdale Gateway
Traffic Impact Analysis
Knightdale, NC



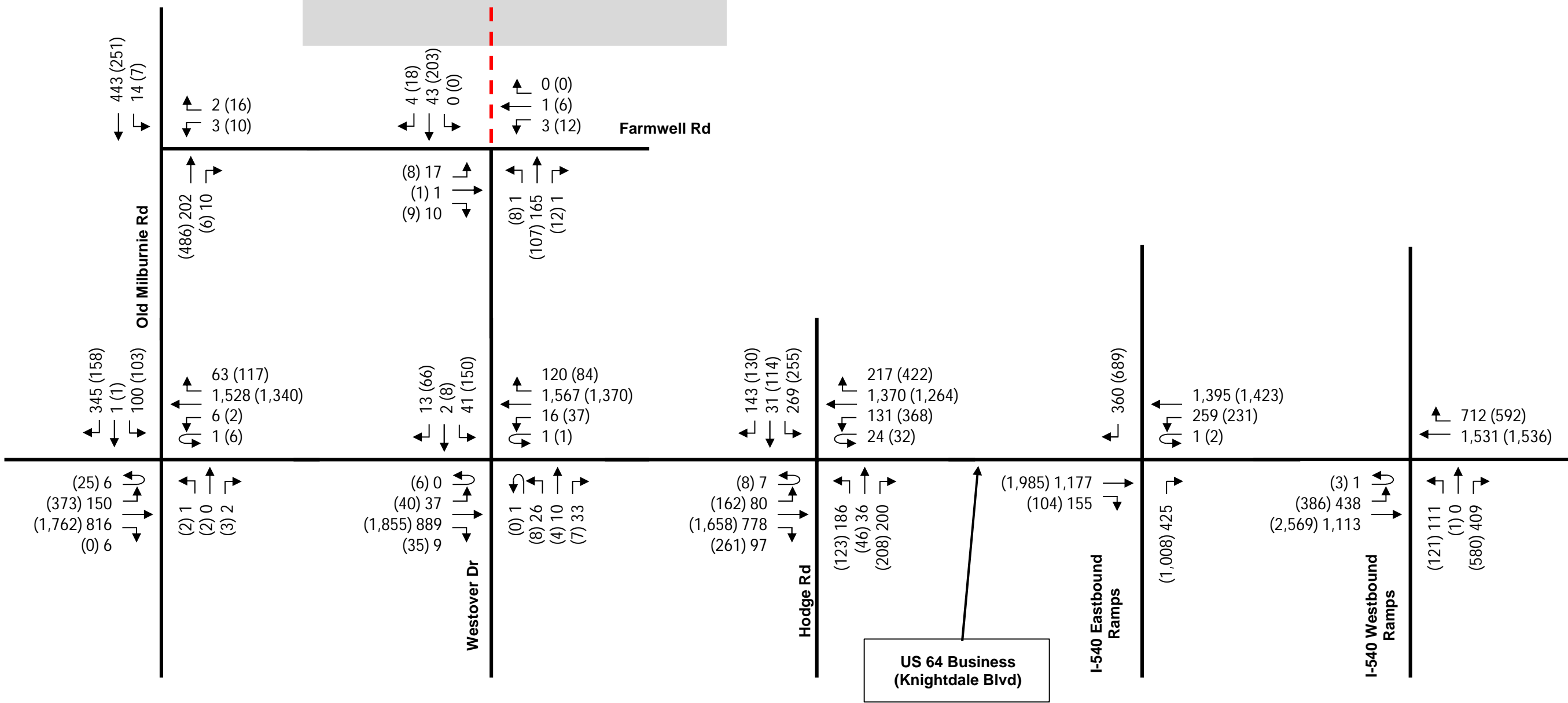
Figure 5.7



PROJECT SITE

LEGEND

- Turning Movement
- XX AM Peak Hour Traffic Volume
- (XX) PM Peak Hour Traffic Volume

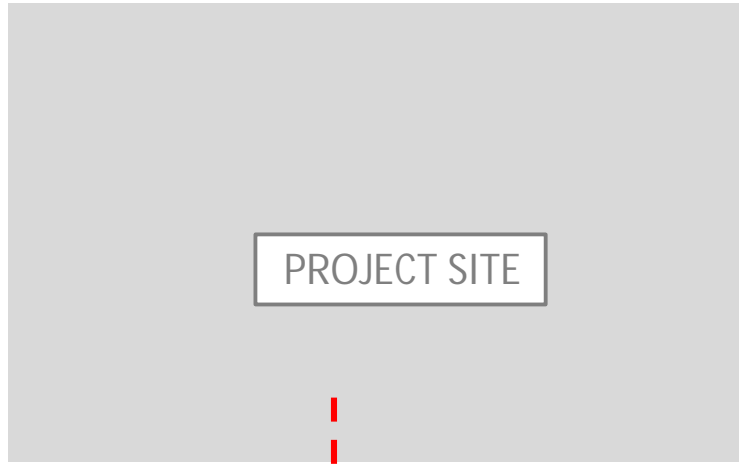


Projected (2025) Build-out +1 Traffic Volumes

Knightdale Gateway Traffic Impact Analysis Knightdale, NC



Figure 5.8

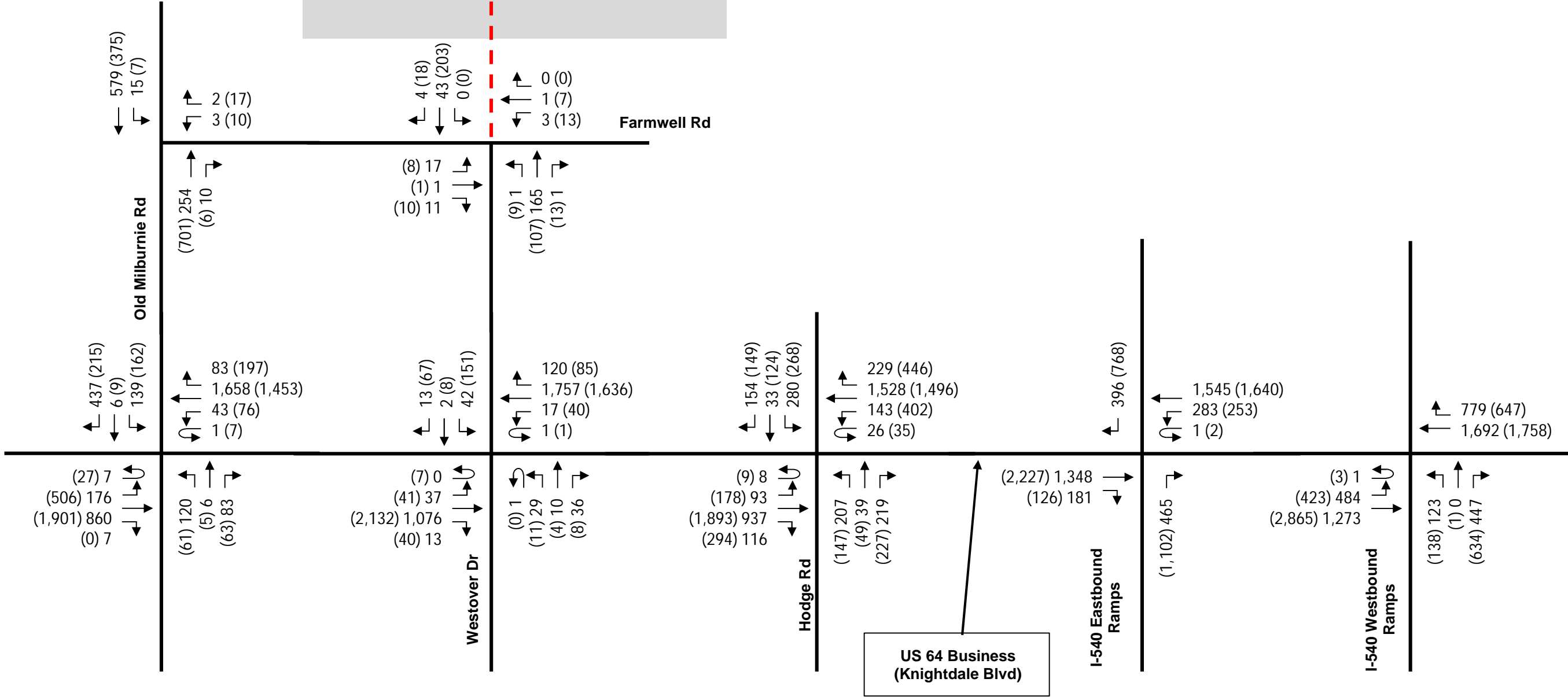


LEGEND

→ Turning Movement

XX AM Peak Hour Traffic Volume

(XX) PM Peak Hour Traffic Volume



Projected (2034) Build-out +10 Traffic Volumes

Knightdale Gateway Traffic Impact Analysis Knightdale, NC



Figure 5.9

6.0 Signal Warrant Analysis

A traffic signal warrant analysis was performed at the intersection of US 64 Business (Knightsdale Boulevard) at Farmwell Road/Westover Drive based on the criteria contained in the *Manual on Uniform Traffic Control Devices* (MUTCD) 2009 Edition published by the Federal Highway Administration (FHWA).

This traffic signal warrant analysis evaluated projected traffic conditions to determine if minimum vehicular volume warrants established by the MUTCD are expected to be satisfied in the 2025 analysis year for this intersection. Warrants 1, 2, and 3 are the vehicular volume warrants and are based on mainline traffic volumes, side street traffic volumes, and the number of travel lanes. To determine the projected volumes, the newly-collected (December 1, 2021) 13-hour counts at the intersection of US 64 Business (Knightsdale Boulevard) at Farmwell Road/Westover Drive were grown to 2025 at 3% per year. The approved development traffic volumes were distributed for 13 hours by using the hourly distributions published by ITE and added to the estimated 2025 traffic counts. The site trips were also distributed for 13 hours based on the ITE hourly distribution data and added to the estimated 2025 traffic counts and approved development traffic to determine the build-out traffic volumes.

The results of the traffic signal warrant analysis under future year 2025 conditions at the intersection of US 64 Business (Knightsdale Boulevard) at Farmwell Road/Westover Drive are shown below in Table 6.0. The posted speed limit along US 64 Business (Knightsdale Boulevard) is 45 mph, so the volume reduction factors were applied for this analysis. The 8-hour (Warrants 1A, 1B, and 1C), 4-hour (Warrant 2), and peak hour (Warrant 3) were evaluated as a part of this analysis.

Table 6.0 Traffic Signal Warrants Summary				
US 64 Business (Knightsdale Boulevard) at Farmwell Road / Westover Drive				
Warrant	Background (2025)		Build-out (2025)	
	Hours Met / Required	Criteria Satisfied?	Hours Met / Required	Criteria Satisfied?
1A	0 / 8	NO	6 / 8	NO
1B	0 / 8	NO	10 / 8	YES
1C	0 / 8	NO	8 / 8	YES
2	0 / 4	NO	10 / 4	YES
3	0 / 1	NO	8 / 1	YES

The MUTCD states that engineering judgement and rationale should be applied to a minor street approach with one lane plus a right-turn lane. The right-turn traffic should not be included in the

minor-street volumes if the movement enters the major street with minimal conflict. At the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road/Westover Drive, the northbound and southbound approaches share the right-turn movement with the left-turn and/or the through movement. However, given the relatively low side street volumes that exist today and the planned laneage in the Build (2025) traffic condition, the right-turns are mostly able to enter the major roadway with minimal conflict and were therefore not included in the analysis. Even with all of the side street right-turn volumes removed, this intersection is anticipated to meet all three MUTCD vehicular volume warrants. Therefore, a traffic signal at the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road/Westover Drive is recommended in the Build (2025) traffic condition.

A summary of the signal warrant analysis can be found in **Appendix F**.

7.0 Capacity Analysis

Capacity analyses (see **Appendix G – L**) were performed for the AM and PM peak hours for the existing traffic condition (2021), the projected (2025) background and build-out +1 traffic conditions, and the projected (2034) background and build-out +10 traffic conditions using Synchro/SimTraffic Version 11 software to determine the operating characteristics of the adjacent road network and the impacts of the proposed project.

Capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a set time duration. Capacity is combined with Level-of-Service (LOS) to describe the operating characteristics of a road segment or intersection. LOS is a qualitative measure that describes operational conditions and motorist perceptions within a traffic stream. The *Highway Capacity Manual* defines six levels of service, LOS A through LOS F, with A representing the shortest average delays and F representing the longest average delays. LOS D is the typically accepted standard for signalized intersections in urbanized areas. For signalized intersections, LOS is defined for the overall intersection operation.

For unsignalized intersections, only the movements that must yield right-of-way experience control delay. Therefore, LOS criteria for the overall intersection is not reported by Synchro/SimTraffic Version 11 or computable using methodology published in the *Highway Capacity Manual*. It is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, while the majority of the traffic moving through the intersection on the major street experiences little or no delay. Table 7.0 lists the LOS control delay thresholds published in the *Highway Capacity Manual* for signalized and unsignalized intersections.

Table 7.0 Level-of-Service Control Delay Thresholds			
Level-of-Service	Signalized Intersections – Control Delay Per Vehicle [sec/veh]	Unsignalized Intersections – Average Control Delay [sec/veh] & Qualitative Operational Description	
A	≤ 10	≤ 10	Short Delays
B	> 10 – 20	> 10 – 15	
C	> 20 – 35	> 15 – 25	
D	> 35 – 55	> 25 – 35	Moderate Delays
E	> 55 – 80	> 35 – 50	
F	> 80	> 50	Long Delays

Existing signal timings were obtained from the field and were not modified unless noted. Existing peak hour factors (PHF's) were used for all conditions except at any new intersections, where a PHF of 0.90 is used instead.

Capacity analyses were performed for the existing (2021) traffic condition, projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions for the following intersections:

- US 64 Business (Knightdale Boulevard) at Old Milburnie Road
- US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive
- US 64 Business (Knightdale Boulevard) at Hodge Road
- US 64 Business (Knightdale Boulevard) at I-540 Eastbound Ramps
- US 64 Business (Knightdale Boulevard) at I-540 Westbound Ramps
- Old Milburnie Road at Farmwell Road
- Farmwell Road at Site Access

A queuing summary can be found in **Appendix M** and the signal plans and timings used in this analysis can be found in **Appendix N**.

7.1 US 64 Business (Knightdale Boulevard) at Old Milburnie Road

Analyses indicate that the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road currently operates at LOS C in both the AM and PM peak hours and is expected to continue to operate at LOS C in both peak hours in the projected (2025) background traffic condition.

As noted previously, this intersection is expected to undergo the following improvements by the projected background and build-out +10 (2034) traffic conditions:

- Construct an exclusive eastbound right-turn lane with a minimum of 375 feet of storage and appropriate taper
- Extend the exclusive westbound left-turn lane to provide a minimum of 500 feet of storage and appropriate taper
- Extend the exclusive westbound right-turn lane to provide a minimum of 100 feet of storage and appropriate taper
- Construct an exclusive northbound left-turn lane

With the above improvements in place, the intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour for the projected (2034) background traffic condition. It should be noted that the signal timings at this intersection were optimized for the projected (2034) background and build-out +10 traffic conditions due to the extensive intersection modifications.

For the projected (2025) build-out +1 traffic condition, the intersection is expected to operate at LOS C in both the AM and PM peak hours with or without the improvements at the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive in place. Therefore, no roadway improvements are recommended at this intersection.

For the projected (2034) build-out +10 traffic condition, the intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour.

Table 7.1 summarizes the operation of the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road for the existing (2021), projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions.

Table 7.1 Level-of-Service US 64 Business (Knightsdale Boulevard) at Old Milburnie Road (Signalized)				
	Background		Build-Out	
Condition	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Existing (2021) Traffic	C (21.7)	C (25.1)	-	-
+1 (2025) Traffic	C (27.3)	C (33.6)	C (27.3)	C (34.3)
+1 (2025) Traffic – <i>Improved</i>	-	-	C (25.9)	C (30.5)
+10 (2034) Traffic	C (33.8)	D (51.7)	C (34.3)	D (49.8)

7.2 US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive

Analyses indicate that the minor street approaches (Farmwell Road and Westover Drive) at the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive are currently operating with long delays in the AM and PM peak hours.

In the projected (2025) background traffic condition, the minor street approaches (Farmwell Road and Westover Drive) at this intersection are expected to continue operating with long delays in the AM and PM peak hours. With the addition of site traffic, the minor street approaches are expected to continue operating with long delays in the AM and PM peak hours for the projected (2025) build-out +1 traffic condition. To accommodate site traffic, the following improvements are recommended:

- Install a traffic signal
- Restripe the southbound approach to provide an exclusive left-turn lane and a shared through/right-turn lane

With these improvements in place, the intersection is expected to operate at LOS B in the AM and PM peak hours for the projected (2025) build-out +1 traffic condition. It was assumed that this signal would be in place for both the projected (2034) background and build-out +10 traffic conditions. For the projected (2034) background traffic condition this intersection is expected to operate at LOS A in both the AM and PM peak hours. For the projected (2034) build-out +10 traffic condition this intersection is expected to operate at LOS B in the AM peak hour and LOS C in the PM peak hour.

It should be noted that this proposed signal did not meet the thresholds or requirements for protected left-turn phasing set forth by Congestion Management. However, to present a conservative analysis, the left-turns were analyzed with a protected phase. During signal design in the future, four-section signal heads with a protected plus permitted flashing yellow arrow (FYA) should be considered for safety purposes due to heavy mainline traffic volumes.

Table 7.2 summarizes the operation of the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road for the existing (2021), projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions.

Table 7.2 Level-of-Service US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive				
	Background		Build-Out	
Condition	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Existing (2021) Traffic	NB – F (99.6) SB – F (>100) EBL – B (13.2) WBL – A (9.9)	NB – F (>100) SB – F (>100) EBL – C (16.8) WBL – C (15.9)	-	-
+1 (2025) Traffic	NB – F (>100) SB – F (>100) EBL – C (15.4) WBL – B (10.7)	NB – F (>100) SB – F (>100) EBL – C (20.9) WBL – C (19.9)	NB – F (>100) SB – F (Err) EBL – C (19.0) WBL – B (10.7)	NB – F (80.1) SB – F (>100) EBL – B (10.2) WBL – C (19.6)
+1 (2025) Traffic – <i>Improved, Signalized</i>	-	-	Overall – B (10.0) NB – D (45.0) SB – E (56.3) EB – A (6.3) WB – A (9.1)	Overall – B (18.0) NB – D (36.5) SB – E (58.2) EB – B (14.3) WB – B (16.6)
+10 (2034) Traffic	Overall – A (6.3) NB – D (45.8) SB – D (49.0) EB – A (4.4) WB – A (5.5)	Overall – A (9.8) NB – D (51.1) SB – D (47.8) EB – A (6.6) WB – B (12.8)	Overall – B (11.6) NB – D (43.9) SB – E (59.8) EB – A (6.4) WB – B (11.9)	Overall – C (21.1) NB – D (37.6) SB – F (>100) EB – B (12.4) WB – C (21.3)

7.3 US 64 Business (Knightsdale Boulevard) at Hodge Road

Analyses indicate that the intersection of US 64 Business (Knightsdale Boulevard) at Hodge Road is currently operating at LOS B in the AM peak hour and LOS C in the PM peak hour.

In the projected (2025) background and (2034) background traffic conditions, the intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour.

For the projected (2025) build-out +1 and (2034) build-out +10 traffic conditions the intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour with or without the improvements at the intersection of US 64 Business (Knightsdale Boulevard) at Farmwell Road / Westover Drive in place. Therefore, no roadway improvements are recommended at this intersection.

Table 7.3 summarizes the operation of the intersection of US 64 Business (Knightsdale Boulevard) at Hodge Road for the existing (2021), projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions.

Table 7.3 Level-of-Service US 64 Business (Knightsdale Boulevard) at Hodge Road (Signalized)				
	Background		Build-Out	
Condition	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Existing (2021) Traffic	B (19.0)	C (26.9)	-	-
+1 (2025) Traffic	C (23.7)	D (37.7)	C (23.3)	D (38.1)
+1 (2025) Traffic – <i>Improved</i>	-	-	C (23.7)	D (35.8)
+10 (2034) Traffic	C (26.2)	D (40.0)	C (25.9)	D (40.6)

7.4 US 64 Business (Knightsdale Boulevard) at I-540 Eastbound Ramps

Analyses indicate that the intersection of US 64 Business (Knightsdale Boulevard) at I-540 Eastbound Ramps is currently operating at LOS A in both the AM and PM peak hours.

In the projected (2025) background and (2034) background traffic conditions, the intersection is expected to continue to operate at LOS A in both the AM and PM peak hours.

For the projected (2025) build-out +1 and (2034) build-out +10 traffic conditions the intersection is expected to operate at LOS A in both the AM and PM peak hours. Therefore, no roadway improvements are recommended at this intersection.

Table 7.4 summarizes the operation of the intersection of US 64 Business (Knightsdale Boulevard) at I-540 Eastbound Ramps for the existing (2021), projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions.

Table 7.4 Level-of-Service US 64 Business (Knightsdale Boulevard) at I-540 Eastbound Ramps (Signalized)				
	Background		Build-Out	
Condition	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Existing (2021) Traffic	A (1.6)	A (4.0)	-	-
+1 (2025) Traffic	A (3.9)	A (6.2)	A (4.0)	A (6.3)
+10 (2034) Traffic	A (5.4)	A (8.0)	A (5.4)	A (8.1)

7.5 US 64 Business (Knightdale Boulevard) at I-540 Westbound Ramps

Analyses indicate that the intersection of US 64 Business (Knightdale Boulevard) at I-540 Westbound Ramps is currently operating at LOS B in both the AM and PM peak hours.

In the projected (2025) background traffic condition, the intersection is expected to continue to operate at LOS B in the AM peak hour and at LOS C in the PM peak hour. In the projected (2034) background traffic condition, the intersection is expected to operate at LOS C in both the AM and PM peak hours.

For the projected (2025) build-out +1 traffic condition, the intersection is expected to operate at LOS B in the AM peak hour and LOS C in the PM peak hour with or without the proposed traffic signal in place at the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive. Additionally, the intersection is expected to operate at LOS C in both the AM and PM peak hours for the projected (2034) build-out +10 traffic condition therefore no roadway improvements are recommended at this intersection.

Table 7.5 summarizes the operation of the intersection of US 64 Business (Knightdale Boulevard) at I-540 Westbound Ramps for the existing (2021), projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions.

Table 7.5 Level-of-Service US 64 Business (Knightdale Boulevard) at I-540 Westbound Ramps (Signalized)				
	Background		Build-Out	
Condition	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Existing (2021) Traffic	B (13.6)	B (18.0)	-	-
+1 (2025) Traffic	B (18.7)	C (20.0)	B (19.2)	C (20.1)
+1 (2025) Traffic – <i>Improved</i>	-	-	B (19.1)	C (20.1)
+10 (2034) Traffic	C (22.7)	C (22.0)	C (23.1)	C (22.3)

7.6 Old Milburnie Road at Farmwell Road

Analyses indicate that the intersection of Old Milburnie Road at Farmwell Road currently operates with short delays in both the AM and PM peak hours for the minor street approach (Farmwell Road).

The intersection is projected to continue to operate with short delays in the AM and PM peak hours in the projected (2025) background and projected (2034) background traffic conditions for the minor street approach (Farmwell Road). With the addition of site traffic, the delays on the minor street approach are expected to remain short for both the AM and PM peak hours in the projected (2025) build-out +1 and (2034) build-out +10 traffic conditions. Therefore, no roadway improvements are recommended at this intersection.

Table 7.6 summarizes the operation of the intersection of Old Milburnie Road at Farmwell Road for the existing (2021), projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions.

Table 7.6 Level-of-Service Old Milburnie Road at Farmwell Road (Unsignalized)				
	Background		Build-Out	
Condition	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Existing (2021) Traffic	WB – B (11.7) SBL – A (7.6)	WB – B (11.9) SBL – A (8.3)	-	-
+1 (2025) Traffic	WB – B (12.3) SBL – A (7.7)	WB – B (12.5) SBL – A (8.5)	WB – B (11.4) SBL – A (7.7)	WB – B (12.9) SBL – A (8.5)
+10 (2034) Traffic	WB – B (13.8) SBL – A (7.8)	WB – C (15.7) SBL – A (9.2)	WB – B (12.5) SBL – A (7.9)	WB – C (16.5) SBL – A (9.2)

7.7 Farmwell Road at Site Access

Analyses indicate that the intersection of Farmwell Road at Site Access currently operates with short delays in both the AM and PM peak hours for the minor street approaches (EB Farmwell Road and WB Farmwell Road).

The intersection is projected to continue to operate with short delays in the AM and PM peak hours in the projected (2025) background and projected (2034) background traffic conditions for the minor street approaches (EB Farmwell Road and WB Farmwell Road). It should be noted that the proposed traffic signal at the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road was assumed to be in place for the projected (2034) background traffic condition.

The site is proposed to be accessed via a connection to Farmwell Road as the north leg that provides one ingress and two egress lanes which will change the configuration of the intersection to a three-way stop control with the northbound approach being free-flow. With this change in intersection configuration and the addition of site traffic, the intersection is projected to operate with long delays on the minor street approaches (EB Farmwell Road, WB Farmwell Road, and Site Access) in the AM and PM peak hours for the projected (2025) build-out +1 traffic condition.

However, with the improvements at the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive in place, for the projected (2025) build-out +1 improved and (2034) build-out +10 traffic conditions the intersection is expected to operate with short delays on the Farmwell Road minor street approaches and moderate delays on the Site Access minor street approach in the AM peak hour. In the PM peak hour, the Farmwell Road minor street approaches are expected to experience moderate delays while the Site Access minor street approach experiences long delays.

Despite still experiencing long delays in the projected (2025) build-out +1 improved and (2034) build-out +10 traffic conditions, simulations show no major queuing issues for the southbound direction at this intersection and any queues that do occur will not impact the external roadway network. Given the short distance between this intersection and the intersection of US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive, it is recommended that proper signage be put in place to inform southbound traffic from the site access to not block the intersection.

Table 7.7 summarizes the operation of the intersection of Farmwell Road at Farmwell Road / Site Access for the existing (2021), projected (2025) background and build-out +1 traffic conditions, and projected (2034) background and build-out +10 traffic conditions.

Table 7.7 Level-of-Service Farmwell Road at Farmwell Road / Site Access (Unsignalized)				
	Background		Build-Out	
Condition	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Existing (2021) Traffic	EB – A (8.6) WB – A (9.1) NBL – A (3.6)	EB – A (9.0) WB – A (9.1) NBL – A (2.7)	-	-
+1 (2025) Traffic	EB – A (8.6) WB – A (9.1) NBL – A (3.6)	EB – A (8.9) WB – A (9.1) NBL – A (2.8)	EB – F (>100) WB – F (79.4)	EB – F (>100) WB – F (>100)
+1 (2025) Traffic – <i>Improved</i>	-	-	EB – C (21.1) WB – B (13.8)	EB – D (25.7) WB – E (46.4)
+10 (2034) Traffic	EB – A (8.6) WB – A (9.1) NBL – A (3.6)	EB – A (8.9) WB – A (9.2) NBL – A (2.9)	EB – C (15.4) WB – A (8.6)	EB – E (36.5) WB – E (39.2)

8.0 Recommendations

As part of an area development identified in the Allen Park Development TIA (Timmons Group, 2021), the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road is expected to undergo the following improvements by the projected background and build-out +10 (2034) traffic conditions:

- Construct an exclusive eastbound right-turn lane with a minimum of 375 feet of storage and appropriate taper
- Extend the exclusive westbound left-turn lane to provide a minimum of 500 feet of storage and appropriate taper

Based on discussions with the Town of Knightdale, the following additional improvements were identified to be included in this analysis for the projected background and build-out +10 (2034) traffic conditions at the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road:

- Extend the exclusive westbound right-turn lane to provide a minimum of 100 feet of storage and appropriate taper
- Construct an exclusive northbound left-turn lane

It should be noted that with these listed improvements in place at the intersection of US 64 Business (Knightdale Boulevard) at Old Milburnie Road, the signal was optimized in the analysis of the projected background and build-out +10 traffic conditions and signal operations were adjusted to match the 2020 signal plan.

It should also be noted that, per the KnightdaleNext 2035 Comprehensive Plan, Old Milburnie Road is planned to be realigned to connect with Hodge Road north of the proposed Knightdale Gateway location. Ultimately, the new roadway that is to be constructed as the proposed site access is planned to be extended by others and connect to the new realigned Old Milburnie Road.

The following improvements are recommended to be performed to accommodate projected Knightdale Gateway site traffic based on the capacity analysis presented herein:

US 64 Business (Knightdale Boulevard) at Farmwell Road / Westover Drive:

- Install a traffic signal
- Restripe the southbound approach to provide an exclusive left-turn lane and a shared through/right-turn lane

Farmwell Road at Site Access

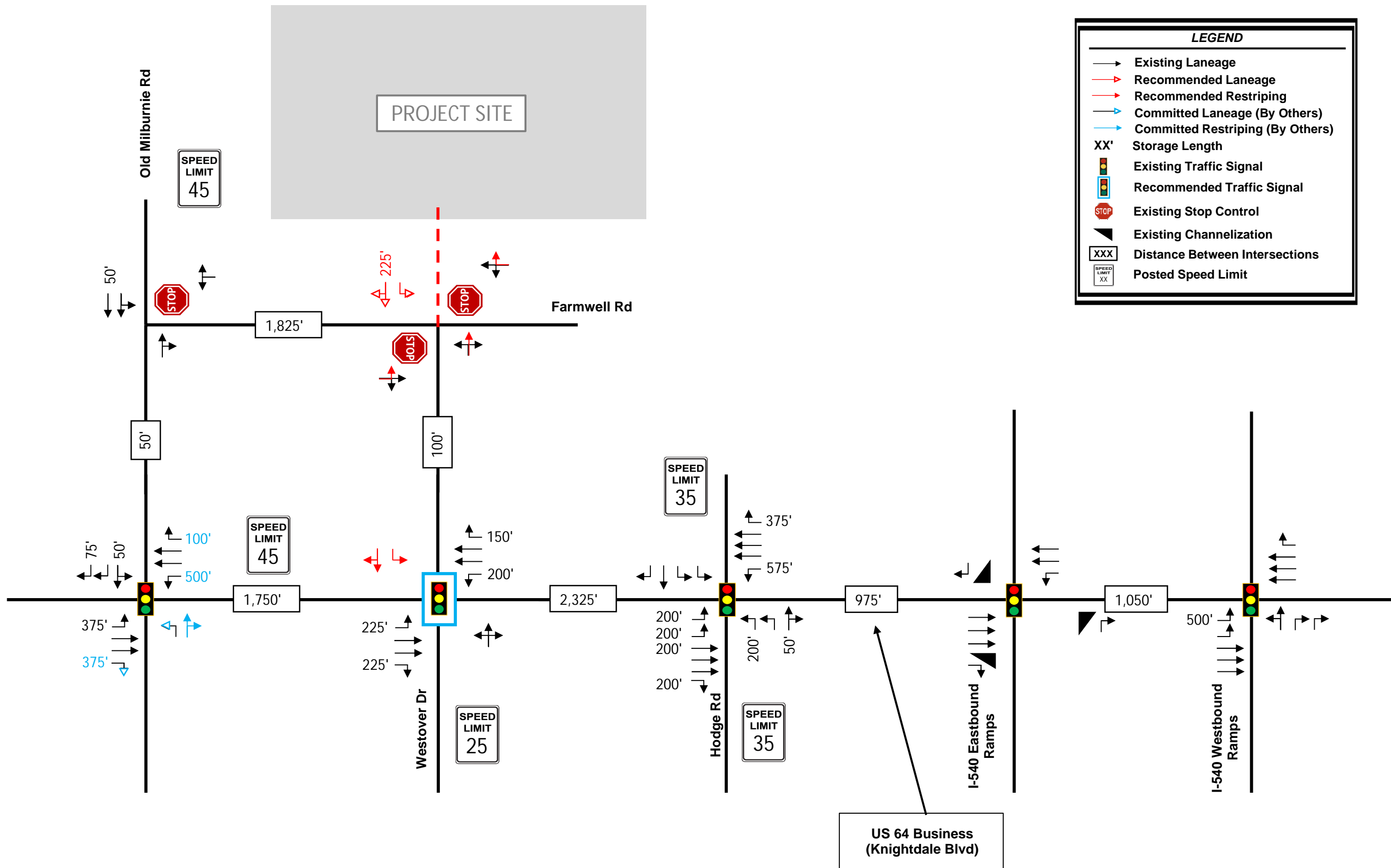
- Construct the proposed site access as the north leg of the intersection of Farmwell Road at US 64 Business (Knightdale Boulevard). The north leg shall contain one ingress lane and two egress lanes striped as an exclusive left-turn lane and a shared through/right-turn

lane. The shared through/right-turn lane should provide a minimum of 225 feet of storage.

- Configure the intersection to be stop-controlled on the eastbound and westbound approaches, with a stop bar, as well as a signage, on the southbound approach instructing southbound traffic to not block the intersection. The northbound approach from US 64 Business (Knightdale Boulevard) will be free-flow.

All of the signalized study intersections are expected to operate at an acceptable LOS in the projected (2025) build-out +1 and projected (2034) build-out +10 traffic conditions.

The committed and recommended laneage is shown on **Figure 8.1**.



LEGEND

- Existing Laneage
- Recommended Laneage
- Recommended Restriping
- Committed Laneage (By Others)
- Committed Restriping (By Others)
- XX' Storage Length
- Existing Traffic Signal
- Recommended Traffic Signal
- Existing Stop Control
- Existing Channelization
- XXX Distance Between Intersections
- XX Posted Speed Limit

Recommended Roadway Laneage
(2025)

Knightdale Gateway
Traffic Impact Analysis
Knightdale, NC



Figure 8.1

Appendix

Appendix A:
Memorandum of Understanding



MEMORANDUM OF UNDERSTANDING

To: Jason Brown, ACIP, CZO, Town of Knightdale
Amy Neidringhaus, PE, NCDOT

From: Lyle Overcash, PE, Kimley-Horn

Date: December 16, 2021

Subject: Traffic Impact Analysis Assumptions
5901 Farmwell Road

Introduction

The proposed site is located at 5901 Farmwell Road in Knightdale, NC. The site is currently occupied by the May Mak Plant Farm and as currently envisioned may consist of up to 225,000 square feet (SF) of warehouse space, 175,000 SF of Research and Development space, and a 3.35 commercial outparcel. For purposes of the traffic study, it will be assumed that this outparcel will consist of 35,000 SF of retail space. Build-out of the development is anticipated by 2024.

Study Intersections

The study area will consist of the following intersections:

US 64 Business (Knightdale Blvd) at Old Milburnie Road	<i>(Signalized)</i>
US 64 Business (Knightdale Blvd) at Farmwell Road	<i>(Unsignalized)</i>
US 64 Business (Knightdale Blvd) at Hodge Road	<i>(Signalized)</i>
US 64 Business (Knightdale Blvd) at I-540 Eastbound Ramps	<i>(Signalized)</i>
US 64 Business (Knightdale Blvd) at I-540 Westbound Ramps	<i>(Signalized)</i>
Old Milburnie Road at Farmwell Road	<i>(Unsignalized)</i>

Study Scenarios

In accordance with the Town of Knightdale's UDO, the study scenarios will consist of:

1. Existing (2021)
2. Background +1 (2025)
3. Build-out +1 (2025)
4. Background +10 (2034)
5. Build-out +10 (2034)

Volume Development Methodology

1. Traffic Data Collection
 - a. New peak hour turning movement counts will be collected at the existing study intersections.

- b. No factoring for peak hour traffic counts due to COVID-19 will be applied.
2. Growth Rate assumptions
 - a. Based on a review of daily vehicular traffic count information from NCDOT and the number of approved developments to be included, a growth rate of 3% will be applied to the existing volumes up to the future year build +1 scenario (2025). A growth rate of 1% will be applied from the build +1 scenario to the build +10 scenario (2034).
3. Background Developments (Build +1)
 - a. Legacy Oaks
4. Background Developments (Build +10)
 - a. Allen Park
 - b. Legacy Oaks
 - c. River's Edge
5. Proposed Development
 - a. Trip Generation will be used for a General Urban/Suburban setting/location
 - b. ITE 11th Ed. rates will be used

Trip Distribution / Assignment

The preliminary site trip distribution used for this site is based on a review of surrounding land uses, existing traffic patterns, and Replica origin-destination data by trip type (office, retail, freight).

The following distribution will be used for site passenger vehicle trips:

- 40% to/from the east on US 64 Business (Knightdale Blvd)
- 25% to/from the west on US 64 Business (Knightdale Blvd)
- 15% to/from the south on I-540
- 10% to/from the north on I-540
- 5% to/from the north on Old Milburnie Road
- 5% to/from the south on Westover Drive

The following distribution will be used for the site truck trips:

- 35% to/from the north on I-540
- 35% to/from the south on I-540
- 20% to/from the east on US 64 Business (Knightdale Blvd)
- 10% to/from the west on US 64 Business (Knightdale Blvd)

Analysis Methodology

This analysis will be performed using Synchro/SimTraffic version 10.3.

Existing peak hour factors (PHF) will be used at all intersections, and a PHF of 0.90 will be used at new intersections. Right-turns on red (RTOR) will be allowed in the analysis where permitted today. Signal timings will be obtained from the City of Raleigh/NCDOT.

Attachments –

Figure 1: Conceptual Site Plan

Figures 2-3: Site Traffic Distribution & Study Area

Figures 4-5: Proposed Vehicular Assignment

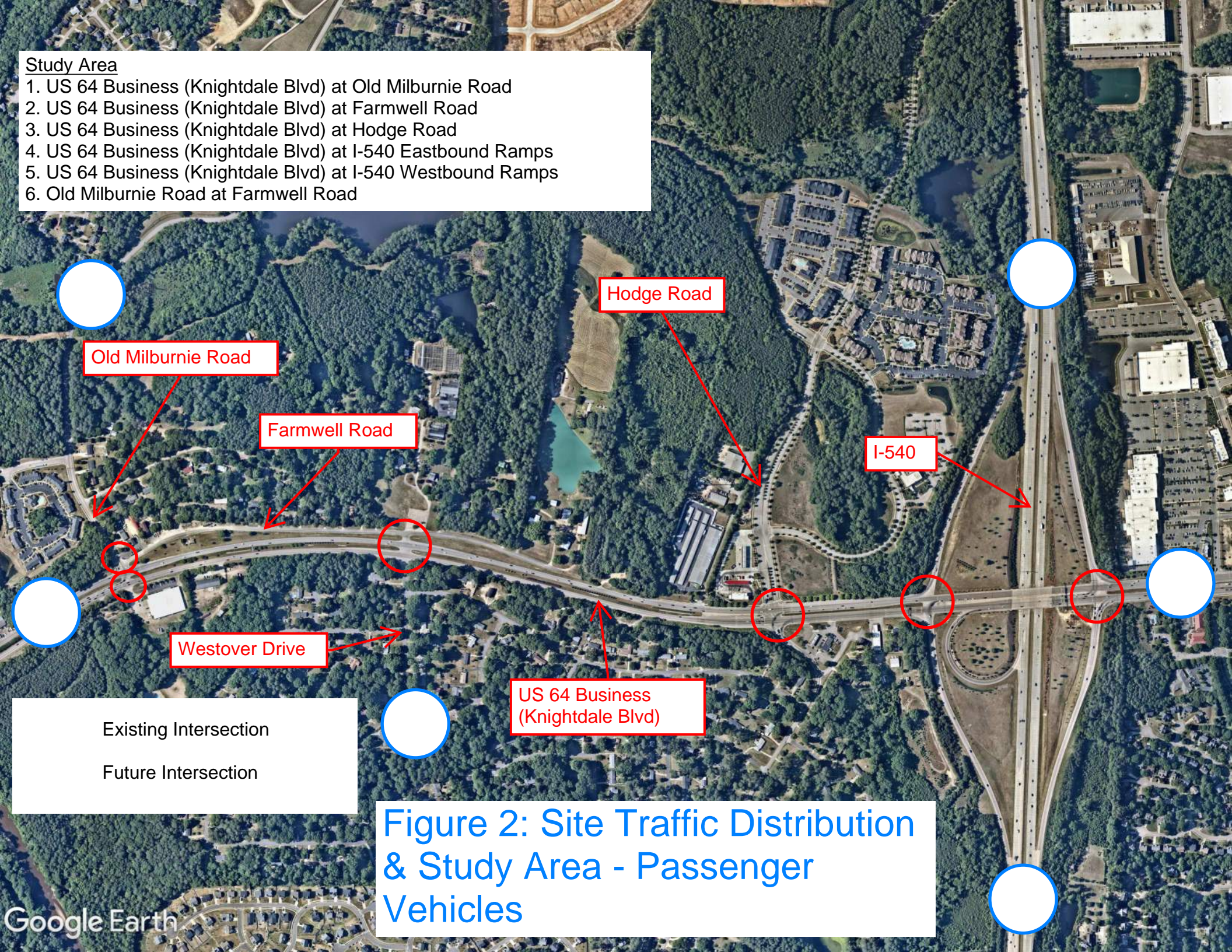
Table 1: Trip Generation

Growth Rate Calculations

Replica Origin-Destination Data

Study Area

- 1. US 64 Business (Knightdale Blvd) at Old Milburnie Road
- 2. US 64 Business (Knightdale Blvd) at Farmwell Road
- 3. US 64 Business (Knightdale Blvd) at Hodge Road
- 4. US 64 Business (Knightdale Blvd) at I-540 Eastbound Ramps
- 5. US 64 Business (Knightdale Blvd) at I-540 Westbound Ramps
- 6. Old Milburnie Road at Farmwell Road



Old Milburnie Road

Farmwell Road

Hodge Road

I-540

Westover Drive

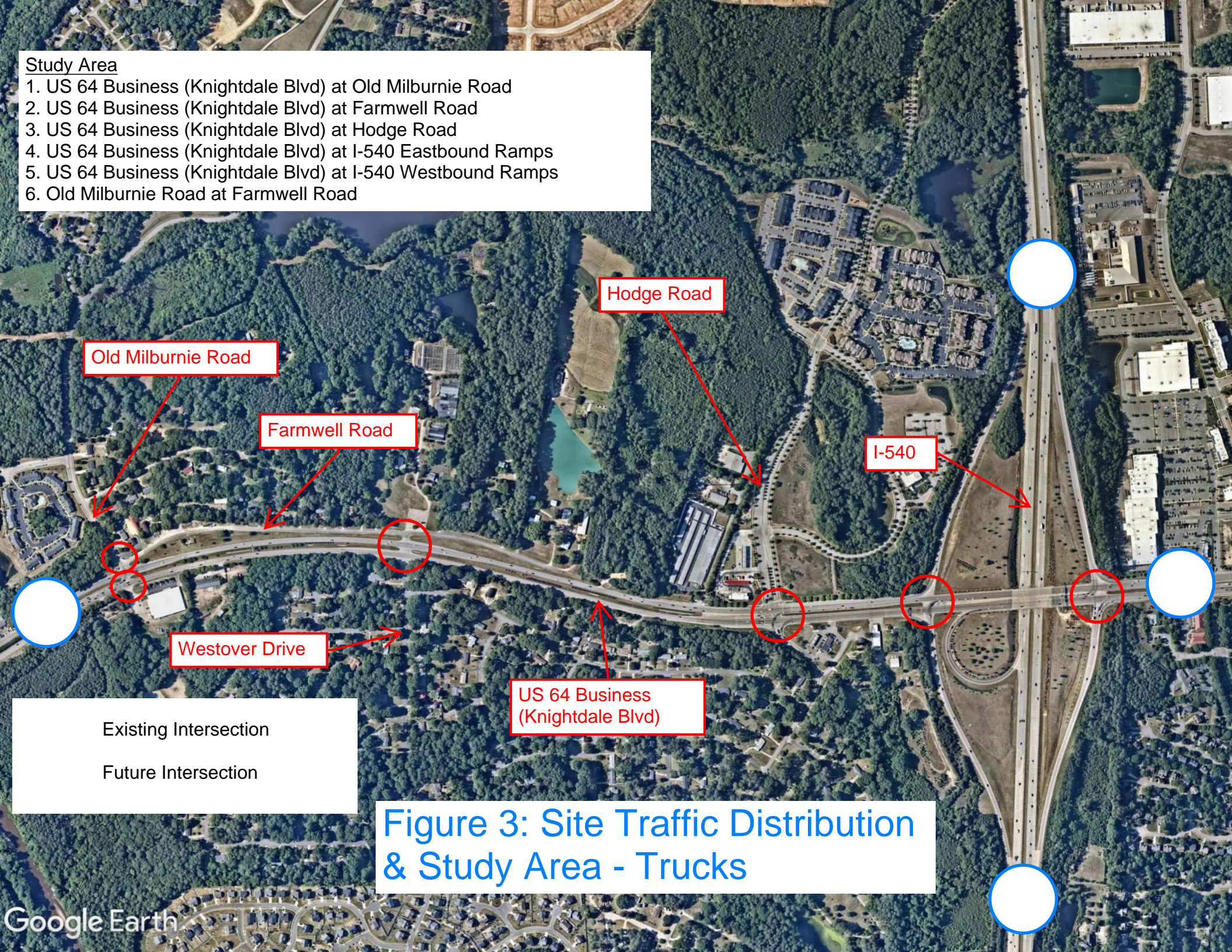
US 64 Business
(Knightdale Blvd)

Existing Intersection
Future Intersection

Figure 2: Site Traffic Distribution & Study Area - Passenger Vehicles

Study Area

- 1. US 64 Business (Knightdale Blvd) at Old Milburnie Road
- 2. US 64 Business (Knightdale Blvd) at Farmwell Road
- 3. US 64 Business (Knightdale Blvd) at Hodge Road
- 4. US 64 Business (Knightdale Blvd) at I-540 Eastbound Ramps
- 5. US 64 Business (Knightdale Blvd) at I-540 Westbound Ramps
- 6. Old Milburnie Road at Farmwell Road



Old Milburnie Road

Farmwell Road

Hodge Road

I-540

Westover Drive

US 64 Business
(Knightdale Blvd)

Existing Intersection
Future Intersection

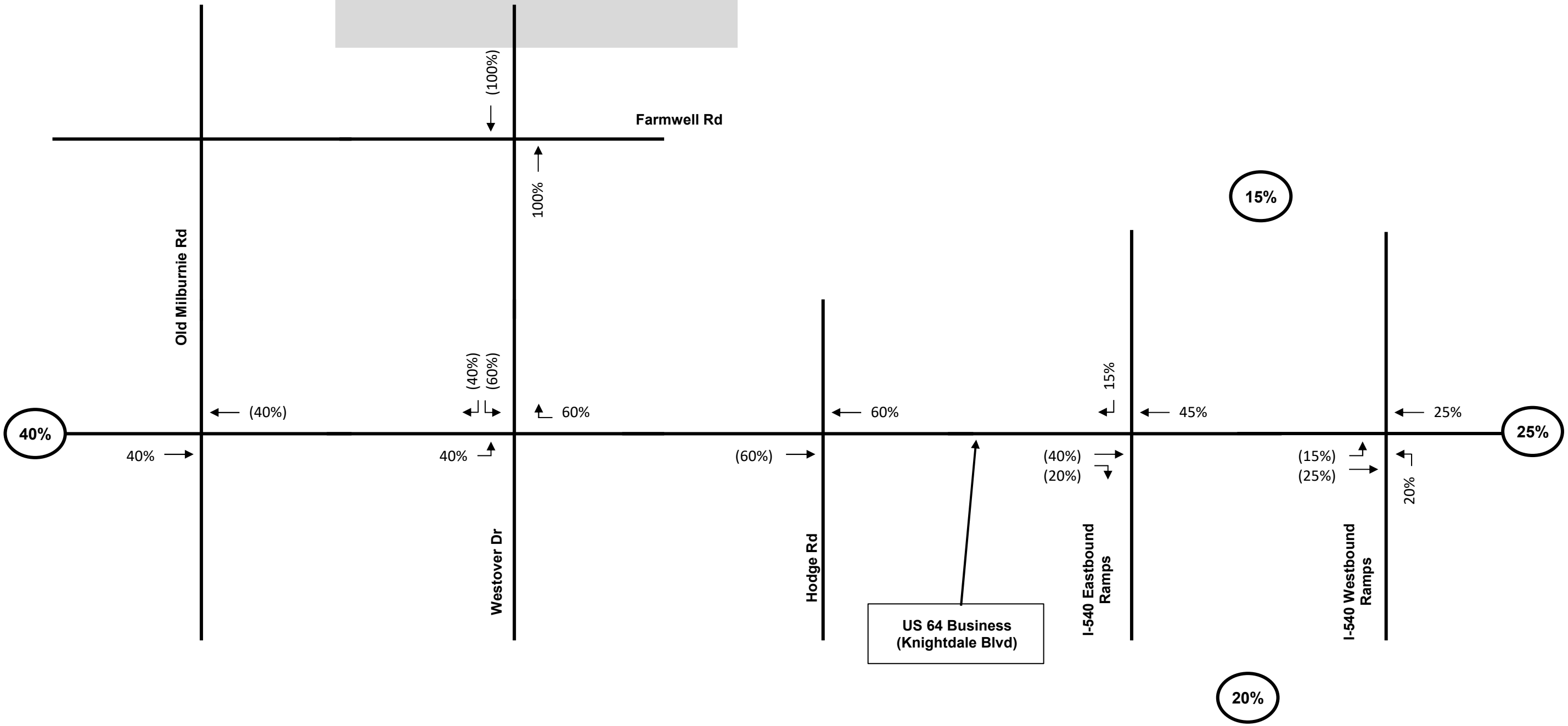
Figure 3: Site Traffic Distribution & Study Area - Trucks



PROJECT SITE

LEGEND

- Turning Movement
- XX% % Entering Traffic
- (XX%) % Exiting Traffic
- (x%) Overall Distribution



Trip Distribution & Assignment - Trucks

5901 Farmwell Road
Transportation Impact Analysis
Knightdale, NC



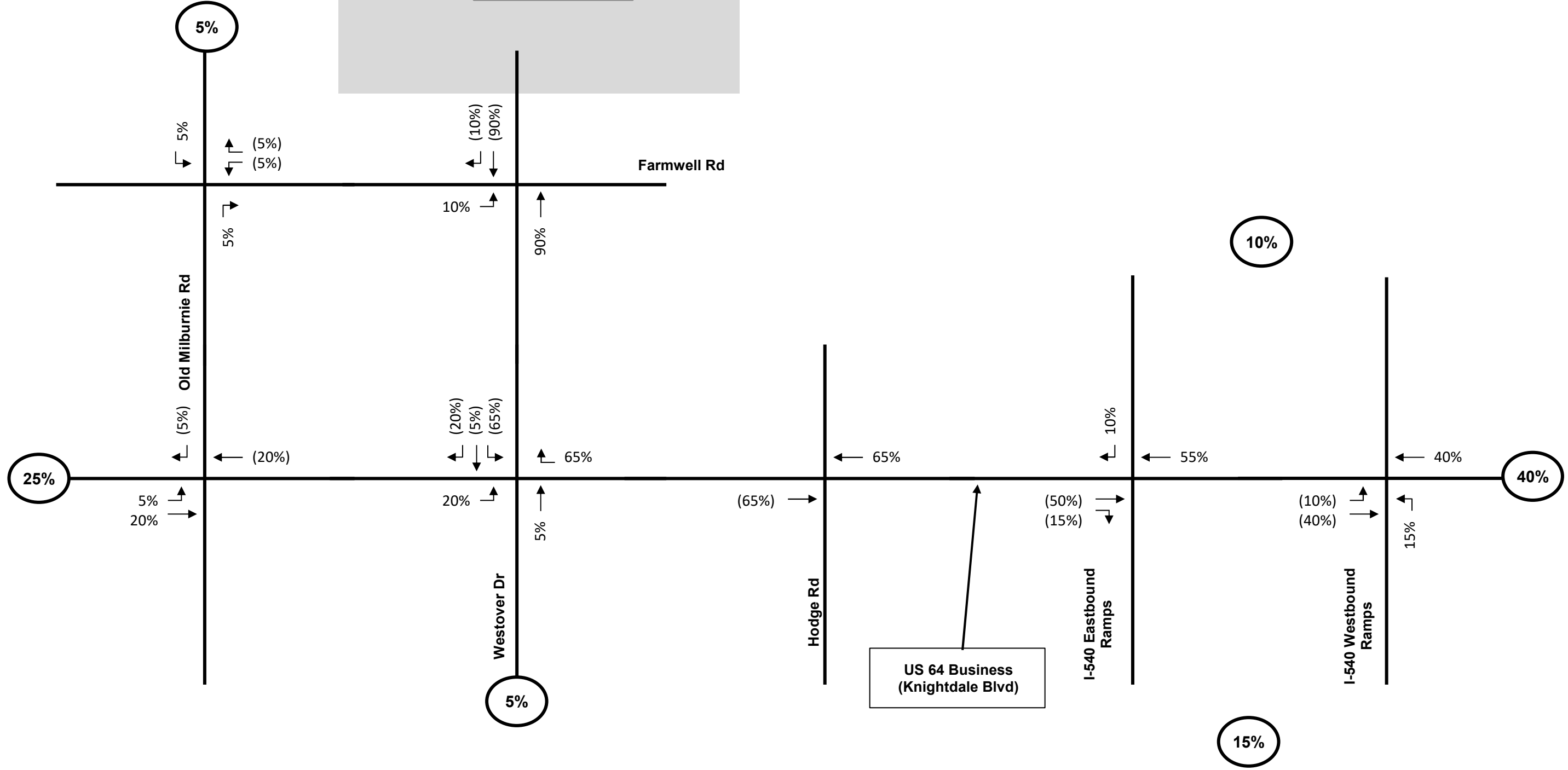
Figure 4



PROJECT SITE

LEGEND

- Turning Movement
- XX% % Entering Traffic
- (XX%) % Exiting Traffic
- (x%) Overall Distribtuion



Trip Distribution & Assignment - Passenger Vehicles

5901 Farmwell Road
Transportation Impact Analysis
Knightdale, NC



Figure 5

Trip Generation Analysis (11th Ed. With 2nd Edition Handbook Daily IC & 3rd Edition AM/PM IC)
5901 Farmwell Road
Knightdale, NC

Land Use	Density	Daily Trips			AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out	Total	In	Out
Proposed Project Trips										
150 Warehousing	225,000 Sq. Ft. GFA	394	197	197	51	39	12	53	15	38
760 Research and Development Center	175,000 Sq. Ft. GFA	1,946	973	973	180	148	32	172	28	144
822 Strip Retail Plaza (<40k SF)	35,000 Sq. Ft. GFA	1,906	953	953	83	50	33	231	116	115
Gross Project Trips		4,246	2,123	2,123	314	237	77	456	159	297
Warehouse Trips		394	197	197	51	39	12	53	15	38
Truck Trips		136	68	68	4	2	2	6	4	2
Car Trips		258	129	129	47	37	10	47	11	36
Office Trips		1,946	973	973	180	148	32	172	28	144
Mixed-Use Reductions		-172	-29	-143	-15	-6	-9	-11	-2	-9
Adjusted Office Trips		1,774	944	830	165	142	23	161	26	135
Retail Trips		1,906	953	953	83	50	33	231	116	115
Mixed-Use Reductions		-172	-143	-29	-15	-9	-6	-11	-9	-2
Pass By Reductions (Based on ITE Rates)		-694	-347	-347	0	0	0	-88	-44	-44
Adjusted Retail Trips		1,040	463	577	68	41	27	132	63	69
Mixed-Use Reductions - TOTAL		-344	-172	-172	-30	-15	-15	-22	-11	-11
Pass-By Reductions - TOTAL		-694	-347	-347	0	0	0	-88	-44	-44
New Trips		3,208	1,604	1,604	284	222	62	346	104	242
Driveway Volumes		3,902	1,951	1,951	284	222	62	434	148	286

Internal Capture Reduction Calculations

Methodology for A.M. Peak Hour and P.M. Peak Hour
based on the *Trip Generation Handbook*, 3rd Edition, published by the Institute of Transportation Engineers

Methodology for Daily
based on the average of the Unconstrained Rates for the A.M. Peak Hour and P.M. Peak Hour

SUMMARY

GROSS TRIP GENERATION

INPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office	973	973	148	32	28	144
Retail	953	953	50	33	116	115	
Restaurant	0	0	0	0	0	0	
Cinema/Entertainment							
Residential	0	0	0	0	0	0	
Hotel	0	0	0	0	0	0	
		1,926	1,926	198	65	144	259

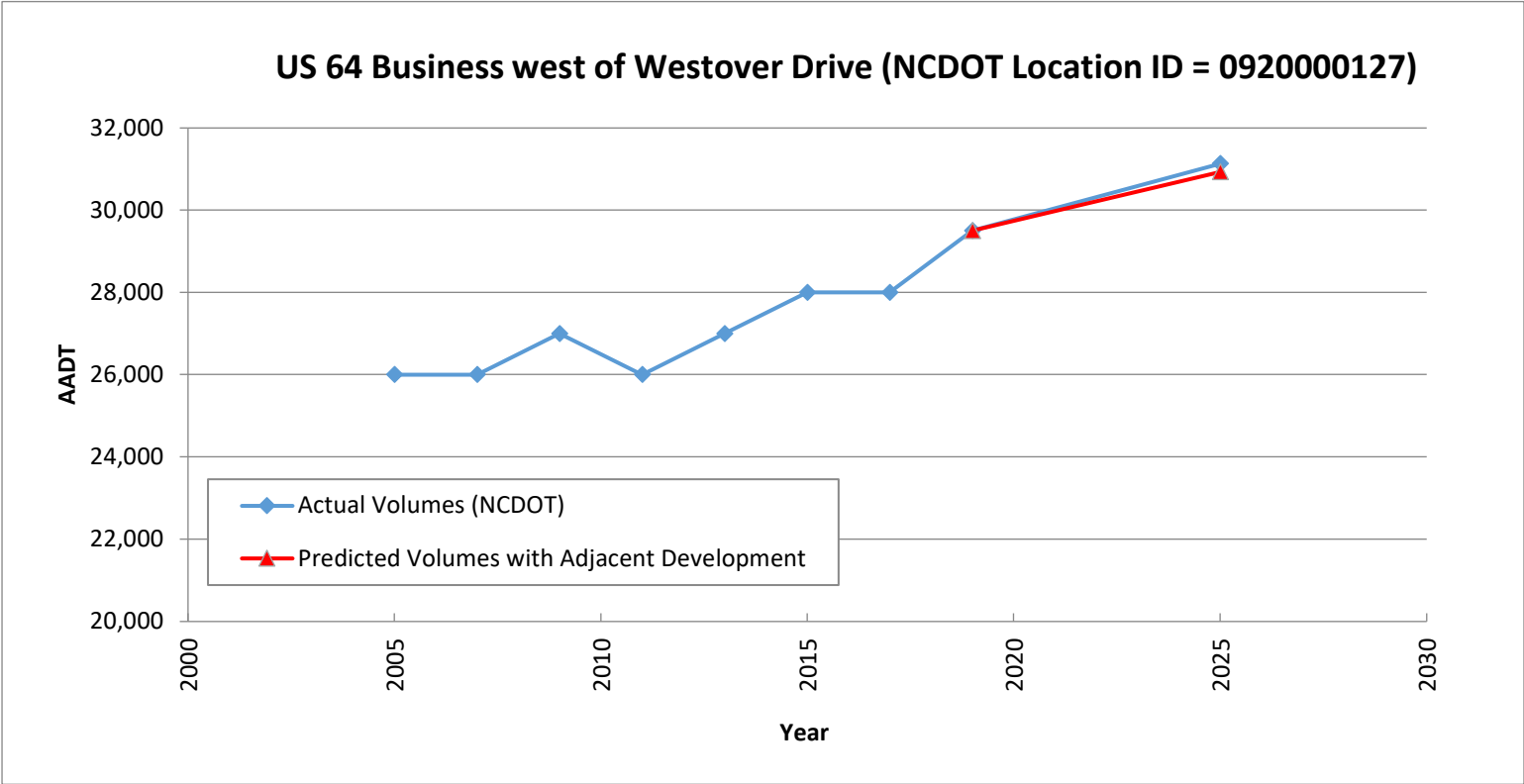
INTERNAL TRIPS

OUTPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office	29	143	6	9	2	9
Retail	143	29	9	6	9	2	
Restaurant	0	0	0	0	0	0	
Cinema/Entertainment	0	0	0	0	0	0	
Residential	0	0	0	0	0	0	
Hotel	0	0	0	0	0	0	
		172	172	15	15	11	11
% Reduction		8.9%		11.4%		5.5%	

EXTERNAL TRIPS

OUTPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office	944	830	142	23	26	135
Retail	810	924	41	27	107	113	
Restaurant	0	0	0	0	0	0	
Cinema/Entertainment	0	0	0	0	0	0	
Residential	0	0	0	0	0	0	
Hotel	0	0	0	0	0	0	
		1,754	1,754	183	50	133	248

US 64 Business west of Westover Drive (NCDOT Location ID = 0920000127)

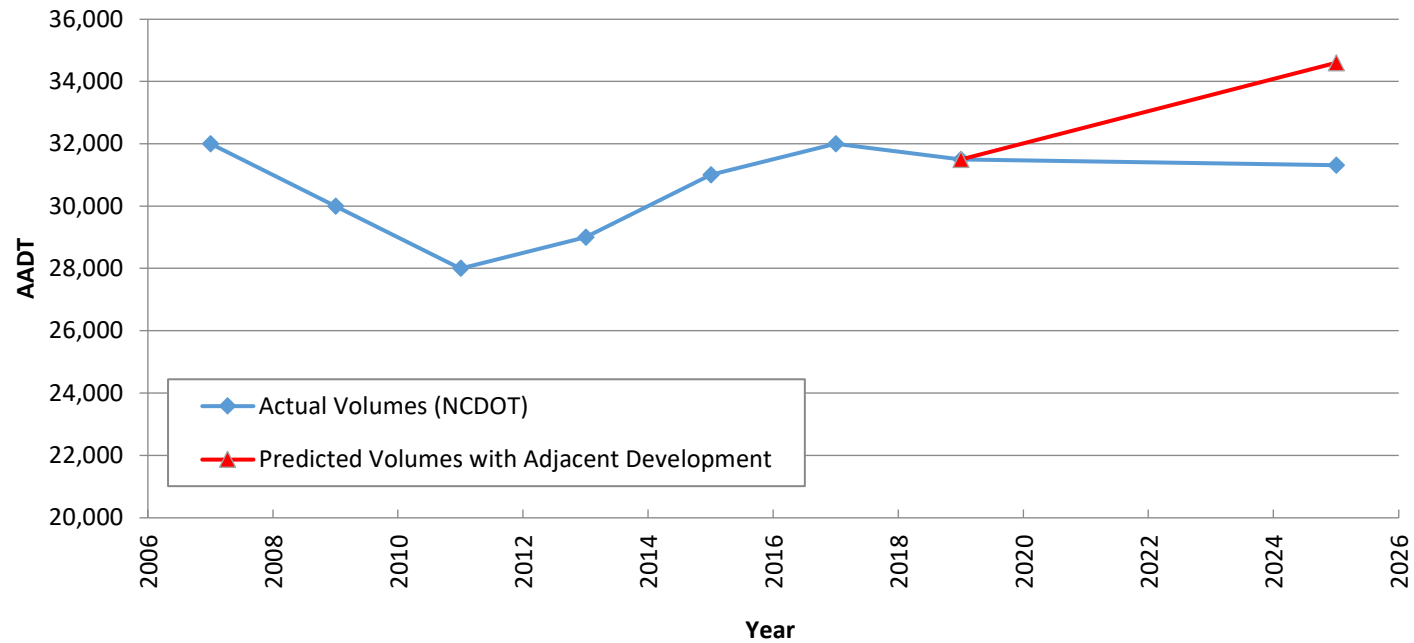


Effective Historical Annual Growth for US 64 Business west of Westover Drive = 0.9%

Effective Annual Growth from Adjacent Development = 0.8%

Effective Annual Growth from Adjacent Development and Historic Growth = 1.7%

US 64 Business east of Hodge Road (NCDOT Location ID = 0920000156)

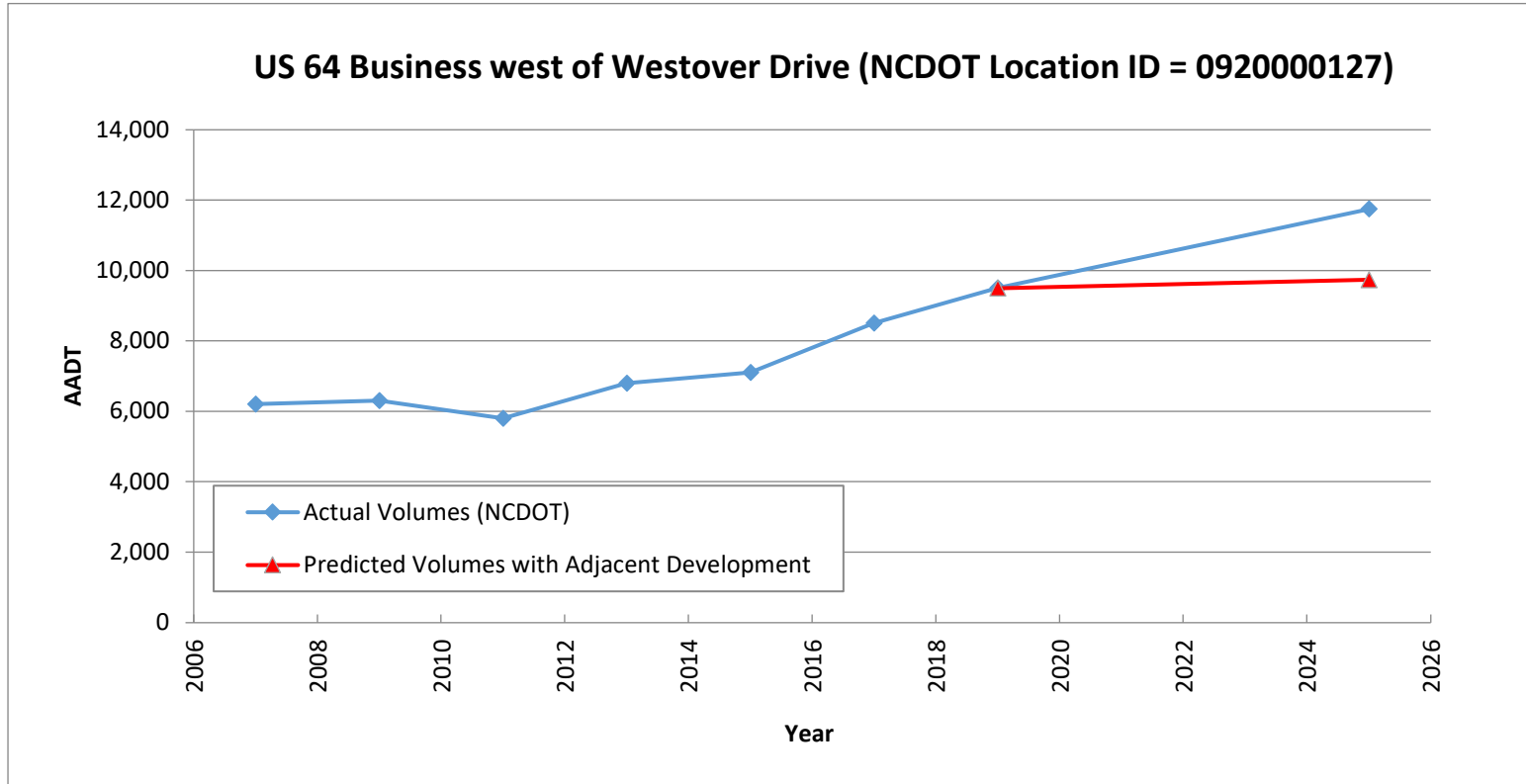


Effective Historical Annual Growth for US 64 Business east of Hodge Road = -0.1%

Effective Annual Growth from Adjacent Development = 1.6%

Effective Annual Growth from Adjacent Development and Historic Growth = 1.5%

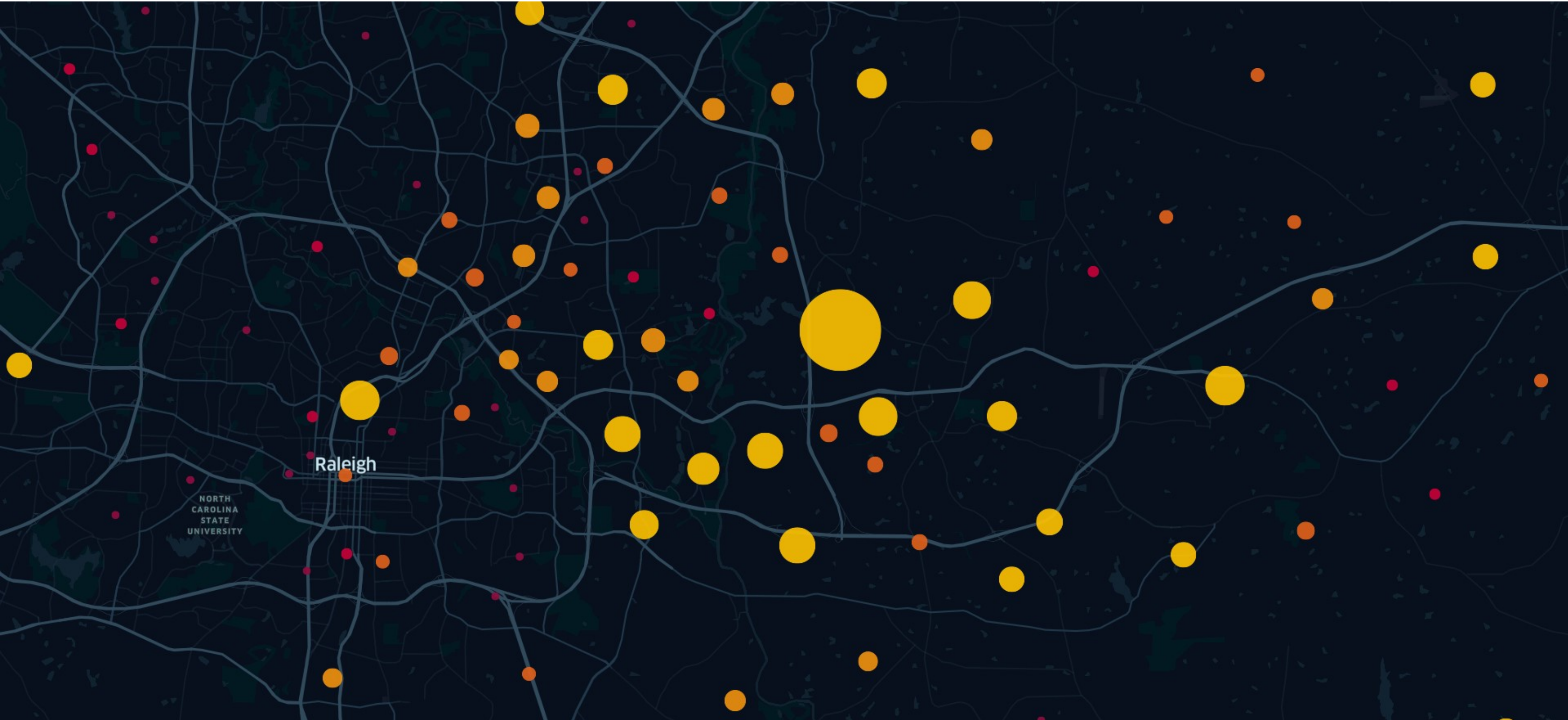
US 64 Business west of Westover Drive (NCDOT Location ID = 0920000127)



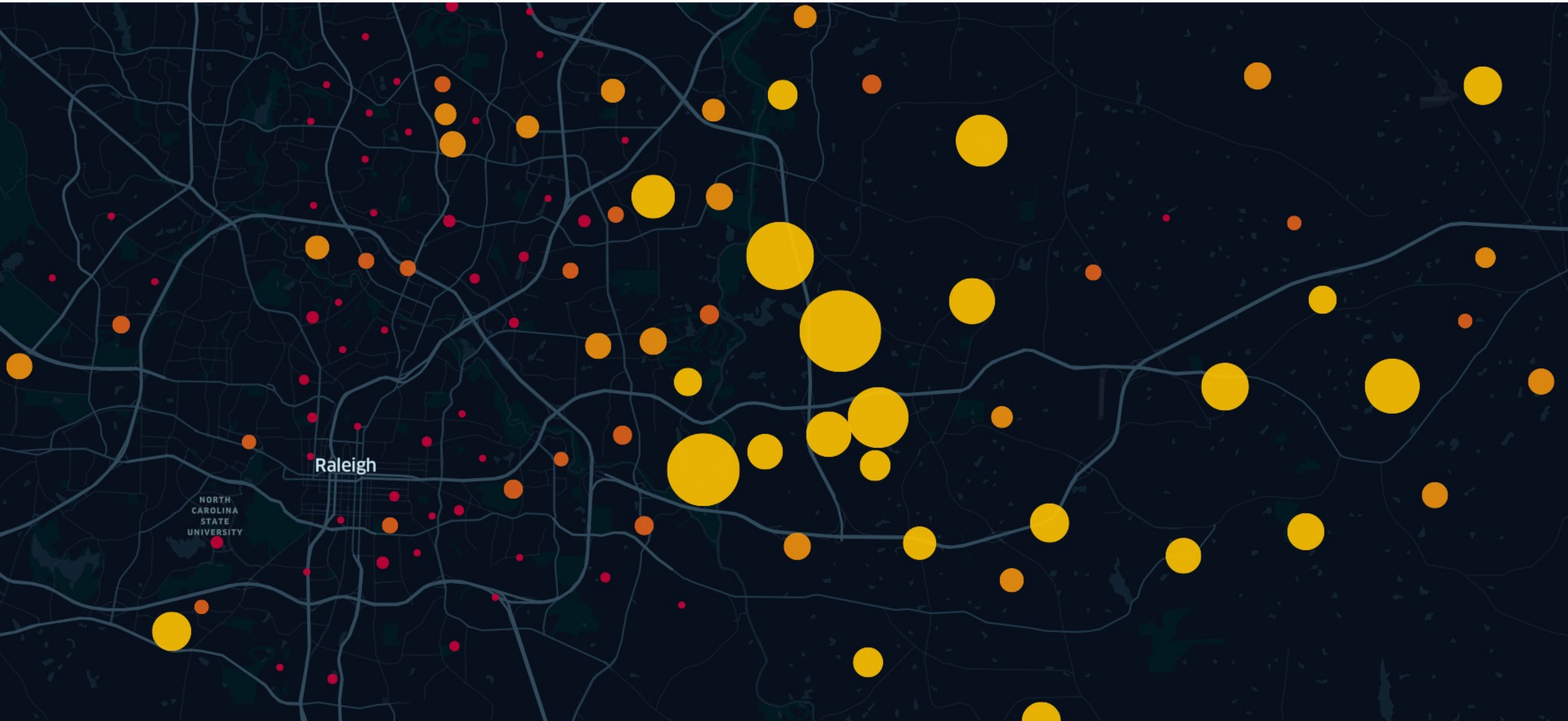
Effective Historical Annual Growth for Hodge Road south of US 64 Business = 3.6%

Effective Annual Growth from Adjacent Development = 0.4%

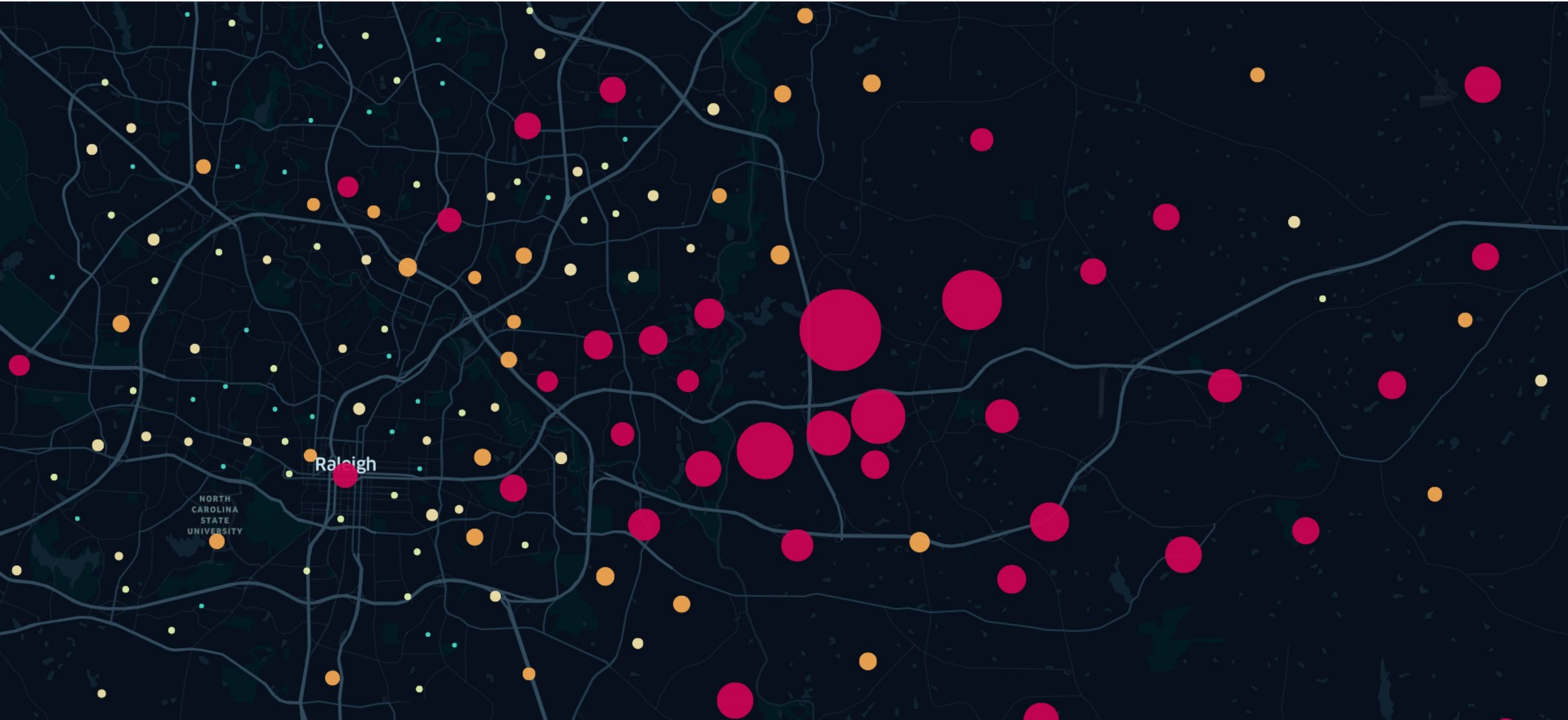
Effective Annual Growth from Adjacent Development and Historic Growth = 3.9%



Existing Block Group 2, (Tract 541.13) Freight Trip Distribution



Existing Block Group 2, (Tract 541.13) Office Trip Distribution



Existing Block Group 2, (Tract 541.13) Retail Trip Distribution

Appendix B: Trip Generation

Trip Generation Analysis (11th Ed. With 2nd Edition Handbook Daily IC & 3rd Edition AM/PM IC)
 Knightdale Gateway
 Knightdale, NC

Land Use	Density	Daily Trips			AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out	Total	In	Out
Proposed Project Trips										
150 Warehousing	450,000 Sq. Ft. GFA	750	375	375	78	60	18	80	22	58
710 General Office Building	60,000 Sq. Ft. GFA	744	372	372	108	95	13	109	19	90
822 Strip Retail Plaza (<40k SF)	25,000 Sq. Ft. GFA	1,362	681	681	59	35	24	165	83	82
Gross Project Trips		2,856	1,428	1,428	245	190	55	354	124	230
Warehouse Trips		750	375	375	78	60	18	80	22	58
Truck Trips		270	136	134	10	6	4	14	8	6
Car Trips		480	239	241	68	54	14	66	14	52
Office Trips		744	372	372	108	95	13	109	19	90
Mixed-Use Reductions		-97	-15	-82	-8	-4	-4	-9	-2	-7
Adjusted Office Trips		647	357	290	100	91	9	100	17	83
Retail Trips		1,362	681	681	59	35	24	165	83	82
Mixed-Use Reductions		-97	-82	-15	-8	-4	-4	-9	-7	-2
Pass By Reductions (Based on ITE Rates)		-506	-253	-253	0	0	0	-62	-31	-31
Adjusted Retail Trips		759	346	413	51	31	20	94	45	49
Mixed-Use Reductions - TOTAL		-194	-97	-97	-16	-8	-8	-18	-9	-9
Pass-By Reductions - TOTAL		-506	-253	-253	0	0	0	-62	-31	-31
New Trips		2,156	1,078	1,078	229	182	47	274	84	190
Driveway Volumes		2,662	1,331	1,331	229	182	47	336	115	221

Appendix C:
Traffic Count Data



Location: Old Milburnie Rd/Farmwell Rd -- Knightdale Blvd

Date: 12/1/2021

Site Code: 15637401

Start Time	Old Milburnie Rd Southbound					Farmwell Rd Southwestbound					New Bern Ave Westbound					Old Milburnie Rd Northbound					New Bern Ave Eastbound				
	Right	Thru	Left	Left to Farmwell Rd	U-Turn	Right to Old Milburnie Rd	Right to New Bern Ave	Left to Old Milburnie Rd	Left to New Bern Ave	U-Turn	Right to Farmwell Rd	Right	Thru	Left	U-Turns	Right	Right to Farmwell Rd	Thru	Left	U-Turn	Right	Thru	Left to Farmwell Rd	Left	U-Turn
07:00 AM	50	0	24	0	0	0	0	0	0	0	0	30	283	0	0	0	0	0	0	0	0	146	1	25	1
07:15 AM	75	0	28	1	0	0	0	0	0	0	0	22	267	0	0	0	0	0	0	0	0	138	0	17	2
07:30 AM	90	0	39	0	0	0	0	0	0	0	0	8	345	1	0	0	0	0	0	0	0	185	0	33	1
07:45 AM	93	1	16	2	0	0	0	0	1	0	0	13	300	3	0	1	0	0	1	0	0	168	0	34	3
08:00 AM	66	0	18	1	0	0	0	0	0	0	0	15	340	1	1	1	0	0	0	0	0	149	1	21	0
08:15 AM	56	0	12	2	0	0	0	0	0	0	0	16	307	0	0	0	0	0	0	0	5	156	0	36	1
08:30 AM	38	0	11	1	0	1	1	0	0	0	0	21	251	2	0	0	0	0	2	0	3	149	1	53	2
08:45 AM	85	1	37	0	0	0	0	0	0	0	0	22	243	2	1	0	0	0	0	0	2	135	1	46	5
Peak Hour	305	1	85	5	0	0	0	0	1	0	0	52	1292	5	1	2	0	0	1	0	5	658	1	124	5

Peak Hour: 7:30 AM - 8:30 AM

Peak 15: 7:30 AM - 7:45 AM

PHF: 0.905627



Location: Old Milburnie Rd/Farmwell Rd -- Knightdale Blvd

Date: 12/1/2021

Site Code: 15637402

Start Time	Old Milburnie Rd Southbound					Farmwell Rd Southwestbound					New Bern Ave Westbound					Old Milburnie Rd Northbound					New Bern Ave Eastbound					
	Right	Thru	Left	Left to Farmwell Rd	U-Turn	Right to Old Milburnie Rd	Right to New Bern Ave	Left to Old Milburnie Rd	Left to New Bern Ave	U-Turn	Right to Farmwell Rd	Right	Thru	Left	U-Turn	Right	Right to Farmwell Rd	Thru	Left	U-Turn	Right	Thru	Left to Farmwell Rd	Left	U-Turn	
04:00 PM	60	0	29	0	0	1	0	0	0	0	0	29	227	3	1	0	0	0	0	0	0	2	301	1	48	7
04:15 PM	46	0	24	0	0	0	0	0	0	0	0	20	254	0	1	2	0	0	1	0	0	0	320	2	60	6
04:30 PM	43	0	15	1	0	2	1	0	0	0	0	20	264	0	0	0	0	1	1	0	0	0	347	1	60	6
04:45 PM	33	0	25	0	0	0	0	0	0	0	0	23	241	2	1	1	0	1	0	0	1	0	319	0	71	13
05:00 PM	34	0	15	1	0	1	0	0	1	0	0	17	272	0	1	0	0	0	2	0	0	0	382	0	71	6
05:15 PM	32	1	29	1	0	1	0	0	0	0	0	27	289	0	1	0	0	0	0	0	0	0	381	1	81	3
05:30 PM	35	0	26	0	0	2	0	0	0	0	1	36	281	0	1	0	0	2	0	0	0	0	389	0	97	8
05:45 PM	31	0	16	1	0	2	0	0	0	0	0	20	272	2	2	3	0	0	0	0	0	0	338	0	78	5
Peak Hour	132	1	86	3	0	6	0	0	1	0	1	100	1114	2	5	3	0	2	2	0	0	1490	1	327	22	

Peak Hour: 5:00 PM - 6:00 PM

Peak 15: 5:30 PM - 5:45 PM

PHF: 0.939066



Location: Westover Dr -- Farmwell Rd/Knightdale Blvd

Date: 12/1/2021

Site Code: 15637409

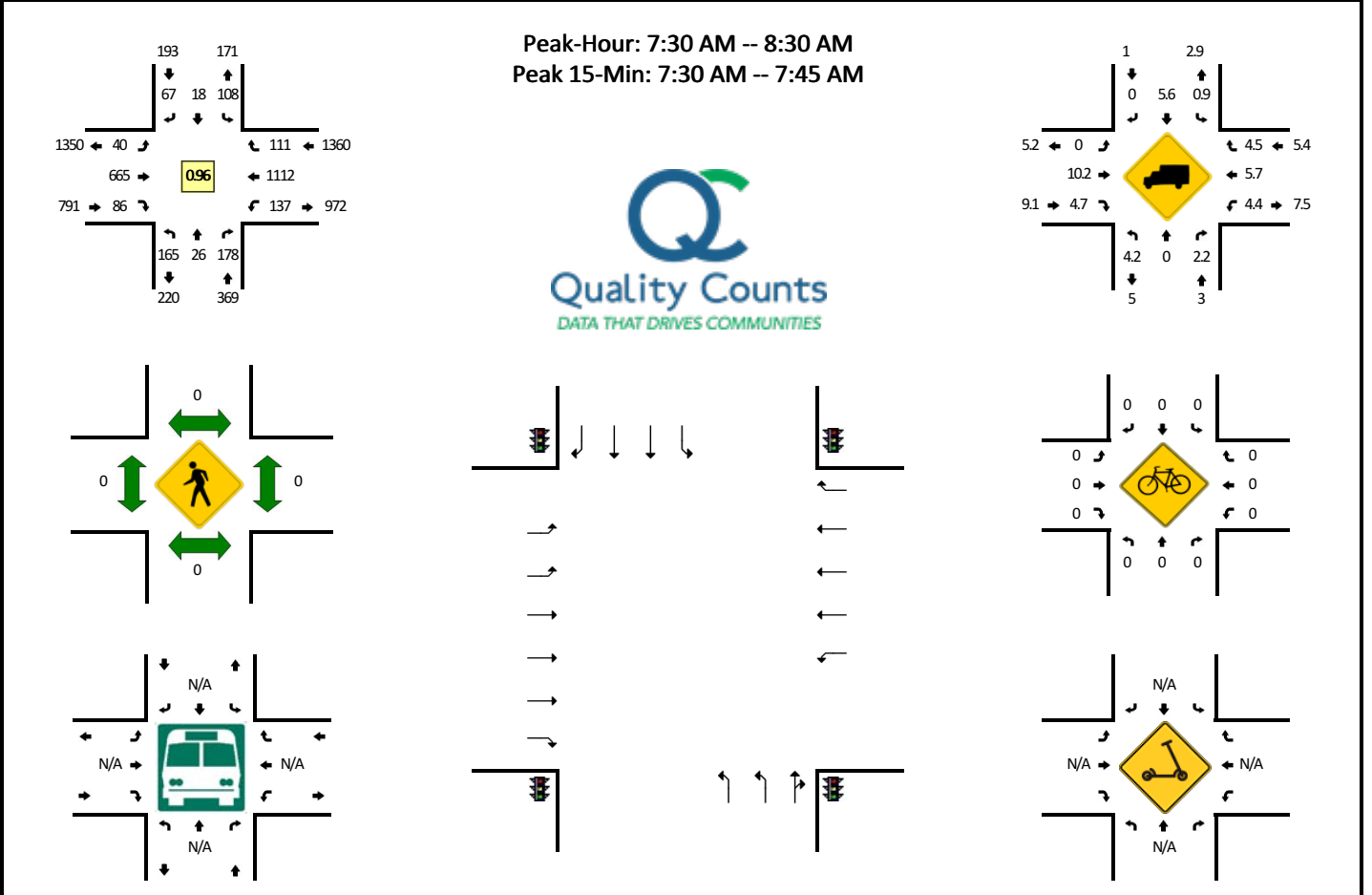
Start Time	Farmwell Rd Southeastbound					Farmwell Rd Southwestbound					Knightdale Blvd Westbound					Westover Dr Northbound					Knightdale Blvd Eastbound				
	Right to Knightdale Blvd	Right to Westover Dr	Left to Knightdale Blvd	Left	U-Turn	Right	Right to Knightdale Blvd	Left to Westover Dr	Left to Knightdale Blvd	U-Turn	Right to Farmwell Rd	Right to Farmwell Rd	Thru	Left	U-Turn	Right	Right to Farmwell Rd	Left to Farmwell Rd	Left	U-Turn	Right	Thru	Left to Farmwell Rd (East)	Left to Farmwell Rd (West)	U-Turn
07:00 AM	0	0	2	0	0	0	0	0	0	0	1	1	296	2	0	6	0	1	5	0	2	182	0	0	0
07:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	292	2	1	1	0	0	4	0	1	163	0	0	0
07:30 AM	0	0	0	0	0	0	1	0	1	0	0	0	352	4	0	9	0	0	4	1	3	238	0	0	0
07:45 AM	1	0	5	0	0	1	0	0	1	0	1	0	319	4	0	4	0	0	4	0	0	172	0	0	0
08:00 AM	0	0	2	0	0	0	0	0	0	0	0	1	336	2	0	12	0	0	7	0	3	178	0	0	0
08:15 AM	0	0	1	1	0	0	0	0	0	0	0	0	326	3	1	3	0	0	8	0	2	165	0	0	0
08:30 AM	0	0	1	2	0	0	0	0	1	0	0	1	255	1	0	6	0	0	4	0	2	150	0	0	0
08:45 AM	0	0	0	1	0	0	1	0	0	0	0	0	278	1	0	1	0	0	1	0	4	180	1	1	0
09:00 AM	0	0	1	0	0	0	0	0	0	0	0	3	227	4	0	3	0	0	1	0	2	193	0	0	1
04:00 PM	0	0	0	0	0	0	1	0	3	0	1	1	250	1	0	1	0	0	0	0	2	348	1	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	305	4	0	2	0	0	2	0	3	355	0	1	1
04:30 PM	0	0	1	0	0	0	0	0	2	0	2	0	249	7	0	2	0	0	5	0	7	355	2	0	1
04:45 PM	1	0	2	0	0	0	0	0	2	0	4	1	289	4	0	4	0	0	5	0	6	351	1	0	2
05:00 PM	0	0	1	0	0	1	4	0	1	0	2	2	266	8	0	1	0	0	2	0	8	397	1	0	2
05:15 PM	0	0	2	0	0	0	1	0	0	0	0	1	322	13	0	0	0	0	4	0	9	399	2	0	2
05:30 PM	0	0	0	1	0	2	2	0	1	0	4	2	324	3	1	3	0	0	1	0	7	413	0	0	1
05:45 PM	2	0	3	0	0	2	1	0	1	0	1	1	275	8	0	1	0	0	0	0	7	389	1	1	0
Total	8	2	61	12	1	14	39	0	45	0	57	29	13211	159	10	146	1	2	134	2	174	12421	16	6	31
AM Peak Hour	1	0	8	1	0	1	1	0	2	0	1	1	1333	13	1	28	0	0	23	1	8	753	0	0	0
PM Peak Hour	2	0	6	1	0	5	8	0	3	0	7	6	1187	32	1	5	0	0	7	0	31	1598	4	1	5

Peak Hour: 7:30 AM - 8:30 AM
PHF: 0.89

Peak Hour: 5:00 PM - 6:00 PM
Peak 15: 5:30 PM - 5:45 PM
PHF: 0.950654

LOCATION: Hodge Rd -- Knightdale Blvd
CITY/STATE: Knightdale, NC

QC JOB #: 15637403
DATE: Wed, Dec 1 2021



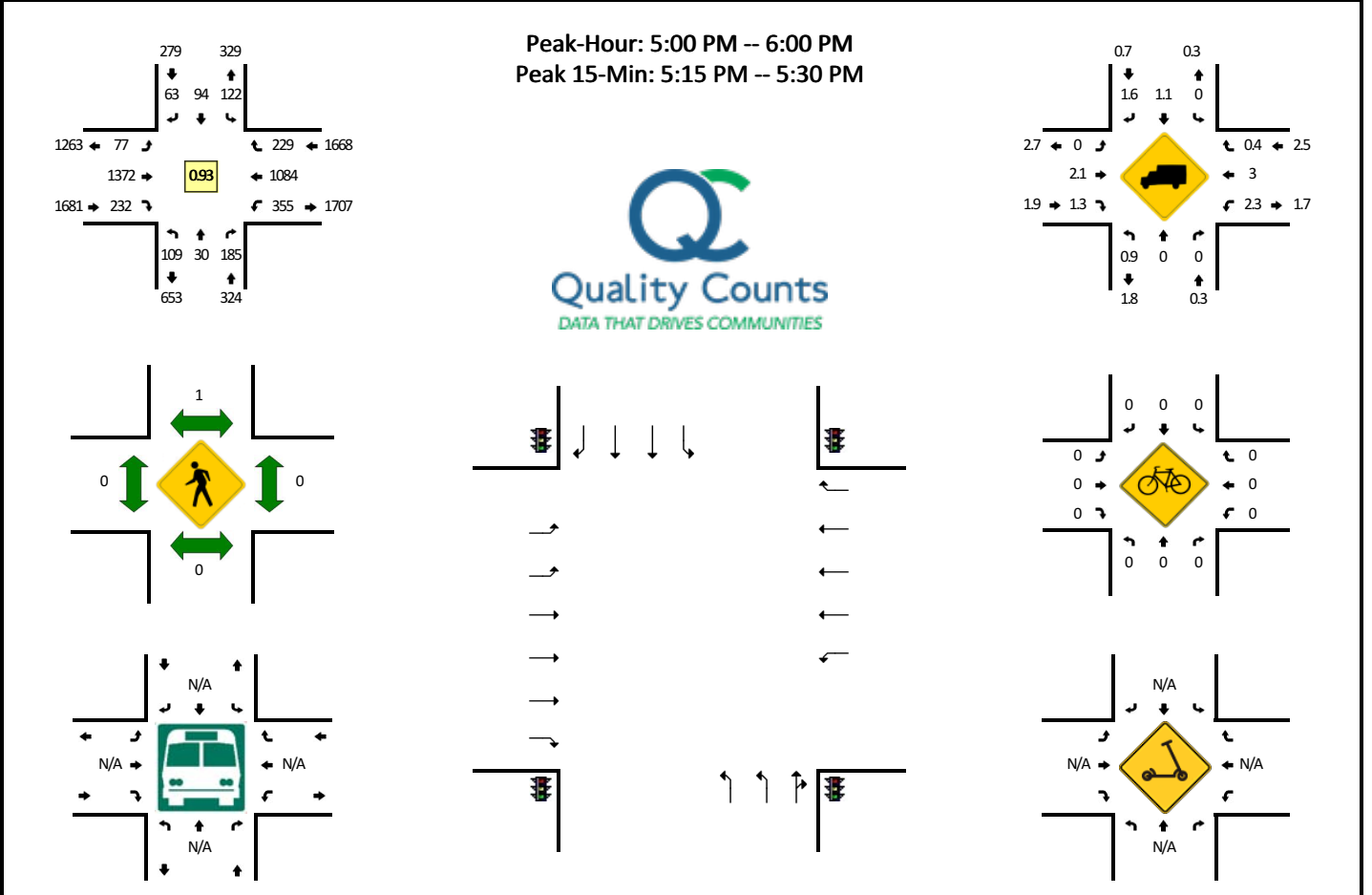
15-Min Count Period Beginning At	Hodge Rd (Northbound)				Hodge Rd (Southbound)				Knightdale Blvd (Eastbound)				Knightdale Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	45	6	53	0	30	6	19	0	3	143	19	0	20	237	14	3	598	
7:15 AM	34	2	55	0	26	3	15	0	6	155	24	0	28	264	21	1	634	
7:30 AM	45	6	45	0	30	4	19	0	12	177	30	3	28	274	31	3	707	
7:45 AM	41	8	48	0	24	4	19	0	4	181	19	0	24	279	27	7	685	2624
8:00 AM	45	2	38	0	30	6	11	0	5	156	23	0	33	271	23	6	649	2675
8:15 AM	34	10	47	0	24	4	18	0	13	151	14	3	31	288	30	5	672	2713
8:30 AM	37	3	37	0	30	6	18	0	6	132	13	0	23	198	23	2	528	2534
8:45 AM	35	5	35	0	20	4	10	0	9	164	18	1	30	229	19	4	583	2432

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	180	24	180	0	120	16	76	0	48	708	120	12	112	1096	124	12	2828
Heavy Trucks	20	0	4		0	0	0		0	92	0		4	72	4		196
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	

Comments:

LOCATION: Hodge Rd -- Knightdale Blvd
CITY/STATE: Knightdale, NC

QC JOB #: 15637404
DATE: Wed, Dec 1 2021



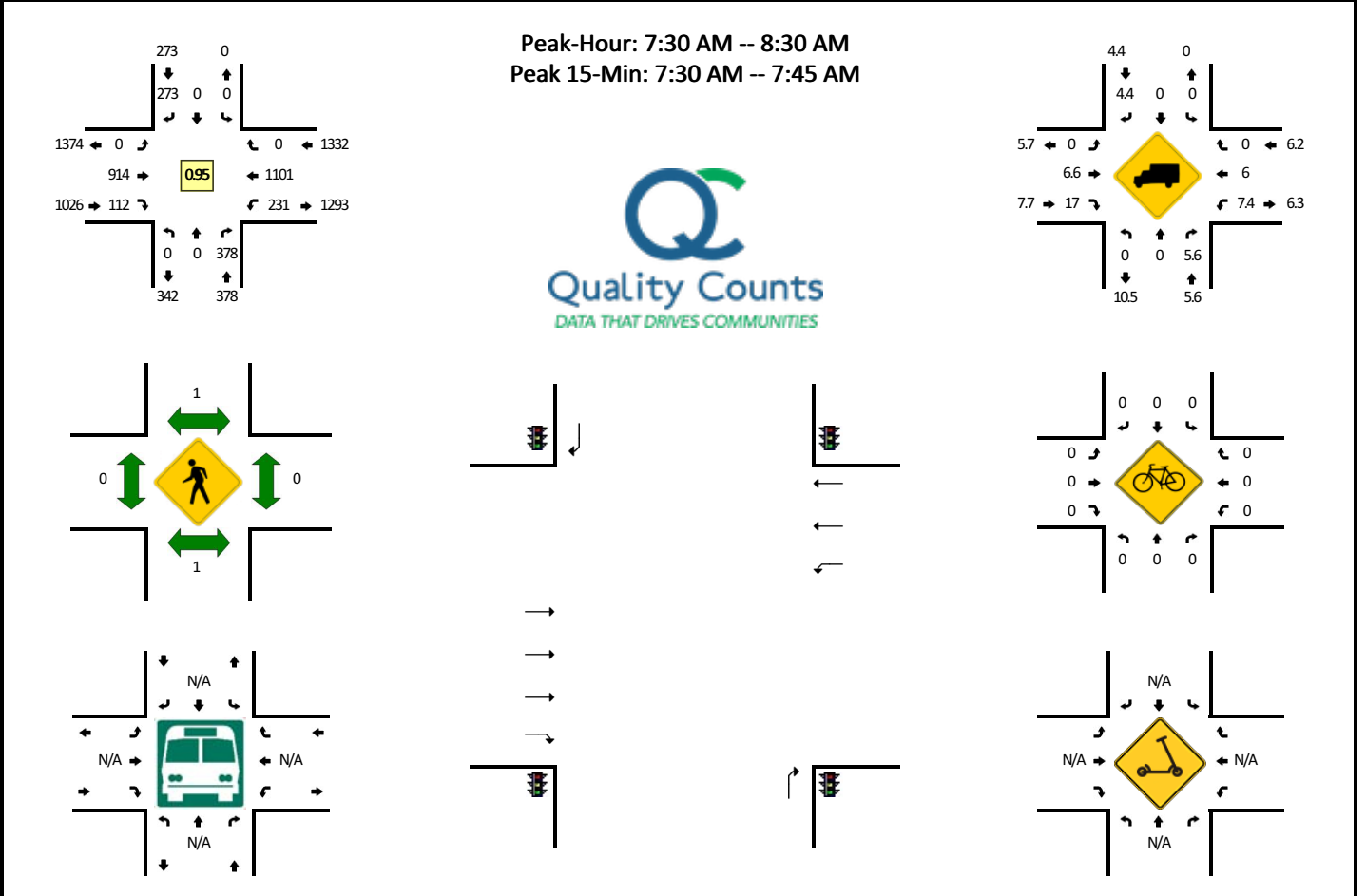
15-Min Count Period Beginning At	Hodge Rd (Northbound)				Hodge Rd (Southbound)				Knightdale Blvd (Eastbound)				Knightdale Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	22	5	34	0	20	7	16	0	17	276	60	2	64	233	48	7	811	
4:15 PM	22	12	42	0	37	11	15	0	17	294	52	0	62	264	30	12	870	
4:30 PM	29	11	50	0	34	10	15	0	25	280	43	0	67	205	39	9	817	
4:45 PM	24	7	34	0	29	5	20	0	24	334	44	2	76	272	36	9	916	3414
5:00 PM	27	6	51	0	29	19	15	0	9	319	52	1	90	238	41	11	908	3511
5:15 PM	30	10	40	0	35	20	15	0	15	370	68	0	76	309	68	6	1062	3703
5:30 PM	25	5	48	0	31	30	19	0	22	331	59	3	88	280	62	5	1008	3894
5:45 PM	27	9	46	0	27	25	14	0	24	352	53	3	73	257	58	6	974	3952

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	120	40	160	0	140	80	60	0	60	1480	272	0	304	1236	272	24	4248
Heavy Trucks	0	0	0		0	4	0		0	28	0		20	40	4		96
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

LOCATION: I-540 SB Ramps -- Knightdale Blvd
CITY/STATE: Knightdale, NC

QC JOB #: 15637405
DATE: Wed, Dec 1 2021

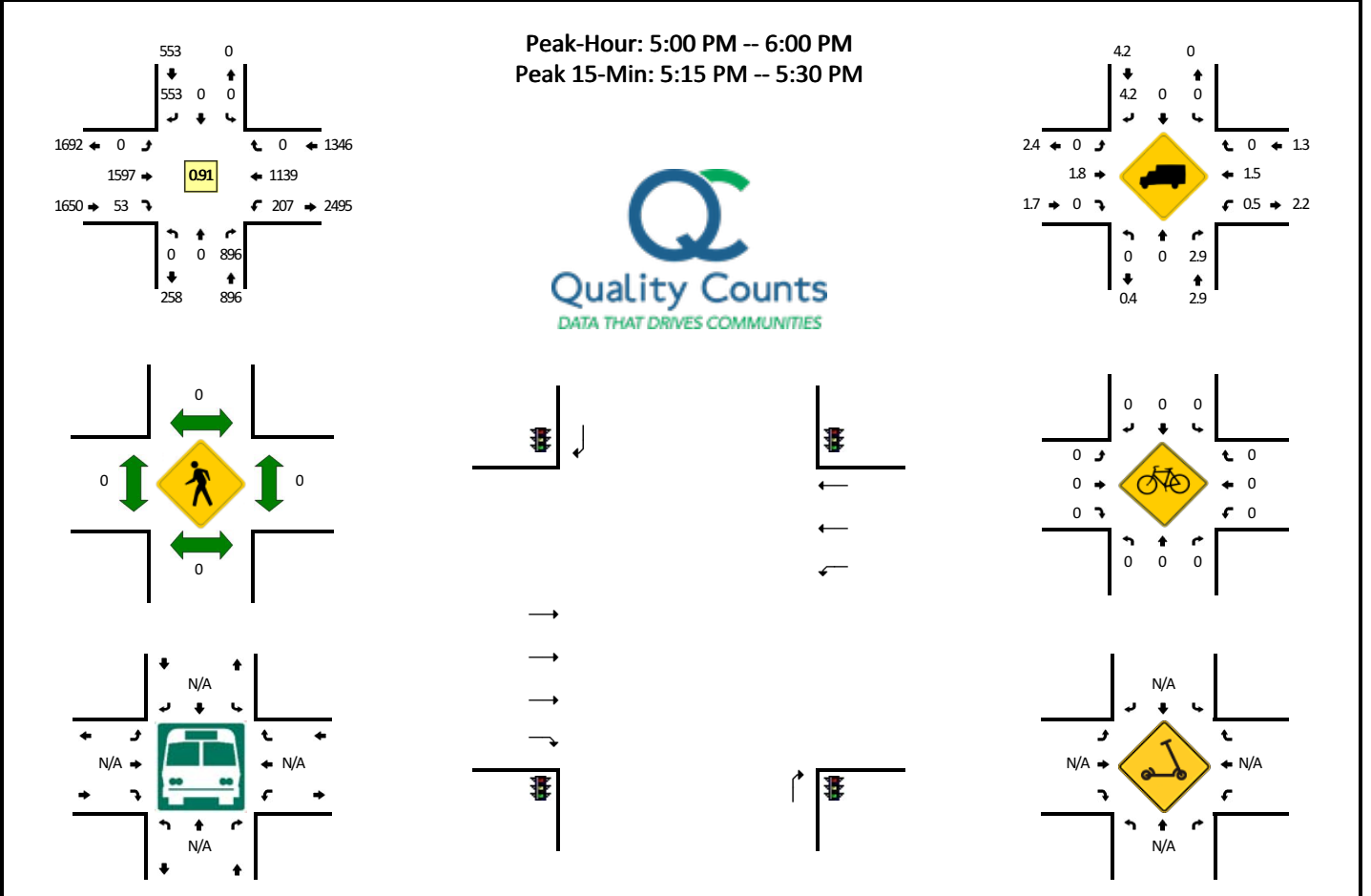


15-Min Count Period Beginning At	I-540 SB Ramps (Northbound)				I-540 SB Ramps (Southbound)				Knightdale Blvd (Eastbound)				Knightdale Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	60	0	0	0	48	0	0	220	18	0	63	230	0	1	640	
7:15 AM	0	0	73	0	0	0	55	0	0	224	21	0	63	257	0	1	694	
7:30 AM	0	0	99	0	0	0	63	0	0	229	43	0	77	285	0	0	796	
7:45 AM	0	0	100	0	0	0	62	0	0	251	23	0	51	269	0	0	756	2886
8:00 AM	0	0	77	0	0	0	65	0	0	218	24	0	46	275	0	0	705	2951
8:15 AM	0	0	102	0	0	0	83	0	0	216	22	0	56	272	0	1	752	3009
8:30 AM	0	0	71	0	0	0	61	0	0	194	15	0	45	190	0	2	578	2791
8:45 AM	0	0	90	0	0	0	51	0	0	219	11	0	52	224	0	0	647	2682
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	396	0	0	0	252	0	0	916	172	0	308	1140	0	0	3184	
Heavy Trucks	0	0	20		0	0	8		0	72	48		28	72	0		248	
Buses																	0	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																	0	

Comments:

LOCATION: I-540 SB Ramps -- Knightdale Blvd
CITY/STATE: Knightdale, NC

QC JOB #: 15637406
DATE: Wed, Dec 1 2021

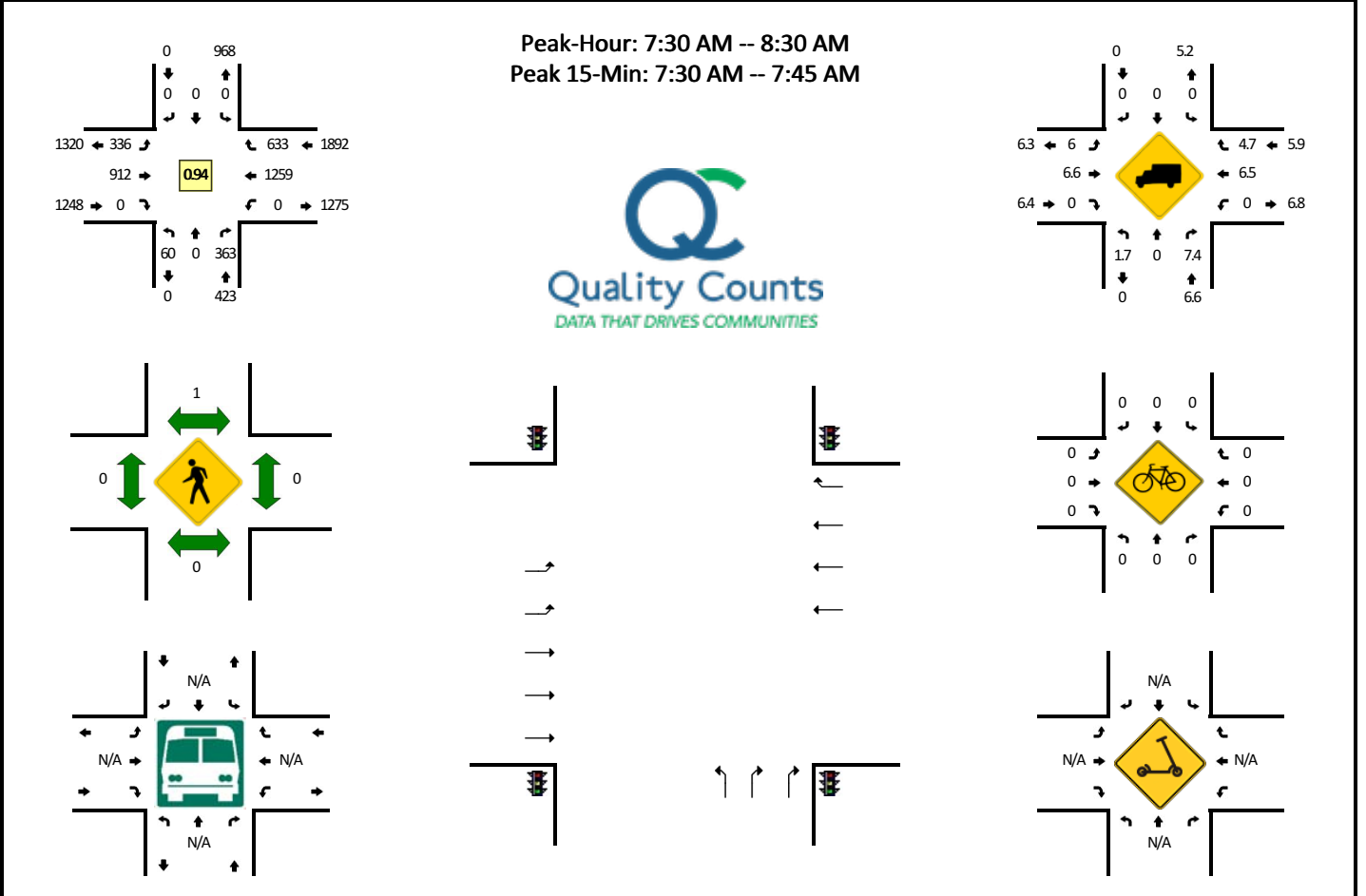


15-Min Count Period Beginning At	I-540 SB Ramps (Northbound)				I-540 SB Ramps (Southbound)				Knightdale Blvd (Eastbound)				Knightdale Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	199	0	0	0	105	0	0	314	18	0	64	262	0	0	962	
4:15 PM	0	0	200	0	0	0	106	0	0	377	22	0	66	248	0	1	1020	
4:30 PM	0	0	172	0	0	0	103	0	0	342	14	0	73	230	0	0	934	
4:45 PM	0	0	192	0	0	0	105	0	0	405	18	0	50	301	0	1	1072	3988
5:00 PM	0	0	181	0	0	0	117	0	0	389	11	0	50	258	0	1	1007	4033
5:15 PM	0	0	252	0	0	0	170	0	0	415	14	0	52	320	0	1	1224	4237
5:30 PM	0	0	243	0	0	0	145	0	0	405	12	0	52	279	0	0	1136	4439
5:45 PM	0	0	220	0	0	0	121	0	0	388	16	0	51	282	0	0	1078	4445
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	1008	0	0	0	680	0	0	1660	56	0	208	1280	0	4	4896	
Heavy Trucks	0	0	32		0	0	44		0	28	0		4	16	0		124	
Buses																	0	
Pedestrians																	0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																	0	

Comments:

LOCATION: I-540 NB Ramps -- Knightdale Blvd
CITY/STATE: Knightdale, NC

QC JOB #: 15637407
DATE: Wed, Dec 1 2021

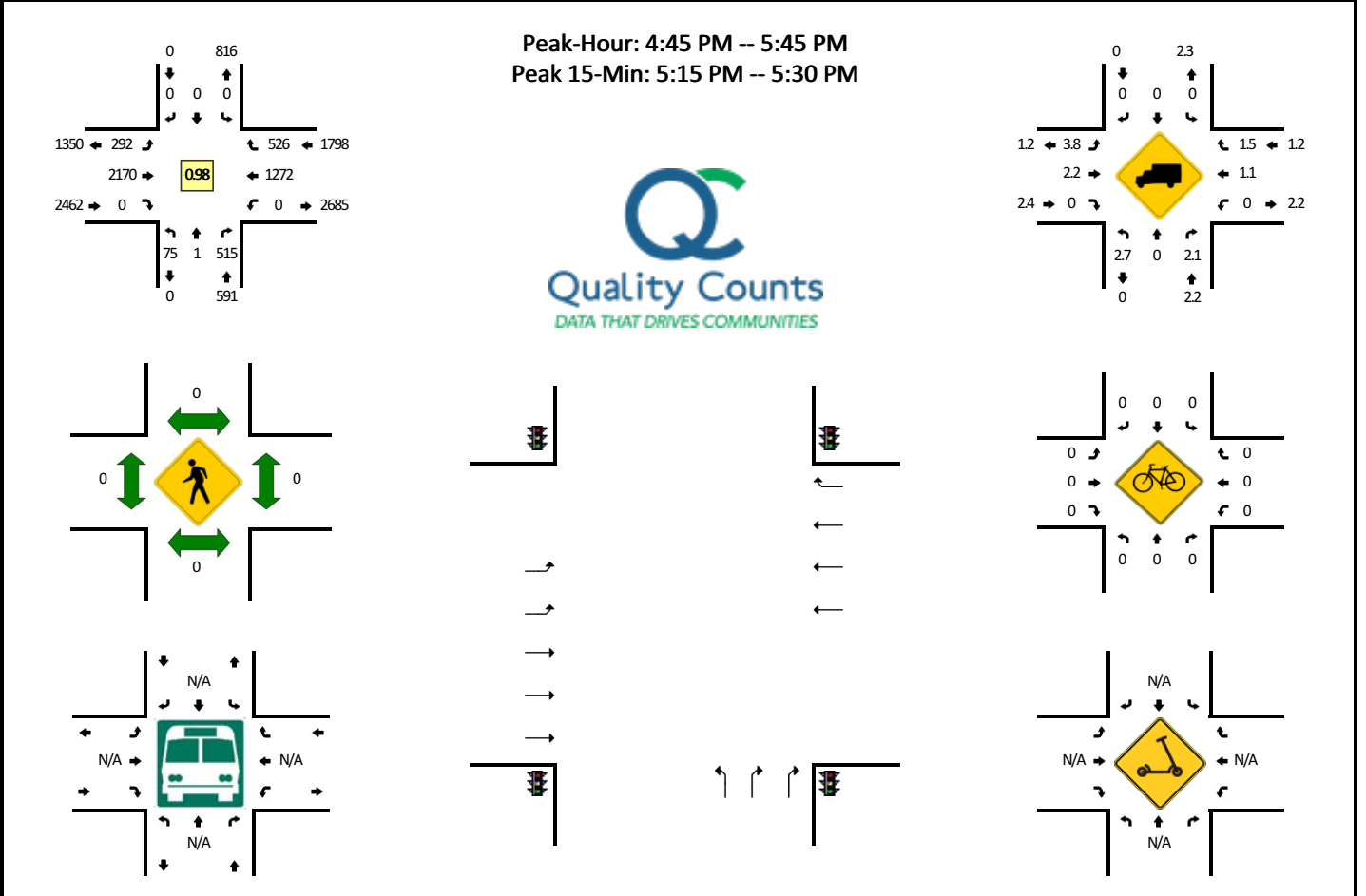


15-Min Count Period Beginning At	I-540 NB Ramps (Northbound)				I-540 NB Ramps (Southbound)				Knightdale Blvd (Eastbound)				Knightdale Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	18	0	82	0	0	0	0	0	77	198	0	0	0	289	121	0	785	
7:15 AM	9	0	86	0	0	0	0	0	94	198	0	1	0	304	146	1	839	
7:30 AM	17	0	79	0	0	0	0	0	102	209	0	0	0	342	197	0	946	
7:45 AM	11	0	100	0	0	0	0	0	85	257	0	0	0	299	156	0	908	3478
8:00 AM	21	0	88	0	0	0	0	0	79	212	0	0	0	309	155	0	864	3557
8:15 AM	11	0	96	0	0	0	0	0	69	234	0	1	0	309	125	0	845	3563
8:30 AM	14	0	86	0	0	0	0	0	73	201	0	0	0	231	110	0	715	3332
8:45 AM	20	0	108	0	0	0	0	0	47	247	0	0	0	244	105	0	771	3195
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	68	0	316	0	0	0	0	0	408	836	0	0	0	1368	788	0	3784	
Heavy Trucks	4	0	36		0	0	0		24	76	0		0	92	28		260	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scooters																		

Comments:

LOCATION: I-540 NB Ramps -- Knightdale Blvd
CITY/STATE: Knightdale, NC

QC JOB #: 15637408
DATE: Wed, Dec 1 2021



15-Min Count Period Beginning At	I-540 NB Ramps (Northbound)				I-540 NB Ramps (Southbound)				Knightdale Blvd (Eastbound)				Knightdale Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	23	1	126	0	0	0	0	0	50	437	0	2	0	317	103	0	1059	
4:15 PM	12	0	134	0	0	0	0	0	64	522	0	1	0	285	109	0	1127	
4:30 PM	18	0	167	0	0	0	0	0	60	444	0	0	0	301	131	0	1121	
4:45 PM	12	0	157	0	0	0	0	0	70	517	0	0	0	328	151	0	1235	4542
5:00 PM	20	0	114	0	0	0	0	0	82	506	0	1	0	290	145	0	1158	4641
5:15 PM	18	1	108	0	0	0	0	0	52	579	0	0	0	361	117	0	1236	4750
5:30 PM	25	0	136	0	0	0	0	0	85	568	0	2	0	293	113	0	1222	4851
5:45 PM	19	1	135	0	0	0	0	0	54	547	0	0	0	336	101	0	1193	4809
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	72	4	432	0	0	0	0	0	208	2316	0	0	0	1444	468	0	4944	
Heavy Trucks	0	0	8		0	0	0		12	44	0		0	20	12		96	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

Comments:

Appendix D:
Approved Development Data

Traffic Impact Analysis

Legacy Oaks

Knightdale, NC

Prepared for:
Shenandoah Homes

Kimley»Horn

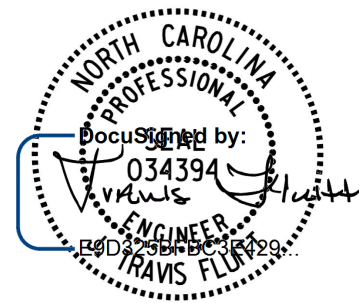
© Kimley-Horn and Associates, Inc. 2020

Traffic Impact Analysis for
Legacy Oaks
Knightdale, North Carolina

Prepared for:
Shenandoah Homes
Raleigh, North Carolina

Prepared by:
Kimley-Horn and Associates, Inc.
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

June 2020
013538000



6/3/2020

3.0 Traffic Generation

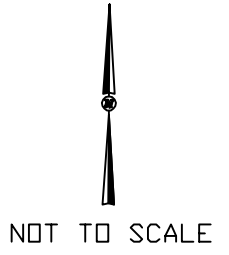
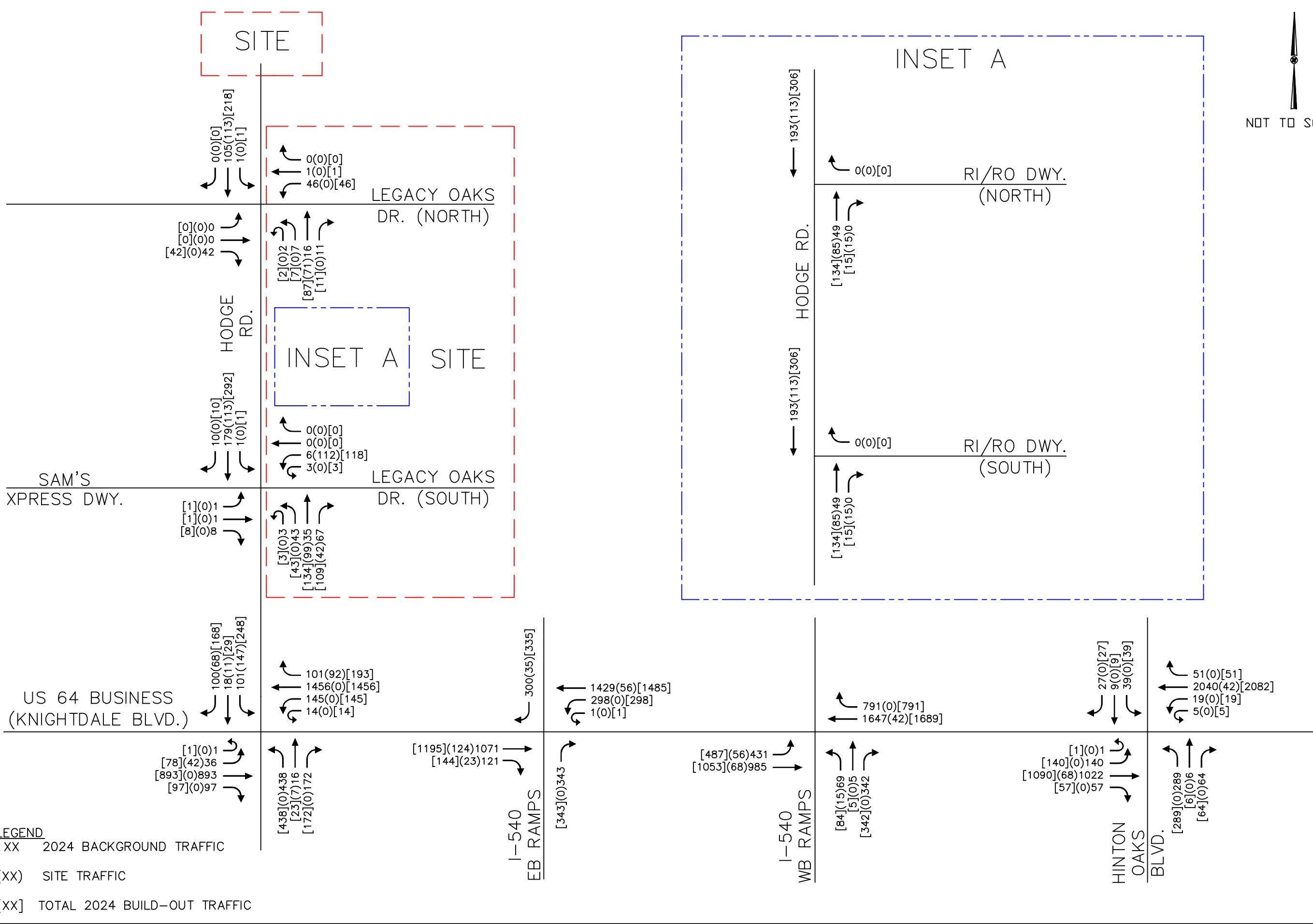
The traffic generation potential of the proposed development was determined using the traffic generation rates published in *Trip Generation* (Institute of Transportation Engineers, Tenth Edition, 2017). As currently envisioned the development will consist of approximately 217 single-family homes, 93 townhomes, 72 multifamily apartments, a 130-room hotel, and 16,000 SF of retail space in addition to the existing land uses. The trip generation for the site is summarized in Table 3.0.

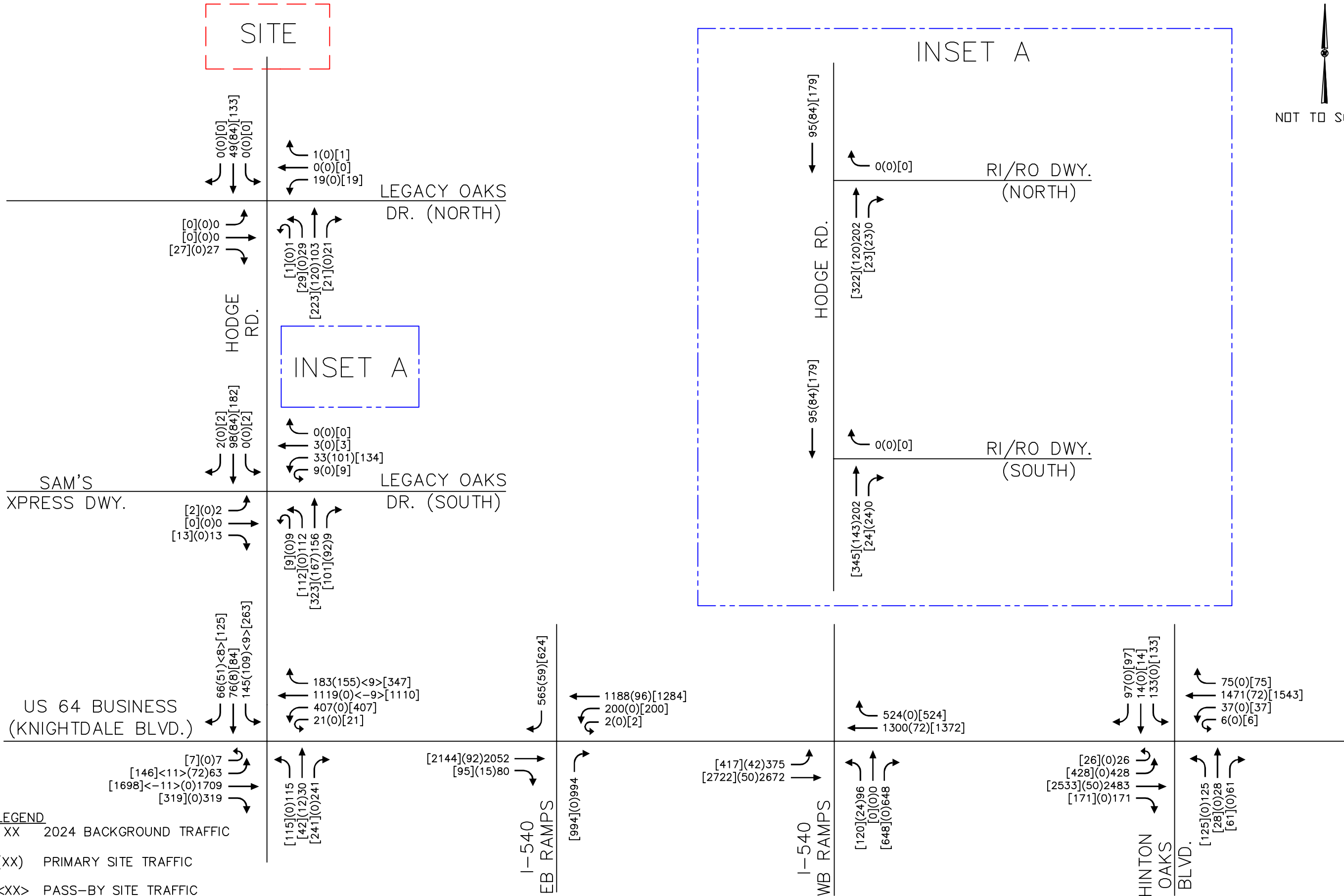
Land Use Code	Land Use	Intensity		Daily		AM Peak Hour		PM Peak Hour	
				In	Out	In	Out	In	Out
210	Single Family Detached Housing	217	d.u.	1,061	1,061	40	119	135	79
220	Multifamily Housing (Low-Rise)	93	d.u.	331	331	10	35	35	20
221	Multifamily Housing (Mid-Rise)	72	d.u.	196	196	7	18	20	12
310	Hotel	130	rooms	521	521	35	25	36	35
820	Shopping Center	16,000	s.f.	865	865	54	33	67	73
Subtotal				2,974	2,974	146	230	293	219
<i>Internal Capture Reduction</i>				362	362	5	5	34	34
<i>Pass-By Capture Reduction</i>				229	229	0	0	20	17
Total Net New External Trips				2,383	2,383	141	225	239	168

As shown in Table 3.0, the proposed development has the potential to generate 4,766 daily trips, 366 trips during the AM peak hour, and 407 trips during the PM peak hour on a typical weekday. For reference, uses analyzed on the “West Tract” in the original *Watson Tract TIA* were projected to generate 12,850 daily trips, 1,062 trips during the AM peak hour, and 1,404 trips during the PM peak hour, which far exceed the trip generation of the combined existing and proposed uses on this site.

Internally captured trips are trips that begin and end on the project site and do not access the external roadway network. Internal capture was applied using ITE methodology. It should be noted that to be conservative, no internal capture was applied between the proposed and existing uses even though such capture will certainly occur.

Pass-by trips are trips already on the roadway network that will make a trip to the site as they pass by on the adjacent street. Pass-by capture was calculated using ITE rates, and pass-by trips were assigned based on existing traffic patterns. Detailed trip generation calculations are included in the Appendix of this report.





LEGEND
 XX 2024 BACKGROUND TRAFFIC
 (XX) PRIMARY SITE TRAFFIC
 <XX> PASS-BY SITE TRAFFIC
 [XX] TOTAL 2024 BUILD-OUT TRAFFIC

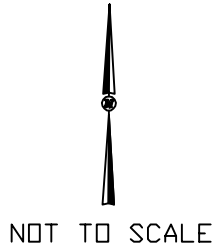


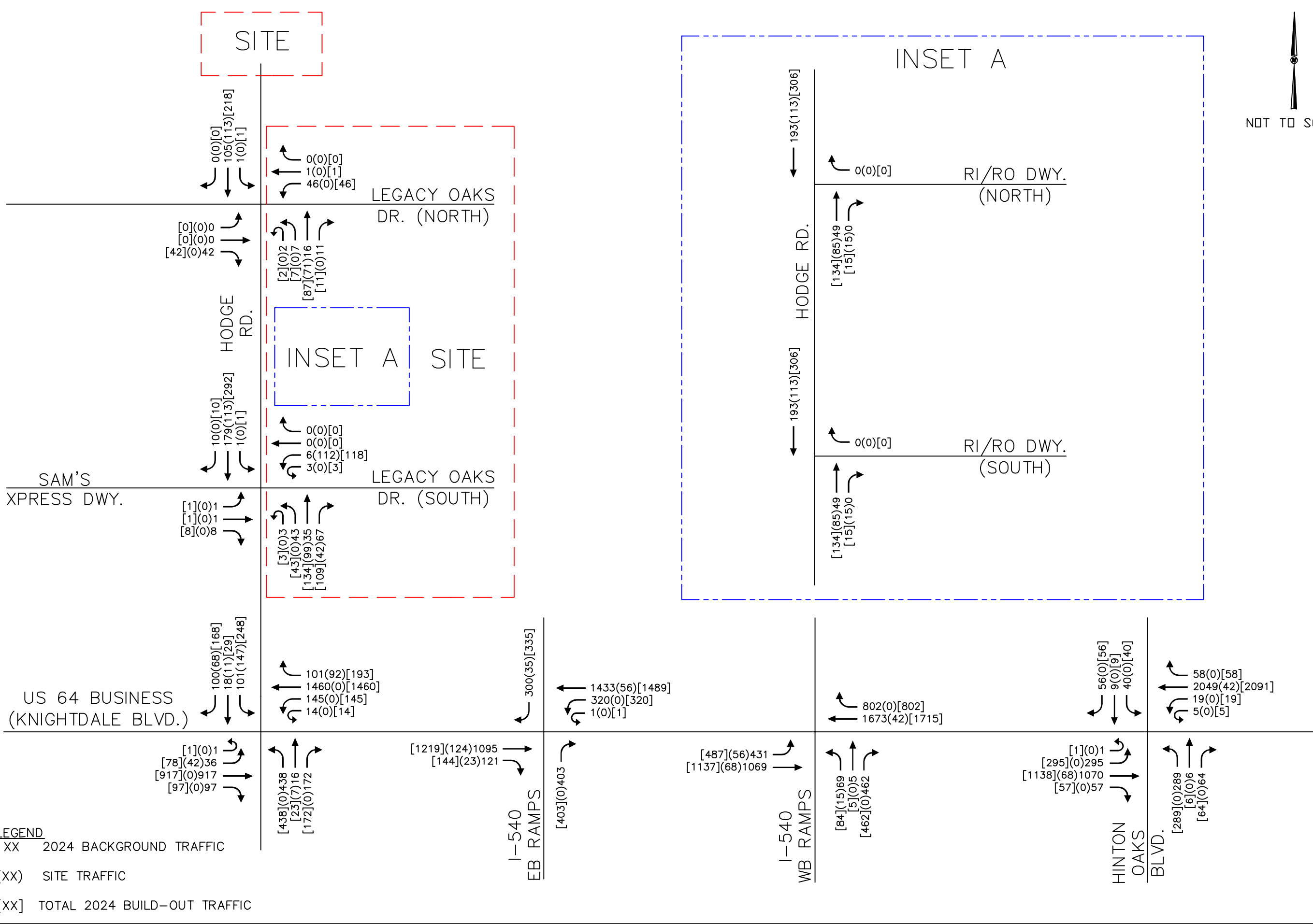
FIGURE 5.10

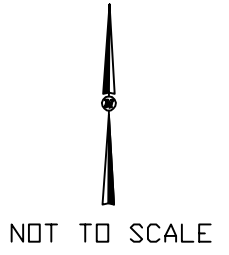
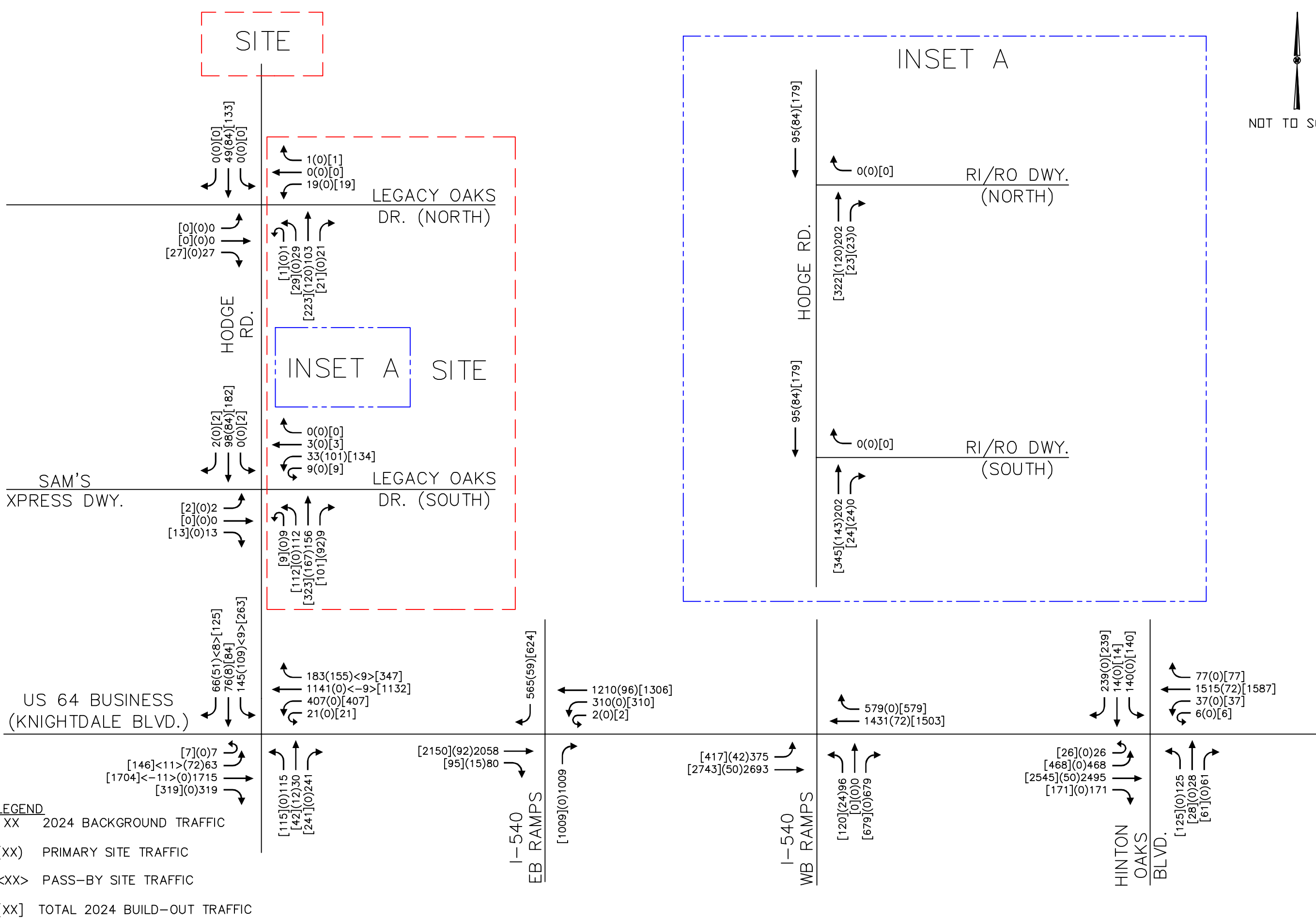
PROJECTED BUILD-OUT+1 (2024) PM PEAK HOUR TRAFFIC VOLUMES

LEGACY OAKS KNIGHTDALE, NC TRAFFIC IMPACT ANALYSIS



THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.





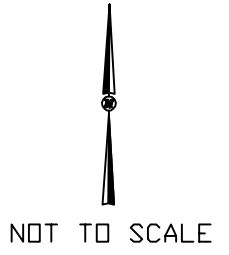
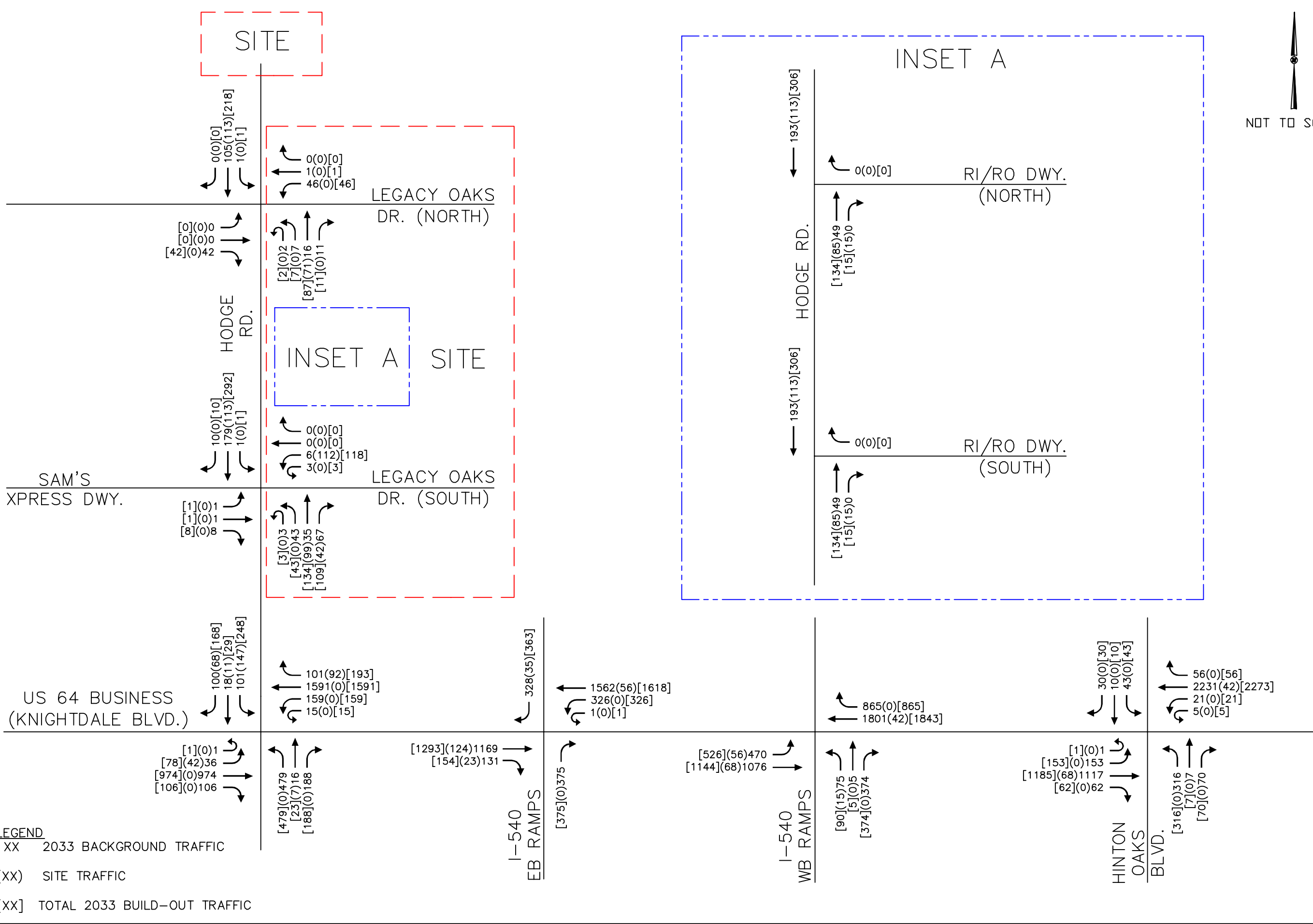


FIGURE 5.13

PROJECTED BUILD-OUT+10 (2033) AM PEAK HOUR TRAFFIC VOLUMES

LEGACY OAKS KNIGHTDALE, NC TRAFFIC IMPACT ANALYSIS



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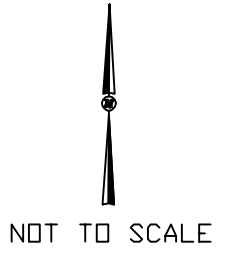
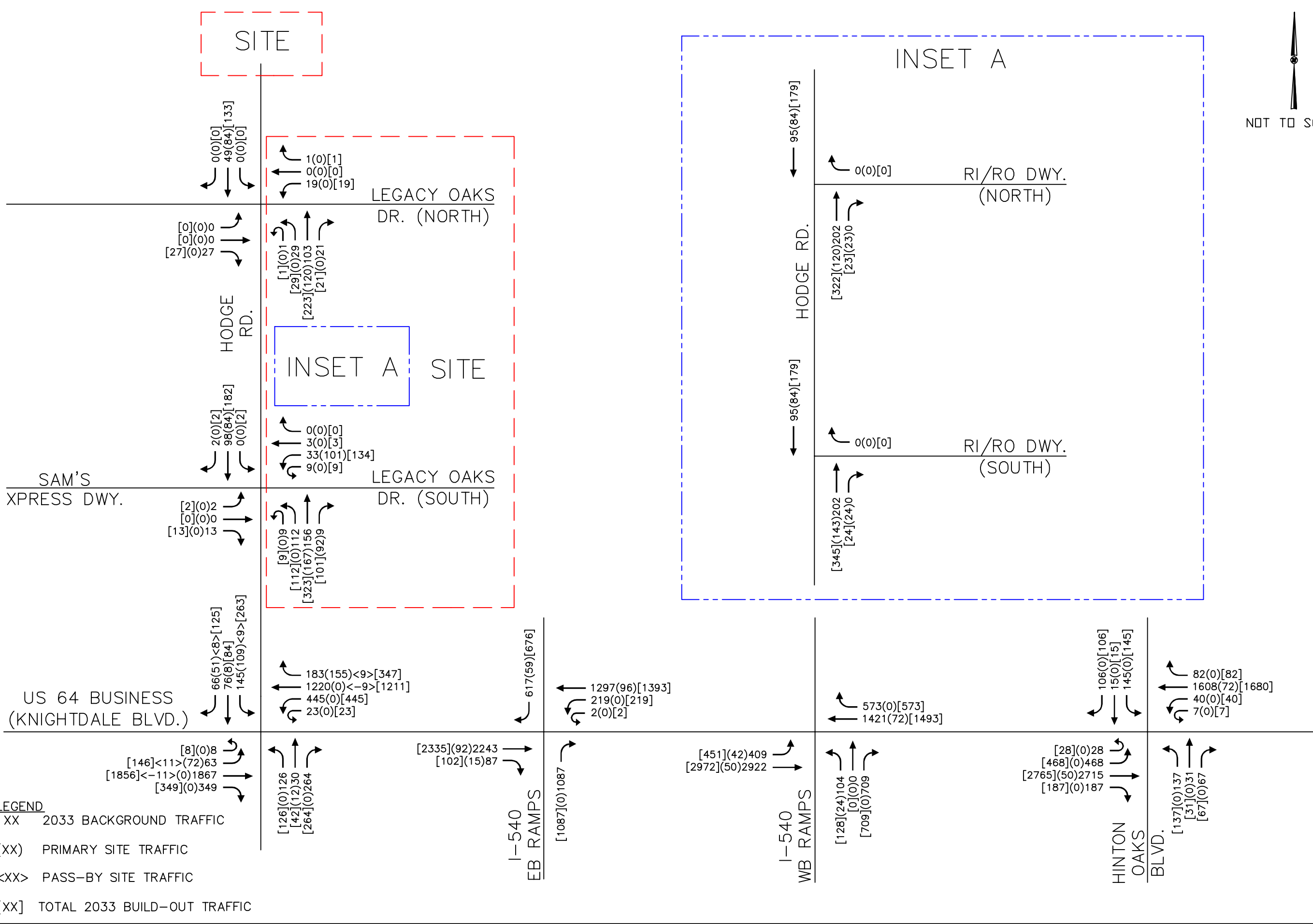


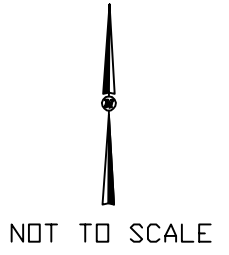
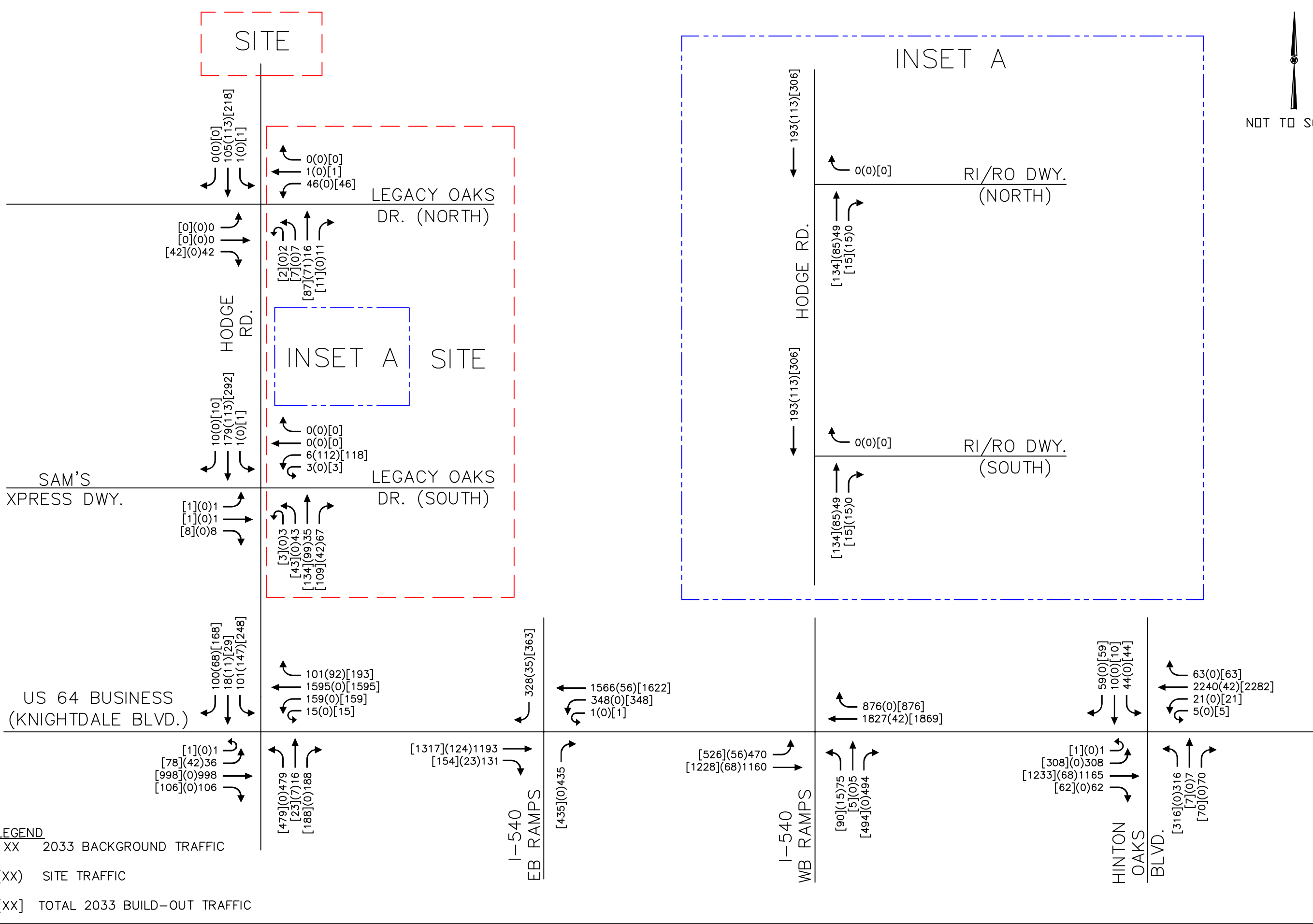
FIGURE 5.14

PROJECTED BUILD-OUT+10 (2033) PM PEAK HOUR TRAFFIC VOLUMES

LEGACY OAKS KNIGHTDALE, NC TRAFFIC IMPACT ANALYSIS



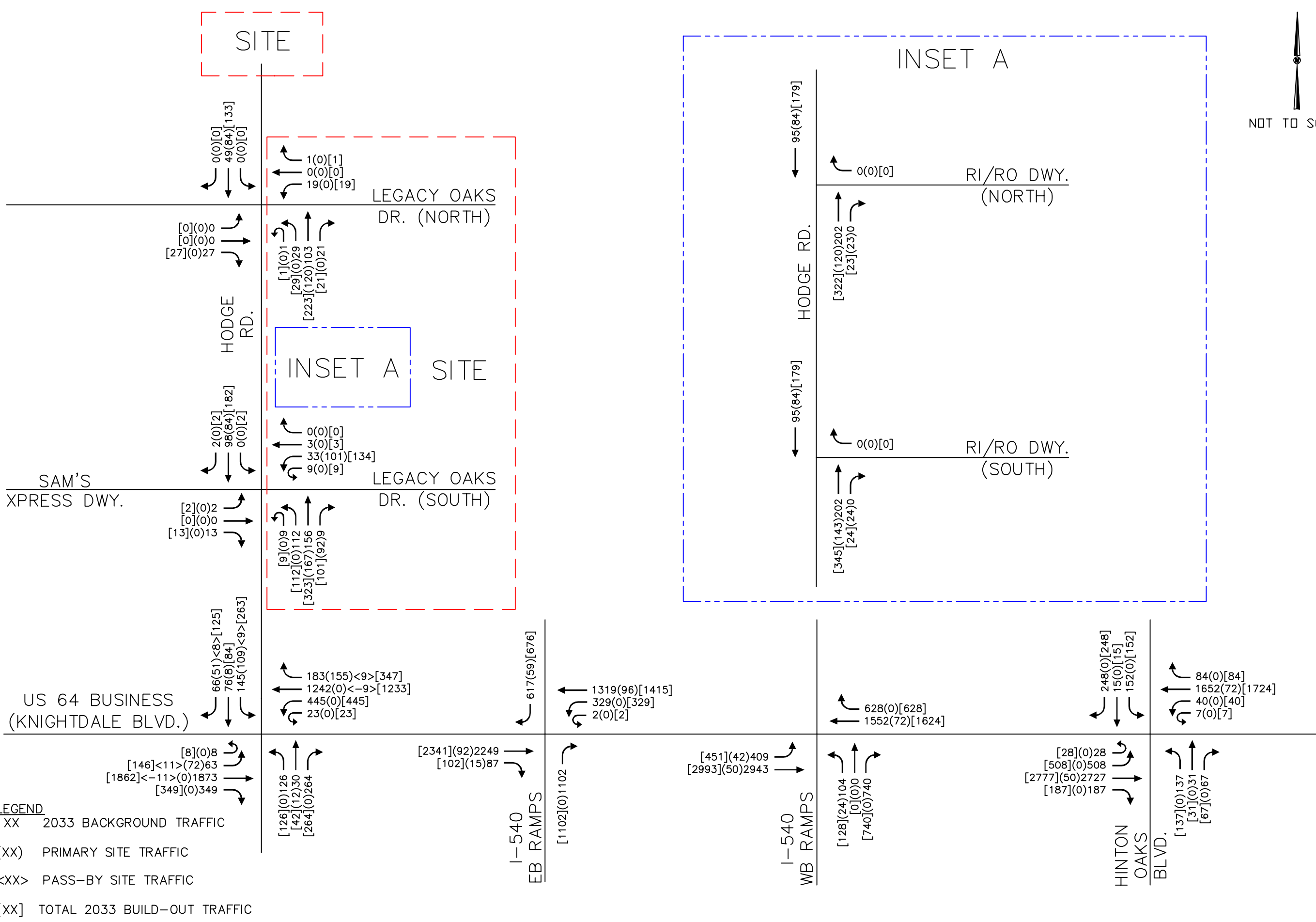
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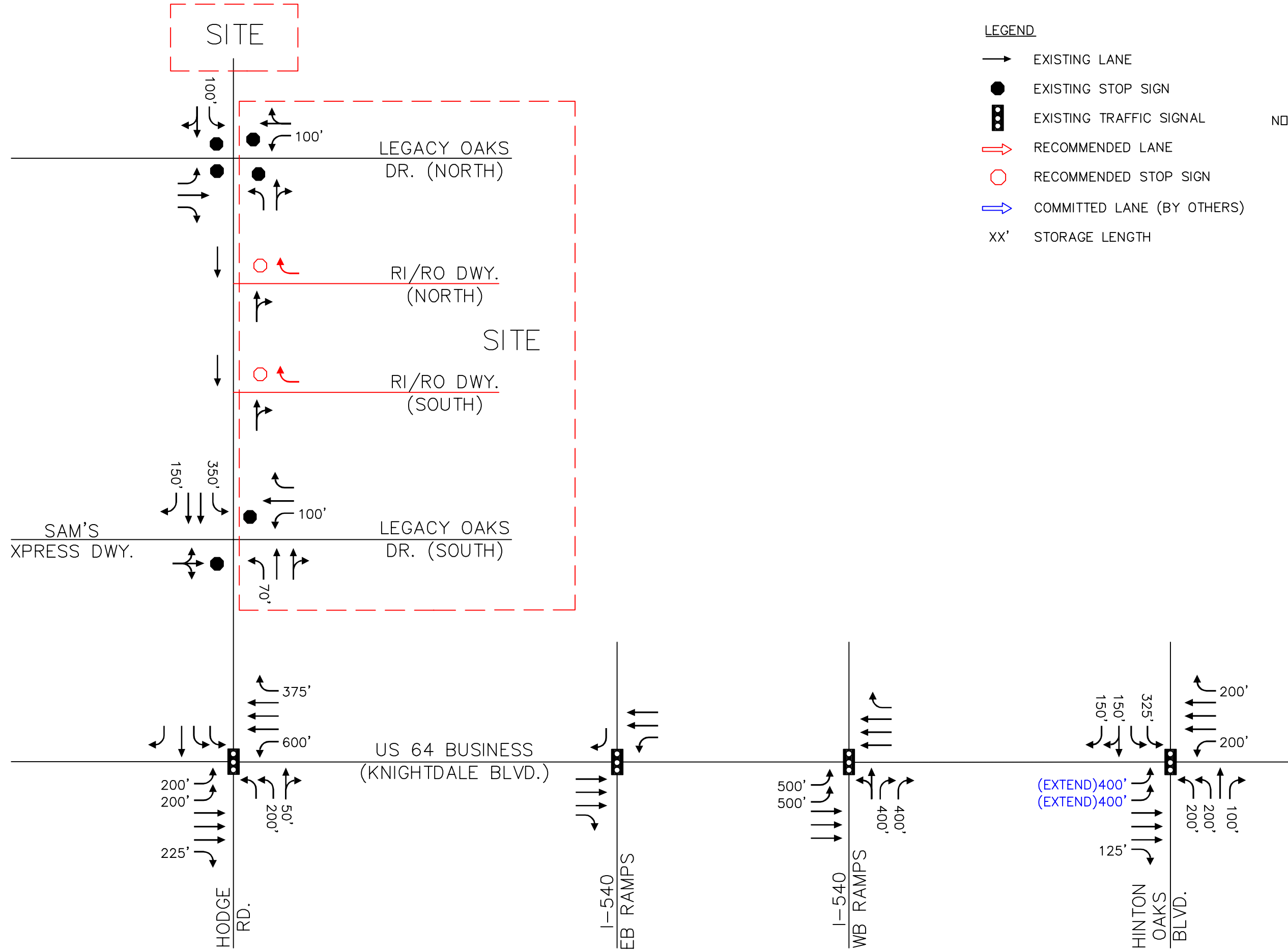


LEGACY OAKS
KNIGHTDALE, NC
TRAFFIC IMPACT ANALYSIS

PROJECTED BUILD-OUT+10 (2033)
AM PEAK HOUR TRAFFIC VOLUMES
- WITH HINTON OAKS INDUSTRIAL

FIGURE
5.15





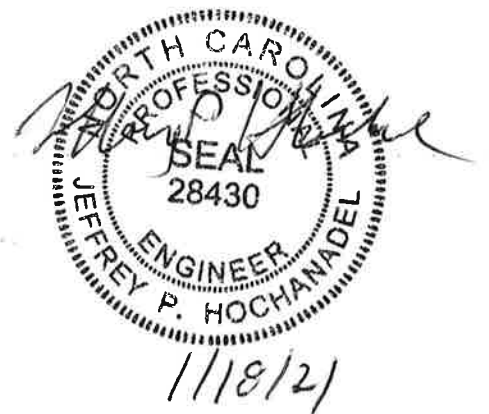
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Allen Park Development

Traffic Impact Analysis

Knightdale, North Carolina

January 2021



Prepared for:

Natelli Communities

4 SITE TRIP GENERATION AND DISTRIBUTION

Site trips for the Allen Park Development were estimated based on the proposed land use supplied by the developer and subsequently distributed onto the surrounding roadway network.

4.1 TRIP GENERATION

The site-generated trips shown in **Table 4-1** are based on trip generation information provided in the 10th Edition of the ITE's *Trip Generation Manual* and the anticipated development of the residential land use. Trip generation was calculated using the provided equation, and the proposed number of residential units as the independent variable (per NCDOT standards).

Table 4-1: Trip Generation Summary

ITE Land Use Code	Independent Variable	Daily			AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
210 – Single Family Detached Housing	447 Units	2,062	2,062	4,124	81	242	322	270	158	428
220 – Multifamily Housing (Low-Rise)	173 Units	634	634	1,268	18	62	80	60	36	96
Total:		2,696	2,696	5,392	99	303	402	330	194	524

SOURCE: Institute of Transportation Engineers' *Trip Generation Manual* 10th Edition (2017)

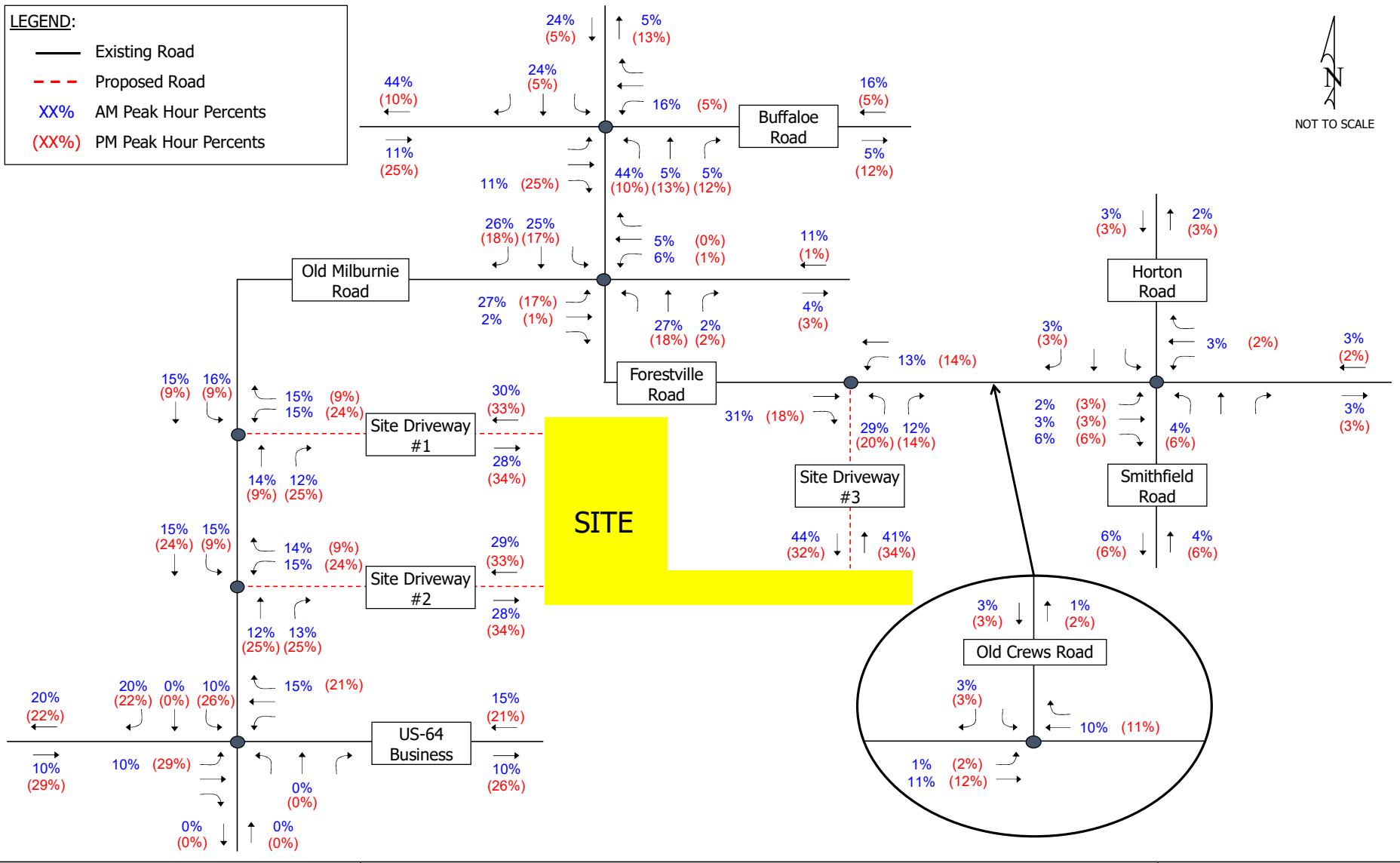
AM peak hour trips generated totaled 99 incoming and 303 outgoing where PM peak hour trips totaled 330 incoming and 194 outgoing. Average daily traffic (ADT) volumes generated by the development totaled 5,392 vehicles per day. No reduction in trips was included due to internal capture and/or pass-by trips.

4.2 TRIP DISTRIBUTION

The directional traffic patterns, or trip distribution, of the site-generated traffic was determined using the existing AM and PM peak hour traffic characteristics as well as engineering judgment. It was assumed, for purposes of this study, that all site traffic would enter and exit the study area in the same manner as the existing traffic. The percentages were routed, via shortest path, to and from the proposed development. This distribution was submitted to, reviewed, and approved by the NCDOT and Town of Knightdale prior to the submittal of this study. The distribution percentages were then applied to the generated trips to predict routes and project traffic volumes for the 2028 Build scenario. **Figure 4-1** shows the trip distribution percentages. **Figure 4-2** shows the trip distribution volumes. 2028 Build traffic volumes were determined by applying the combined site trip distribution volumes to the Background traffic volumes (see **Figure 3-1**).

LEGEND:

- Existing Road
- - - Proposed Road
- XX% AM Peak Hour Percents
- (XX%) PM Peak Hour Percents

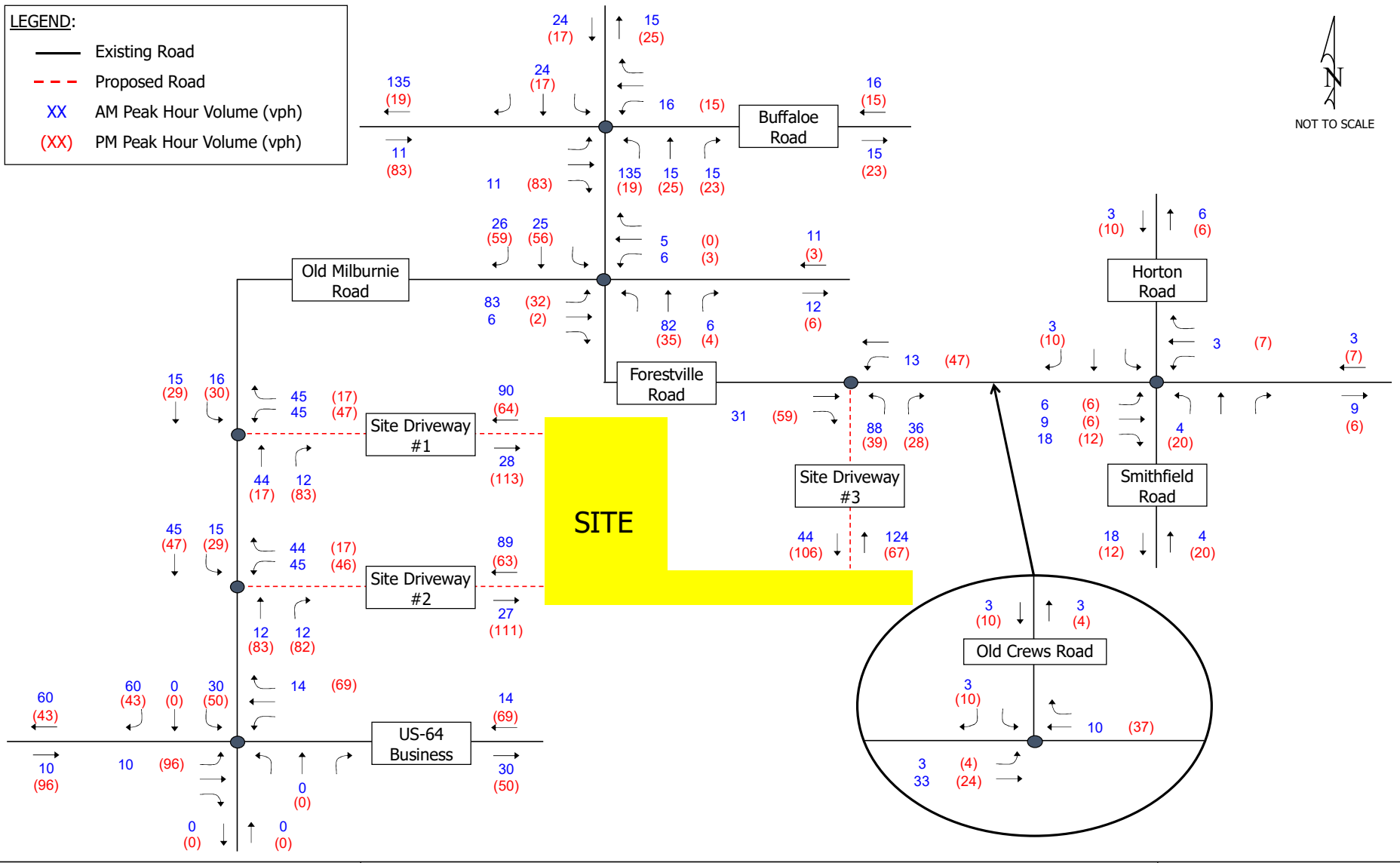


Allen Park
Traffic Impact Analysis
 Trip Distribution Percentages

Figure 4-1

LEGEND:

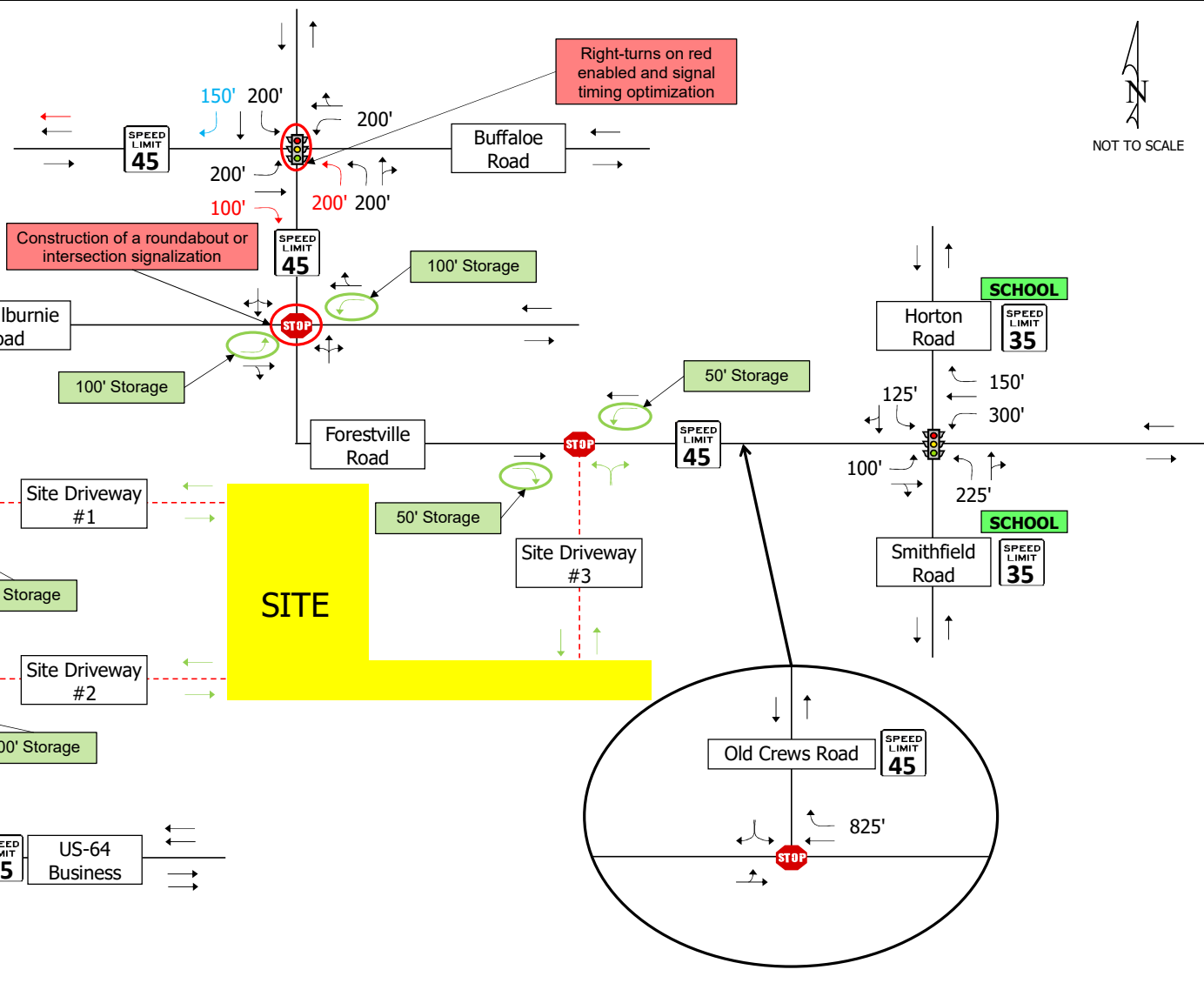
- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



Allen Park
Traffic Impact Analysis
 Trip Distribution Volumes

Figure 4-2

- LEGEND:**
- Existing Road
 - - - Proposed Road
 - 🚦 Signalized Intersection
 - 🛑 Unsignalized Intersection
 - ↔ Existing Lane Configuration
 - ↔ Proposed Lane Configuration
 - ↔ UDO Improvements
 - ↔ Improvements by others



**Allen Park
Traffic Impact Analysis
2028 Proposed Lane Configuration**

Figure 6-1



River's Edge Apartments Traffic Impact Analysis

Knightsdale, NC

Prepared for:

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Prepared by:

WSP USA Corp.
License # F-0891
15401 Weston Pkwy, Suite 100
Cary, NC 27513
919-678-0035

December 19, 2014



12/19/14



SITE TRIP GENERATION AND DISTRIBUTION

The current site plan shows a total of 306 apartment units. While the exact use of the 1.6-acre outparcel has not been determined, the Town of Knightdale and NCDOT agreed that this traffic study will assume the use to be a fast food restaurant. Table 3 below shows the non-pass-by and pass-by trip estimates based on the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 9th Edition, ITE Trip Generation Handbook, 2nd Edition, as well as North Carolina Department of Transportation (NCDOT) Congestion Management Section's Capacity Analysis Guidelines.

Table 3: Site Trip Generation

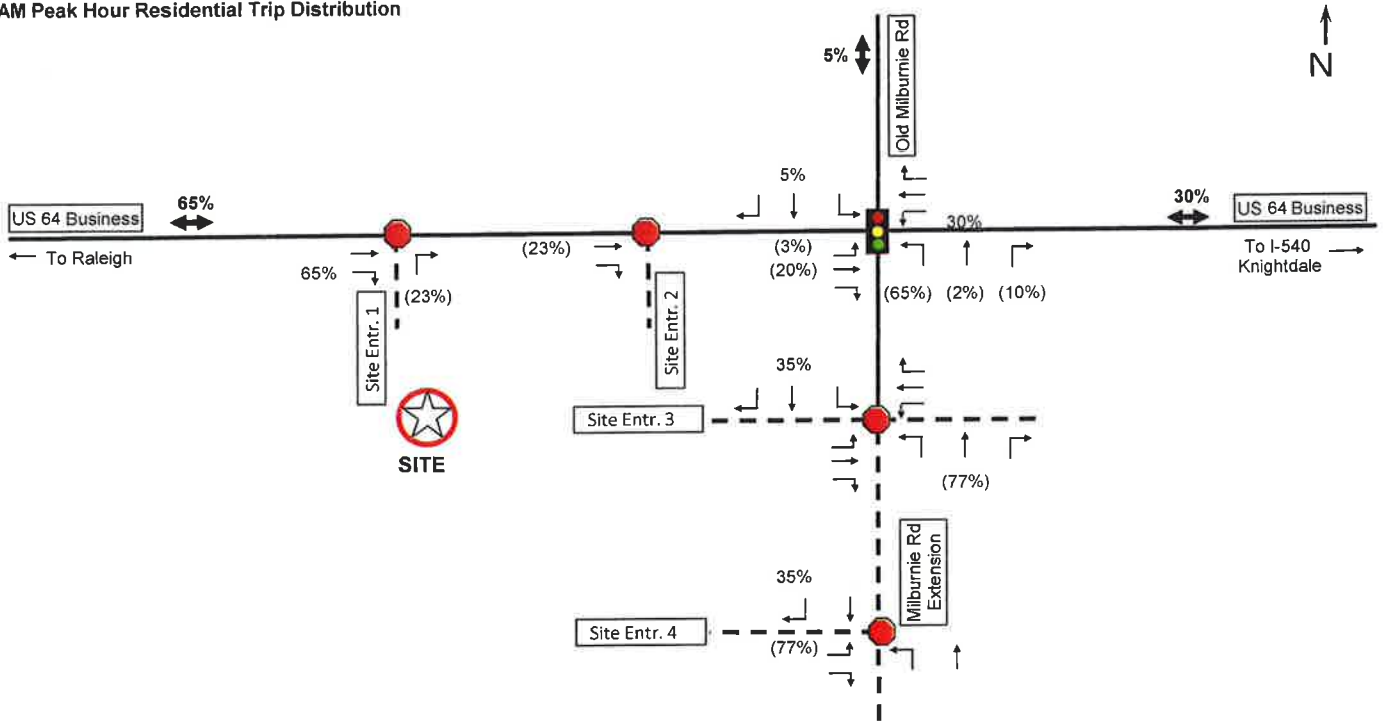
ITE CODE	LAND USE	SIZE		Average Daily Trips (24 Hours)			AM Peak Hour (One Hour Between 7 AM And 9 AM)			PM Peak Hour (One Hour Between 4 PM And 6 PM)		
				Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
220	Apartment	306	DU	989	989	1,978	31	123	154	121	65	186
934	Fast-Food Restaurant with Drive-Through Window	5,000	SF	1,241	1,240	2,481	116	111	227	85	78	163
				Pass-By Trips (49% AM, 50% PM)			-56	-55	-111	-41	-41	-82
				Non-Pass-By Peak Hour Trips			60	56	116	44	37	81
TOTAL NON PASS-BY, EXTERNAL TRIPS				2,230	2,229	4,459	91	179	270	165	102	267

The apartments are expected to generate 1,978 daily trips, including 154 trips in the AM peak hour, and 186 trips in the PM peak hour. The drive-through fast-food restaurant attracts a portion of its trips from the background traffic passing the site. These *pass-by trips* are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. In traffic analysis, the pass-by trips are subtracted from the through-volumes passing a given site access point on an adjacent road, and added to the site driveway turning movements. It is estimated that 49% of the AM peak hour trips (227 trips) generated from the fast-food restaurant. In the PM peak hour, the pass-by trips are estimated to be 50% of the total restaurant trips (163 trips). The proposed development overall generates a total of 270 non-pass-by trips in the AM peak hour, and 267 non-pass-by trips in the PM peak hour.

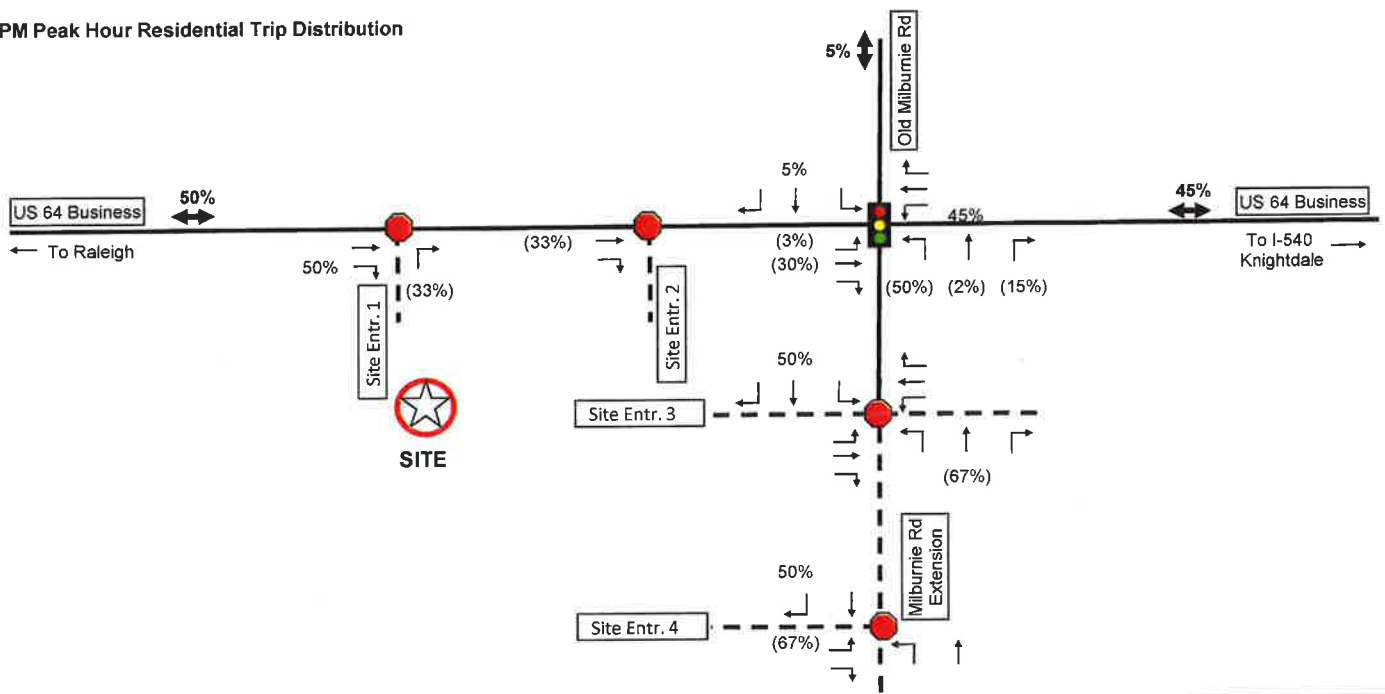
The directional distributions of the residential (apartment) site trips are based on the existing traffic pattern. It is estimated that in the AM peak hour, 65% of the apartment egress trips will head west on US 64 Business towards Raleigh, 30% will head east towards I-540 / Knightdale, and 5% will head north on Old Milburnie Rd. In the PM peak hour, 50% of the ingress trips will come from the west on US 64 Business, 45% from the east, and 5% from the north on Old Milburnie Rd. The ingress trips are assumed to following the same patterns as the egress trips during peak hours.

As the isolated outparcel (fast-food restaurant) has a right-in only entrance on the median divided US 64 Business and a full movement driveway on Milburnie Road, it is believed that most of the commercial trips will come from the west. After discussions with the Town of Knightdale and NCDOT, it is assumed that 90% pass-by trips will be coming from the west on US 64 Business, and 10% pass-by trips will be coming from the east. It is also assumed that 60% of the non-pass-by trips will come from the west on US 64 Business, 35% will come from the east and 5% will come from the north accessing the outparcel via the Milburnie Road entrance.

AM Peak Hour Residential Trip Distribution



PM Peak Hour Residential Trip Distribution



Legend	
	Turning Movement
	Existing Roadway
	Proposed Roadway
XX%	Entering Site Traffic %
(XX%)	Exiting Site Traffic %

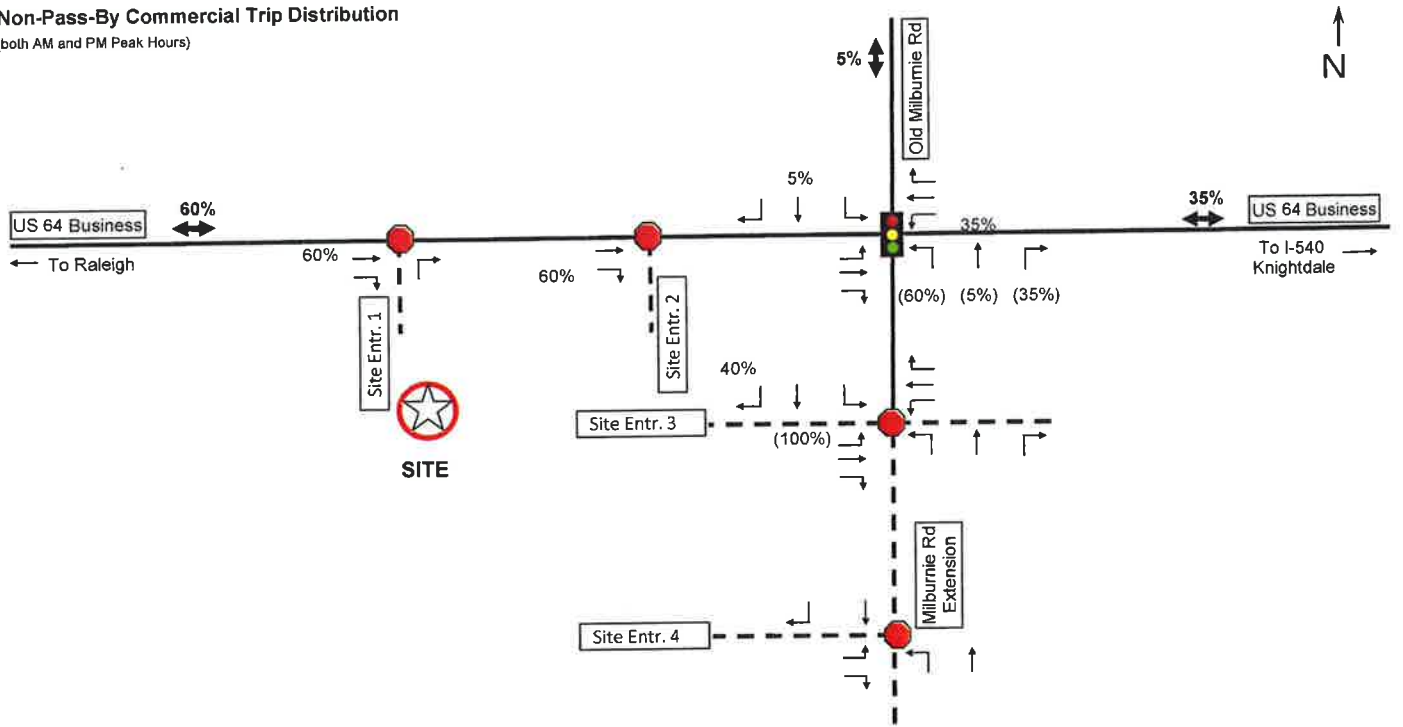


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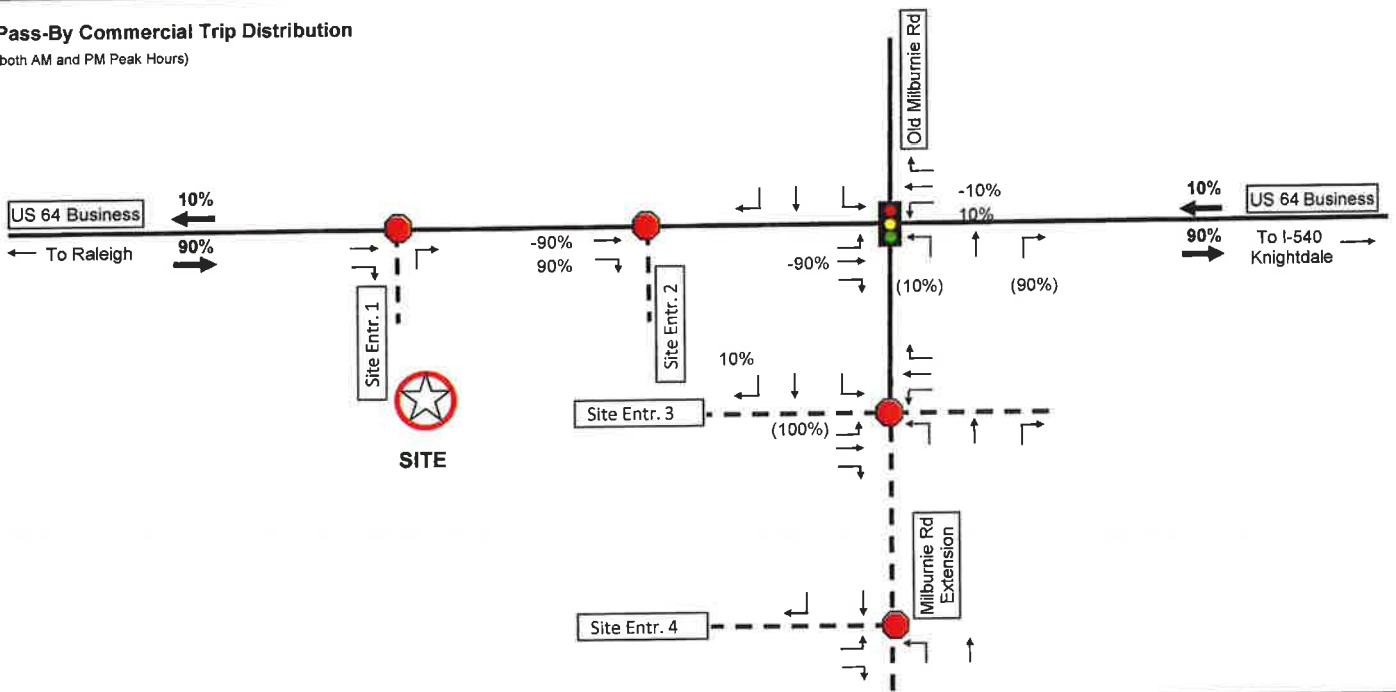
**River's Edge Apartments
 Traffic Impact Analysis**

**Figure 6
 Residential Site Trip
 Distribution**

Non-Pass-By Commercial Trip Distribution
(both AM and PM Peak Hours)



Pass-By Commercial Trip Distribution
(both AM and PM Peak Hours)



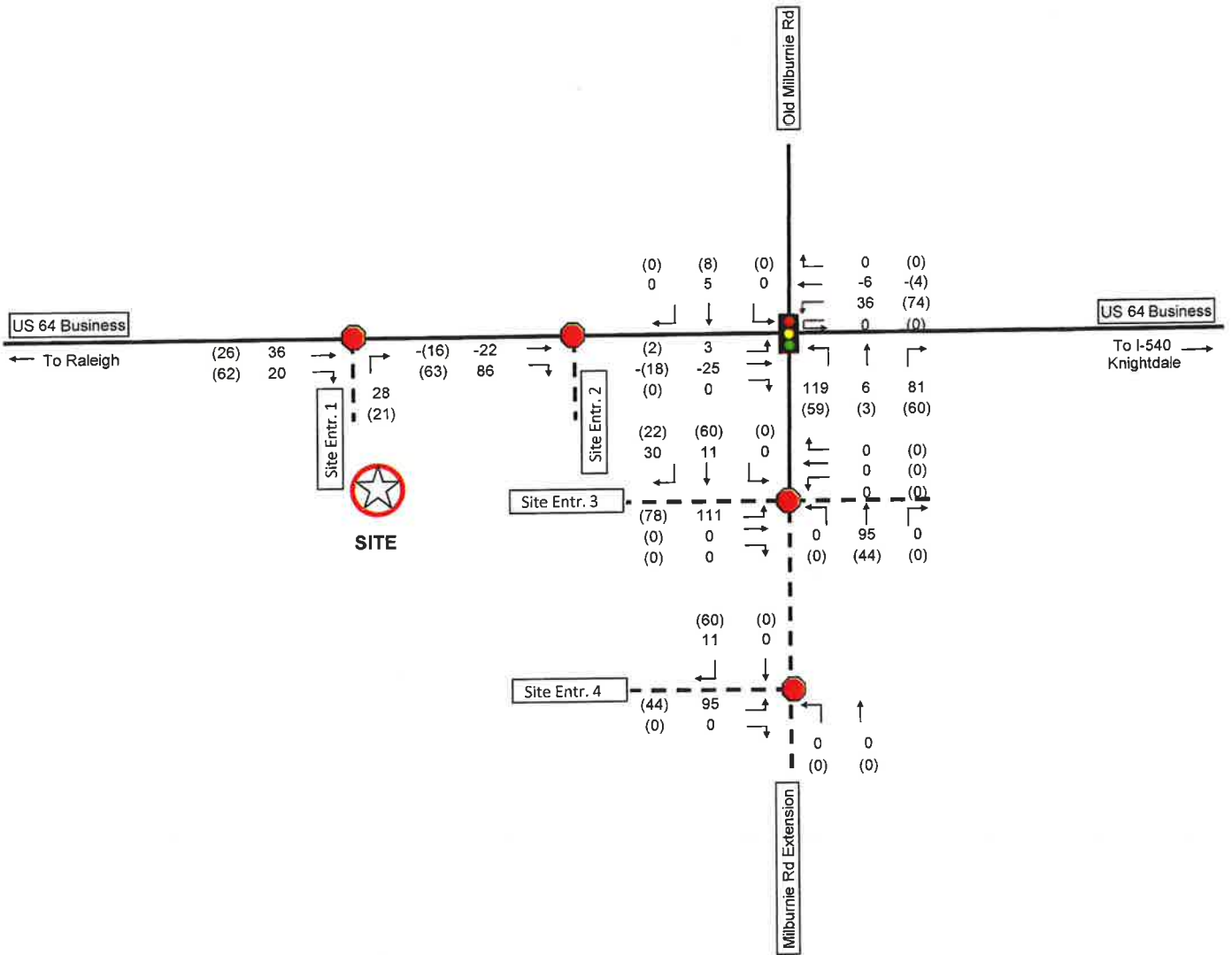
Legend	
	Turning Movement
	Existing Roadway
	Proposed Roadway
XX%	Entering Site Traffic %
(XX%)	Exiting Site Traffic %



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**River's Edge Apartments
Traffic Impact Analysis**

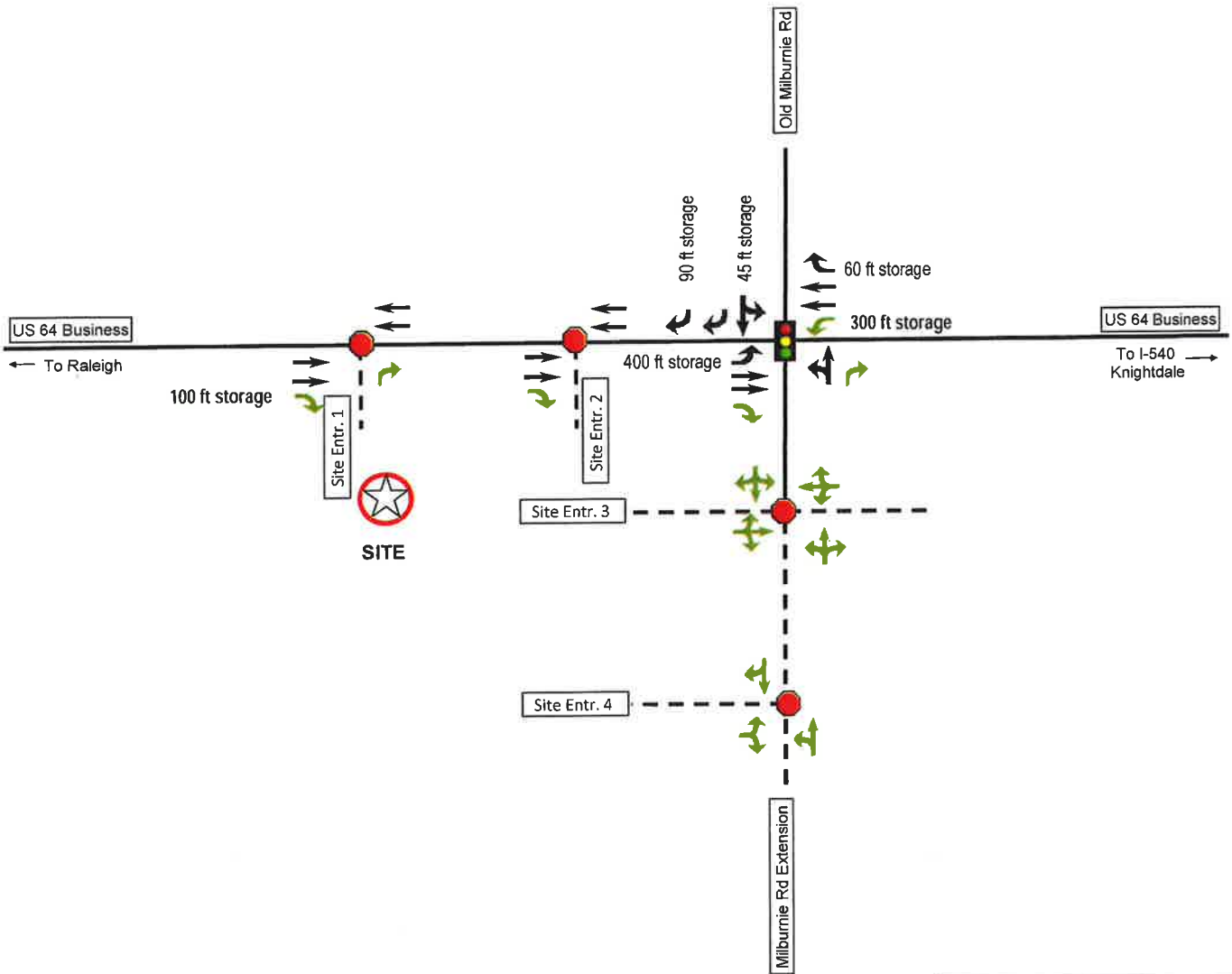
**Figure 7
Commercial Site Trip
Distribution**



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River's Edge Apartments Traffic Impact Analysis

**Figure 9
 Peak Hour Site Traffic
 Volumes**



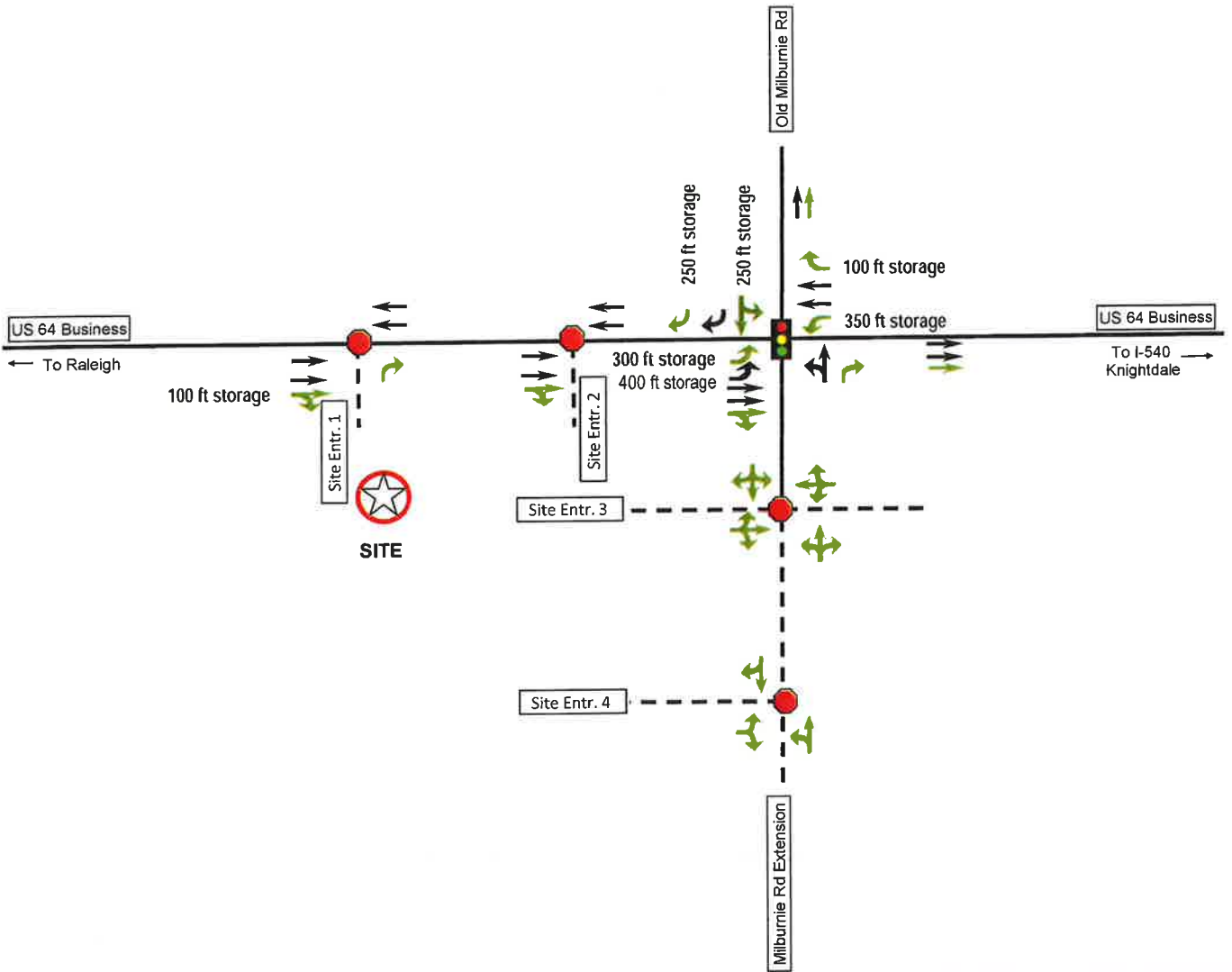
—	Existing Roadway
- -	Proposed Roadway
	Signalized Intersection
	Unsignalized Intersection
	Existing / Planned Lane
	Proposed Lane



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River's Edge Apartments Traffic Impact Analysis

Figure 12
2016 Build Proposed Lane
Configurations



—	Existing Roadway
- -	Proposed Roadway
🚦	Signalized Intersection
●	Unsignalized Intersection
↔	Existing / Planned Lane
↔	Proposed Lane



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River's Edge Apartments Traffic Impact Analysis

Figure 16
2026 Build Proposed Lane
Configurations

Appendix E:
Intersection Spreadsheets

INTERSECTION VOLUME DEVELOPMENT

INTERSECTION #1
US 64 Business (Knightdale Boulevard) at Old Milburnie Road

	AM PEAK HOUR															
	Old Milburnie Road Northbound				Old Milburnie Road Southbound				US 64 Business (Knightdale Boulevard) Eastbound				US 64 Business (Knightdale Boulevard) Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	1	0	2	0	86	1	305	5	125	658	5	1	5	1,292	52
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0			
Conflicting Pedestrians	0				0				0				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				0				0			
Heavy Vehicles	0	0	0	0	0	3	0	2	0	3	63	1	1	0	70	1
Heavy Vehicle %	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	10%	20%	100%	2%	5%	2%
Peak Hour Factor	0.91				0.91				0.91				0.91			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	1	0	2	0	86	1	305	5	125	658	5	1	5	1,292	52
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	1	0	2	0	97	1	343	6	141	741	6	1	6	1,454	59
Background Growth Trips (Design Year)	0	1	0	2	0	106	1	375	7	154	810	7	1	7	1,590	65
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)						3					38					63
Allen Park TIA (2034)						30		60		10						14
River's Edge TIA (2034)		119	6	81			5			3	-25			36	-6	
Total Approved Development Trips	0	119	6	81	0	33	5	60	0	13	13	0	0	36	57	18
2025 No-Build Traffic	0	1	0	2	0	100	1	343	6	141	779	6	1	6	1,517	63
2034 No-Build Traffic (Design Year)	0	120	6	83	0	139	6	435	7	167	823	7	1	43	1,647	83
Trip Distribution IN											40%					
Trip Distribution OUT															(40%)	
Warehouse Truck Trips	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
Trip Distribution IN								(5%)		5%	20%					(20%)
Trip Distribution OUT																
Warehouse Car Trips	0	0	0	0	0	0	0	1	0	3	11	0	0	0	3	0
Trip Distribution IN								(5%)		5%	20%					(20%)
Trip Distribution OUT																
Office Trips	0	0	0	0	0	0	0	0	0	5	18	0	0	0	2	0
Trip Distribution IN								(5%)		5%	20%					(20%)
Trip Distribution OUT																
Retail Trips	0	0	0	0	0	0	0	1	0	2	6	0	0	0	4	0
Pass-By Distribution IN																
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	0	0	0	0	0	2	0	10	37	0	0	0	11	0
Balancing Adjustment										-1						
Total Vehicular Project Trips	0	0	0	0	0	0	0	2	0	9	37	0	0	0	11	0
2025 Build Traffic	0	1	0	2	0	100	1	345	6	150	816	6	1	6	1,528	63
2025 Build Heavy Vehicle %	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	9%	19%	113%	2%	5%	2%
2034 Build Traffic (Design Year)	0	120	6	83	0	139	6	437	7	176	860	7	1	43	1,658	83
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	8%	16%	109%	2%	5%	2%

	PM PEAK HOUR															
	Old Milburnie Road Northbound				Old Milburnie Road Southbound				US 64 Business (Knightdale Boulevard) Eastbound				US 64 Business (Knightdale Boulevard) Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	2	2	3	0	87	1	132	22	328	1,490	0	5	2	1,114	101
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0			
Conflicting Pedestrians	0				0				0				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				0				0			
Heavy Vehicles	0	1	0	0	0	1	0	0	0	5	24	0	0	0	21	0
Heavy Vehicle %	2%	50%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Peak Hour Factor	0.94				0.94				0.94				0.94			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	2	2	3	0	87	1	132	22	328	1,490	0	5	2	1,114	101
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	2	2	3	0	98	1	149	25	369	1,677	0	6	2	1,254	114
Background Growth Trips (Design Year)	0	2	2	3	0	107	1	163	27	404	1,834	0	7	2	1,371	125
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)						5					66					47
Allen Park TIA (2034)						50		43		96						69
River's Edge TIA (2034)		59	3	60			8			2	-18			74	-4	
Total Approved Development Trips	0	59	3	60	0	55	8	43	0	98	48	0	0	74	43	72
2025 No-Build Traffic	0	2	2	3	0	103	1	149	25	369	1,743	0	6	2	1,301	117
2034 No-Build Traffic (Design Year)	0	61	5	63	0	162	9	206	27	502	1,882	0	7	76	1,414	197
Trip Distribution IN											40%					
Trip Distribution OUT															(40%)	
Warehouse Truck Trips	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
Trip Distribution IN								(5%)		5%	20%					(20%)
Trip Distribution OUT																
Warehouse Car Trips	0	0	0	0	0	0	0	3	0	1	3	0	0	0	10	0
Trip Distribution IN								(5%)		5%	20%					(20%)
Trip Distribution OUT																
Office Trips	0	0	0	0	0	0	0	4	0	1	3	0	0	0	17	0
Trip Distribution IN								(5%)		5%	20%					(20%)
Trip Distribution OUT																
Retail Trips	0	0	0	0	0	0	0	2	0	2	9	0	0	0	10	0
Pass-By Distribution IN																
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	0	0	0	0	0	9	0	4	18	0	0	0	39	0
Balancing Adjustment											1					
Total Vehicular Project Trips	0	0	0	0	0	0	0	9	0	4	19	0	0	0	39	0
2025 Build Traffic	0	2	2	3	0	103	1	158	25	373	1,762	0	6	2	1,340	117
2025 Build Heavy Vehicle %	2%	56%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
2034 Build Traffic (Design Year)	0	61	5	63	0	162	9	215	27	506	1,901	0	7	76	1,453	197
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%

INTERSECTION VOLUME DEVELOPMENT

INTERSECTION #2
US 64 Business (Knightdale Boulevard) at Westover Drive/Farmwell Road

	AM PEAK HOUR																
	Westover Drive Northbound				Farmwell Road Southbound				US 64 Business (Knightdale Boulevard) Eastbound				US 64 Business (Knightdale Boulevard) Westbound				
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	
Observed 2021 Traffic Volumes	1	23	0	28	0	10	0	2	0	0	753	8	0	1	13	1,333	2
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0				
Conflicting Pedestrians	0				0				0				0				
Bicycles	0				0				0				0				
Conflicting Bicycles	0				0				0				0				
Heavy Vehicles	0	1	0	1	0	1	0	0	0	0	71	0	0	1	1	72	0
Heavy Vehicle %	2%	4%	2%	4%	2%	10%	2%	2%	2%	2%	9%	2%	100%	8%	5%	2%	
Peak Hour Factor	0.89				0.89				0.89				0.89				
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	1	23	0	28	0	10	0	2	0	0	753	8	0	1	13	1,333	2
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	1	26	0	32	0	11	0	2	0	0	848	9	1	15	1500	2	
Background Growth Trips (Design Year)	1	28	0	35	0	12	0	2	0	0	927	10	1	16	1641	2	
New Road Adjustment																	
Legacy Oaks TIA (2025 & 2034)																	
Allen Park TIA (2034)																	
River's Edge TIA (2034)																	
Total Approved Development Trips	0	1	0	1	0	0	0	0	0	0	149	3	0	1	116	0	
2025 No-Build Traffic	1	28	0	33	0	11	0	2	0	0	889	9	1	16	1,567	2	
2034 No-Build Traffic (Design Year)	1	29	0	36	0	12	0	2	0	0	1,076	13	1	17	1,757	2	
Trip Distribution IN									40%								
Trip Distribution OUT					(60%)				(40%)								
Warehouse Truck Trips	0	0	0	0	0	2	0	2	0	2	0	0	0	0	0	4	
Trip Distribution IN									20%								
Trip Distribution OUT					(65%)				(20%)								
Warehouse Car Trips	0	0	3	0	0	9	1	3	0	11	0	0	0	0	0	35	
Trip Distribution IN									20%								
Trip Distribution OUT					(65%)				(20%)								
Office Trips	0	0	5	0	0	6	0	2	0	18	0	0	0	0	0	59	
Trip Distribution IN									20%								
Trip Distribution OUT					(65%)				(20%)								
Retail Trips	0	0	2	0	0	13	1	4	0	6	0	0	0	0	0	20	
Pass-By Distribution IN									50%				-50%				
Pass-By Distribution OUT					(50%)				(50%)								
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Project Trips (Unbalanced)	0	0	10	0	0	30	2	11	0	37	0	0	0	0	0	118	
Balancing Adjustment																	
Total Vehicular Project Trips	0	0	10	0	0	30	2	11	0	37	0	0	0	0	0	118	
2025 Build Traffic	1	26	10	33	0	41	2	13	0	37	889	9	1	16	1,567	120	
2025 Build Heavy Vehicle %	2%	4%	2%	3%	2%	8%	2%	15%	2%	5%	9%	2%	113%	7%	5%	3%	
2034 Build Traffic (Design Year)	1	29	10	36	0	42	2	13	0	37	1,076	13	1	17	1,757	120	
2034 Build Heavy Vehicle % (Design Year)	2%	4%	2%	3%	2%	7%	2%	15%	2%	5%	7%	2%	109%	6%	4%	3%	

	PM PEAK HOUR															
	Westover Drive Northbound				Farmwell Road Southbound				US 64 Business (Knightdale Boulevard) Eastbound				US 64 Business (Knightdale Boulevard) Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	7	0	5	0	9	0	10	5	5	1,598	31	1	32	1,187	13
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0			
Conflicting Pedestrians	0				0				0				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				3				0			
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	30	0	0	0	25	0
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	30%	2%	2%	2%	2%	2%	2%	2%	2%
Peak Hour Factor	0.95				0.95				0.95				0.95			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	7	0	5	0	9	0	10	5	5	1,598	31	1	32	1,187	13
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	8	0	6	0	10	0	11	6	6	1,799	35	1	36	1,336	15
Background Growth Trips (Design Year)	0	9	0	7	0	11	0	12	7	7	1,968	38	1	39	1,461	16
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)																
Allen Park TIA (2034)																
River's Edge TIA (2034)																
Total Approved Development Trips	0	2	0	1	0	0	0	0	0	0	179	2	0	1	191	0
2025 No-Build Traffic	0	8	0	7	0	10	0	11	6	6	1,870	35	1	37	1,386	15
2034 No-Build Traffic (Design Year)	0	11	0	8	0	11	0	12	7	7	2,147	40	1	40	1,652	16
Trip Distribution IN									40%							
Trip Distribution OUT					(60%)				(40%)							
Warehouse Truck Trips	0	0	0	0	0	4	0	2	0	3	0	0	0	0	0	5
Trip Distribution IN									20%							
Trip Distribution OUT					(65%)				(20%)							
Warehouse Car Trips	0	0	1	0	0	34	3	10	0	3	0	0	0	0	0	9
Trip Distribution IN									20%							
Trip Distribution OUT					(65%)				(20%)							
Office Trips	0	0	1	0	0	54	4	17	0	3	0	0	0	0	0	11
Trip Distribution IN									20%							
Trip Distribution OUT					(65%)				(20%)							
Retail Trips	0	0	2	0	0	32	2	10	0	9	0	0	0	0	0	29
Pass-By Distribution IN									50%				-50%			
Pass-By Distribution OUT					(50%)				(50%)							
Pass-By Trips	0	0	0	0	0	16	0	16	0	16	-16	0	0	0	-16	16
Project Trips (Unbalanced)	0	0	4	0	0	140	9	55	0	34	-16	0	0	0	-16	70
Balancing Adjustment																
Total Vehicular Project Trips	0	0	4	0	0	140	8	55	0	34	-15	0	0	0	-16	69
2025 Build Traffic	0	8	4	7	0	150	8	66	6	40	1,855	35	1	37	1,370	84
2025 Build Heavy Vehicle %	2%	2%	2%	2%	2%	3%	2%	8%	2%	8%	2%	2%	2%	2%	2%	6%
2034 Build Traffic (Design Year)	0	11	4	8	0	151	8	67	7	41	2,132	40	1	40	1,636	85
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	2%	2%	3%	2%	8%	2%	7%	2%	2%	2%	2%	2%	6%

INTERSECTION VOLUME DEVELOPMENT

INTERSECTION #3
US 64 Business (Knightdale Boulevard) at Hodge Road

	AM PEAK HOUR															
	Hodge Road Northbound				Hodge Road Southbound				US 64 Business (Knightdale Boulevard) Eastbound				US 64 Business (Knightdale Boulevard) Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	165	26	178	0	108	18	67	6	34	665	86	21	116	1,112	111
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0			
Conflicting Pedestrians	0				0				0				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				0				0			
Heavy Vehicles	0	7	0	4	0	1	1	0	0	0	68	4	2	6	63	5
Heavy Vehicle %	2%	4%	2%	2%	2%	2%	6%	2%	2%	2%	10%	5%	10%	5%	6%	5%
Peak Hour Factor	0.96				0.96				0.96				0.96			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	165	26	178	0	108	18	67	6	34	665	86	21	116	1,112	111
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	186	29	200	0	122	20	75	7	38	749	97	24	131	1,252	125
Background Growth Trips (Design Year)	0	203	32	219	0	133	22	82	8	42	818	106	26	143	1,369	137
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)	7				147				11				68			
Allen Park TIA (2034)	1				1				2				3			
River's Edge TIA (2034)	4				3				7				7			
Total Approved Development Trips	0	4	7	0	0	147	11	72	0	51	89	10	0	0	41	92
2025 No-Build Traffic	0	186	36	200	0	269	31	143	7	80	749	97	24	131	1,252	125
2034 No-Build Traffic (Design Year)	0	207	39	219	0	280	33	154	8	93	907	116	26	143	1,410	229
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Truck Trips	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Car Trips	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	35
Trip Distribution IN																
Trip Distribution OUT																
Office Trips	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	59
Trip Distribution IN																
Trip Distribution OUT																
Retail Trips	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	20
Pass-By Distribution IN																
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	118
Balancing Adjustment																
Total Vehicular Project Trips	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	118
2025 Build Traffic	0	186	36	200	0	269	31	143	7	80	778	97	24	131	1,370	217
2025 Build Heavy Vehicle %	2%	4%	2%	2%	2%	2%	4%	2%	2%	2%	10%	5%	9%	5%	5%	3%
2034 Build Traffic (Design Year)	0	207	39	219	0	280	33	154	8	93	927	116	26	143	1,498	229
2034 Build Heavy Vehicle % (Design Year)	2%	4%	2%	2%	2%	2%	3%	2%	2%	2%	8%	4%	8%	5%	5%	2%

	PM PEAK HOUR															
	Hodge Road Northbound				Hodge Road Southbound				US 64 Business (Knightdale Boulevard) Eastbound				US 64 Business (Knightdale Boulevard) Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	109	30	185	0	122	94	63	7	70	1,372	232	28	327	1,084	229
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				1				0				0			
Conflicting Pedestrians	0				0				1				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				1				0			
Heavy Vehicles	0	1	0	0	0	0	1	1	1	0	29	3	0	8	32	1
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	14%	2%	2%	2%	2%	2%	3%	2%
Peak Hour Factor	0.93				0.93				0.93				0.93			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	109	30	185	0	122	94	63	7	70	1,372	232	28	327	1,084	229
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	123	34	208	0	137	106	71	8	79	1,544	261	32	368	1,220	258
Background Growth Trips (Design Year)	0	135	37	227	0	150	116	78	9	86	1,689	285	35	402	1,334	282
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)	12				118				8				59			
Allen Park TIA (2034)	6				6				4				4			
River's Edge TIA (2034)	6				5				5				49			
Total Approved Development Trips	0	12	12	0	0	118	8	71	0	92	79	9	0	0	109	164
2025 No-Build Traffic	0	123	46	208	0	295	114	130	8	162	1,533	261	32	368	1,211	422
2034 No-Build Traffic (Design Year)	0	147	49	227	0	268	124	149	9	178	1,768	294	35	402	1,443	446
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Truck Trips	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	5
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Car Trips	0	0	0	0	0	0	0	0	0	0	34	0	0	0	0	9
Trip Distribution IN																
Trip Distribution OUT																
Office Trips	0	0	0	0	0	0	0	0	0	0	54	0	0	0	0	11
Trip Distribution IN																
Trip Distribution OUT																
Retail Trips	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	29
Pass-By Distribution IN																
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	0	0	0	0	0	0	0	0	124	0	0	0	0	54
Balancing Adjustment																
Total Vehicular Project Trips	0	0	0	0	0	0	0	0	0	0	125	0	0	0	0	53
2025 Build Traffic	0	123	46	208	0	295	114	130	8	162	1,658	261	32	368	1,264	422
2025 Build Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	14%	2%	2%	2%	2%	2%	3%	2%
2034 Build Traffic (Design Year)	0	147	49	227	0	268	124	149	9	178	1,893	294	35	402	1,496	446
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	2%	2%	2%	2%	2%	12%	2%	2%	2%	2%	2%	3%	2%

INTERSECTION VOLUME DEVELOPMENT

INTERSECTION #4
US 64 Business (Knightdale Boulevard) at I-540 Eastbound Ramps

	AM PEAK HOUR																
	I-540 Eastbound Ramps				I-540 Eastbound Ramps				US 64 Business (Knightdale Boulevard)				US 64 Business (Knightdale Boulevard)				
	Northbound		Right		Southbound		Right		Eastbound		Right		Westbound		Right		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	
Observed 2021 Traffic Volumes	0	0	0	378	0	0	0	273	0	0	914	112	0	1	230	1,101	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0				
Conflicting Pedestrians	0				0				0				0				
Bicycles	0				0				0				0				
Conflicting Bicycles	0				0				0				0				
Heavy Vehicles	0	0	0	21	0	0	0	12	0	0	60	19	0	17	66	0	
Heavy Vehicle %	2%	2%	2%	6%	2%	2%	2%	4%	2%	2%	7%	17%	2%	7%	6%	2%	
Peak Hour Factor	0.95				0.95				0.95				0.95				
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Adjusted 2021 Volumes	0	0	0	378	0	0	0	273	0	0	914	112	0	1	230	1,101	0
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
Background Growth Trips	0	0	0	425	0	0	0	307	0	0	1,029	126	1	259	1,239	0	
Background Growth Trips (Design Year)	0	0	0	465	0	0	0	336	0	0	1,125	138	1	283	1,355	0	
New Road Adjustment																	
Legacy Oaks TIA (2025 & 2034)																	
Allen Park TIA (2034)																	
River's Edge TIA (2034)																	
Total Approved Development Trips	0	0	0	0	0	0	0	42	0	0	199	37	0	0	90	0	
2025 No-Build Traffic	0	0	0	425	0	0	0	342	0	0	1,153	149	1	259	1,295	0	
2034 No-Build Traffic (Design Year)	0	0	0	465	0	0	0	378	0	0	1,324	175	1	283	1,445	0	
Trip Distribution IN																	
Trip Distribution OUT																	
Warehouse Truck Trips	0	0	0	0	0	0	0	1	0	0	2	1	0	0	3	0	
Trip Distribution IN																	
Trip Distribution OUT																	
Warehouse Car Trips	0	0	0	0	0	0	0	5	0	0	7	2	0	0	30	0	
Trip Distribution IN																	
Trip Distribution OUT																	
Office Trips	0	0	0	0	0	0	0	9	0	0	5	1	0	0	50	0	
Trip Distribution IN																	
Trip Distribution OUT																	
Retail Trips	0	0	0	0	0	0	0	3	0	0	10	3	0	0	17	0	
Pass-By Distribution IN																	
Pass-By Distribution OUT																	
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Project Trips (Unbalanced)	0	0	0	0	0	0	0	18	0	0	24	7	0	0	100	0	
Balancing Adjustment																	
Total Vehicular Project Trips	0	0	0	0	0	0	0	18	0	0	24	6	0	0	100	0	
2025 Build Traffic	0	0	0	425	0	0	0	360	0	0	1,177	155	1	259	1,395	0	
2025 Build Heavy Vehicle %	2%	2%	2%	6%	2%	2%	2%	3%	2%	2%	6%	14%	2%	7%	6%	2%	
2034 Build Traffic (Design Year)	0	0	0	465	0	0	0	396	0	0	1,348	181	1	283	1,545	0	
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	5%	2%	2%	2%	4%	2%	2%	5%	12%	2%	7%	5%	2%	

	PM PEAK HOUR															
	I-540 Eastbound Ramps				I-540 Eastbound Ramps				US 64 Business (Knightdale Boulevard)				US 64 Business (Knightdale Boulevard)			
	Northbound		Right		Southbound		Right		Eastbound		Right		Westbound		Right	
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	0	0	896	0	0	0	553	0	0	1,597	53	2	205	1,139	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0			
Conflicting Pedestrians	0				0				0				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				0				0			
Heavy Vehicles	0	0	0	26	0	0	0	23	0	0	28	0	0	1	17	0
Heavy Vehicle %	2%	2%	2%	3%	2%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%
Peak Hour Factor	0.91				0.91				0.91				0.91			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	0	0	896	0	0	0	553	0	0	1,597	53	2	205	1,139	0
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	0	0	1,008	0	0	0	622	0	0	1,797	60	2	231	1,282	0
Background Growth Trips (Design Year)	0	0	0	1,102	0	0	0	680	0	0	1,965	66	2	253	1,402	0
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)																
Allen Park TIA (2034)																
River's Edge TIA (2034)																
Total Approved Development Trips	0	0	0	0	0	0	0	80	0	0	166	31	0	0	193	0
2025 No-Build Traffic	0	0	0	1,008	0	0	0	681	0	0	1,889	75	2	231	1,378	0
2034 No-Build Traffic (Design Year)	0	0	0	1,102	0	0	0	760	0	0	2,131	97	2	253	1,595	0
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Truck Trips	0	0	0	0	0	0	0	1	0	0	2	1	0	0	4	0
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Car Trips	0	0	0	0	0	0	0	1	0	0	26	8	0	0	8	0
Trip Distribution IN																
Trip Distribution OUT																
Office Trips	0	0	0	0	0	0	0	2	0	0	42	12	0	0	9	0
Trip Distribution IN																
Trip Distribution OUT																
Retail Trips	0	0	0	0	0	0	0	5	0	0	25	7	0	0	25	0
Pass-By Distribution IN																
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	0	0	0	0	0	9	0	0	95	28	0	0	46	0
Balancing Adjustment																
Total Vehicular Project Trips	0	0	0	0	0	0	0	8	0	0	96	29	0	0	45	0
2025 Build Traffic	0	0	0	1,008	0	0	0	689	0	0	1,985	104	2	231	1,423	0
2025 Build Heavy Vehicle %	2%	2%	2%	3%	2%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%
2034 Build Traffic (Design Year)	0	0	0	1,102	0	0	0	768	0	0	2,227	126	2	253	1,640	0
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	3%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%

INTERSECTION VOLUME DEVELOPMENT

INTERSECTION #5
US 64 Business (Knightdale Boulevard) at I-540 Westbound Ramps

	AM PEAK HOUR																
	I-540 Westbound Ramps				I-540 Westbound Ramps				US 64 Business (Knightdale Boulevard)				US 64 Business (Knightdale Boulevard)				
	Northbound		Right		Southbound		Right		Eastbound		Right		Westbound		Right		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	
Observed 2021 Traffic Volumes	0	60	0	363	0	0	0	0	1	335	912	0	0	0	0	1,259	633
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0				
Conflicting Pedestrians	0				0				0				0				
Bicycles	0				0				0				0				
Conflicting Bicycles	0				0				0				0				
Heavy Vehicles	0	1	0	27	0	0	0	0	0	20	60	0	0	0	0	82	30
Heavy Vehicle %	2%	2%	2%	7%	2%	2%	2%	2%	2%	6%	7%	2%	2%	2%	2%	7%	5%
Peak Hour Factor	0.94				0.94				0.94				0.94				
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	60	0	363	0	0	0	0	1	335	912	0	0	0	0	1,259	633
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	68	0	409	0	0	0	0	1	377	1026	0	0	0	0	1417	712
Background Growth Trips (Design Year)	0	74	0	447	0	0	0	0	1	412	1122	0	0	0	0	1550	779
New Road Adjustment	0				0				0				0				
Legacy Oaks TIA (2025 & 2034)	15				0				56				68				
Allen Park TIA (2034)	2				0				3				17				
River's Edge TIA (2034)	4				0				8				47				
Total Approved Development Trips	0	21	0	0	0	0	0	0	0	67	132	0	0	0	0	70	0
2025 No-Build Traffic	0	83	0	409	0	0	0	0	1	433	1,094	0	0	0	0	1,459	712
2034 No-Build Traffic (Design Year)	0	95	0	447	0	0	0	0	1	479	1,254	0	0	0	0	1,620	779
Trip Distribution IN	20%				0%				0%				25%				
Trip Distribution OUT	0%				0%				(15%)				(25%)				
Warehouse Truck Trips	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0
Trip Distribution IN	15%				0%				0%				40%				
Trip Distribution OUT	0%				0%				(10%)				(40%)				
Warehouse Car Trips	0	8	0	0	0	0	0	0	0	1	6	0	0	0	0	22	0
Trip Distribution IN	15%				0%				0%				40%				
Trip Distribution OUT	0%				0%				(10%)				(40%)				
Office Trips	0	14	0	0	0	0	0	0	0	1	4	0	0	0	0	36	0
Trip Distribution IN	15%				0%				0%				40%				
Trip Distribution OUT	0%				0%				(10%)				(40%)				
Retail Trips	0	5	0	0	0	0	0	0	0	2	8	0	0	0	0	12	0
Pass-By Distribution IN	0%				0%				0%				0%				
Pass-By Distribution OUT	0%				0%				0%				0%				
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	28	0	0	0	0	0	0	0	5	19	0	0	0	0	72	0
Balancing Adjustment	0				0				0				0				
Total Vehicular Project Trips	0	28	0	0	0	0	0	0	0	5	19	0	0	0	0	72	0
2025 Build Traffic	0	111	0	409	0	0	0	0	1	438	1,113	0	0	0	0	1,531	712
2025 Build Heavy Vehicle %	2%	2%	2%	7%	2%	2%	2%	2%	2%	5%	6%	2%	2%	2%	2%	6%	5%
2034 Build Traffic (Design Year)	0	123	0	447	0	0	0	0	1	484	1,273	0	0	0	0	1,452	779
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	7%	2%	2%	2%	2%	2%	5%	5%	2%	2%	2%	2%	6%	4%

	PM PEAK HOUR																
	I-540 Westbound Ramps				I-540 Westbound Ramps				US 64 Business (Knightdale Boulevard)				US 64 Business (Knightdale Boulevard)				
	Northbound		Right		Southbound		Right		Eastbound		Right		Westbound		Right		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	
Observed 2021 Traffic Volumes	0	75	0	515	0	0	0	0	3	289	2,170	0	0	0	0	1,272	526
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0				
Conflicting Pedestrians	0				0				0				0				
Bicycles	0				0				0				0				
Conflicting Bicycles	0				0				0				0				
Heavy Vehicles	0	2	0	11	0	0	0	0	0	11	48	0	0	0	0	14	8
Heavy Vehicle %	2%	3%	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%
Peak Hour Factor	0.98				0.98				0.98				0.98				
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	75	0	515	0	0	0	0	3	289	2,170	0	0	0	0	1,272	526
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	84	1	580	0	0	0	0	3	325	2,442	0	0	0	0	1,432	592
Background Growth Trips (Design Year)	0	92	1	634	0	0	0	0	3	355	2,671	0	0	0	0	1,566	647
New Road Adjustment	0				0				0				0				
Legacy Oaks TIA (2025 & 2034)	24				0				42				50				
Allen Park TIA (2034)	4				0				3				31				
River's Edge TIA (2034)	5				0				4				36				
Total Approved Development Trips	0	33	0	0	0	0	0	0	0	49	117	0	0	0	0	160	0
2025 No-Build Traffic	0	108	1	580	0	0	0	0	3	367	2,492	0	0	0	0	1,504	592
2034 No-Build Traffic (Design Year)	0	125	1	634	0	0	0	0	3	404	2,788	0	0	0	0	1,726	647
Trip Distribution IN	20%				0%				0%				25%				
Trip Distribution OUT	0%				0%				(15%)				(25%)				
Warehouse Truck Trips	0	2	0	0	0	0	0	0	0	1	2	0	0	0	0	2	0
Trip Distribution IN	15%				0%				0%				40%				
Trip Distribution OUT	0%				0%				(10%)				(40%)				
Warehouse Car Trips	0	2	0	0	0	0	0	0	0	5	21	0	0	0	0	6	0
Trip Distribution IN	15%				0%				0%				40%				
Trip Distribution OUT	0%				0%				(10%)				(40%)				
Office Trips	0	3	0	0	0	0	0	0	0	8	33	0	0	0	0	7	0
Trip Distribution IN	15%				0%				0%				40%				
Trip Distribution OUT	0%				0%				(10%)				(40%)				
Retail Trips	0	7	0	0	0	0	0	0	0	5	20	0	0	0	0	18	0
Pass-By Distribution IN	0%				0%				0%				0%				
Pass-By Distribution OUT	0%				0%				0%				0%				
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	14	0	0	0	0	0	0	0	19	76	0	0	0	0	33	0
Balancing Adjustment	-1				0				0				-1				
Total Vehicular Project Trips	0	13	0	0	0	0	0	0	0	19	77	0	0	0	0	32	0
2025 Build Traffic	0	121	1	580	0	0	0	0	3	386	2,569	0	0	0	0	1,536	592
2025 Build Heavy Vehicle %	2%	4%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
2034 Build Traffic (Design Year)	0	138	1	634	0	0	0	0	3	423	2,865	0	0	0	0	1,758	647
2034 Build Heavy Vehicle % (Design Year)	2%	3%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%

INTERSECTION VOLUME DEVELOPMENT

INTERSECTION #6
Old Milburnie Road at Farmwell Road

AM PEAK HOUR																
	Old Milburnie Road Northbound				Old Milburnie Road Southbound				Eastbound				Farmwell Road Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	0	0	1	0	5	0	0	0	0	0	0	0	1	0	0
Count Balancing	0	0	176	0	0	0	391	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conflicting Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conflicting Bicycles	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Heavy Vehicles	0	0	3	1	0	0	4	0	0	0	0	0	0	1	0	0
Heavy Vehicle %	2%	2%	2%	100%	2%	2%	2%	2%	2%	2%	2%	2%	2%	100%	2%	2%
Peak Hour Factor	1	1	0.91	1	1	1	0.91	1	1	1	0.91	1	1	1	0.91	1
Adjustment Factor	0	0	176	1	0	5	391	0	0	0	0	0	0	1	0	0
Adjusted 2021 Volumes																
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	0	198	1	0	6	440	0	0	0	0	0	0	1	0	0
Background Growth Trips (Design Year)	0	0	217	1	0	7	481	0	0	0	0	0	0	1	0	0
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)			4				3									
Allen Park TIA (2034)			24				90									
River's Edge TIA (2034)			9				5									
Total Approved Development Trips	0	0	37	0	0	0	96	0	0	0	0	0	0	0	0	0
2025 No-Build Traffic	0	0	202	1	0	6	443	0	0	0	0	0	0	1	0	0
2034 No-Build Traffic (Design Year)	0	0	254	1	0	7	579	0	0	0	0	0	0	1	0	0
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Truck Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trip Distribution IN				5%			5%								(5%)	(5%)
Trip Distribution OUT																
Warehouse Car Trips	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	0
Trip Distribution IN				5%			5%								(5%)	(5%)
Trip Distribution OUT																
Office Trips	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0
Trip Distribution IN				5%			5%								(5%)	(5%)
Trip Distribution OUT																
Retail Trips	0	0	0	2	0	2	0	0	0	0	0	0	0	0	1	0
Pass-By Distribution IN																
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	0	10	0	10	0	0	0	0	0	0	0	0	2	0
Balancing Adjustment				-1			-2									
Total Vehicular Project Trips	0	0	0	9	0	8	0	0	0	0	0	0	0	0	2	0
2025 Build Traffic	0	0	202	10	0	14	443	0	0	0	0	0	0	3	0	2
2025 Build Heavy Vehicle %	2%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%	2%	2%	38%	2%	2%
2034 Build Traffic (Design Year)	0	0	254	10	0	15	579	0	0	0	0	0	0	3	0	2
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%	2%	2%	36%	2%	2%

PM PEAK HOUR																
	Old Milburnie Road Northbound				Old Milburnie Road Southbound				Eastbound				Farmwell Road Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	0	0	2	0	3	0	0	0	0	0	0	0	1	0	6
Count Balancing	0	0	429	0	0	0	219	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conflicting Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conflicting Bicycles	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Heavy Vehicles	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Peak Hour Factor	1	1	0.94	1	1	1	0.94	1	1	1	0.94	1	1	1	0.94	1
Adjustment Factor	0	0	429	2	0	3	219	0	0	0	0	0	0	1	0	6
Adjusted 2021 Volumes																
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	0	483	2	0	3	246	0	0	0	0	0	0	1	0	7
Background Growth Trips (Design Year)	0	0	528	2	0	3	269	0	0	0	0	0	0	1	0	8
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)			3				5									
Allen Park TIA (2034)			165				93									
River's Edge TIA (2034)			5				8									
Total Approved Development Trips	0	0	173	0	0	0	106	0	0	0	0	0	0	0	0	0
2025 No-Build Traffic	0	0	486	2	0	3	251	0	0	0	0	0	0	1	0	7
2034 No-Build Traffic (Design Year)	0	0	701	2	0	3	375	0	0	0	0	0	0	1	0	8
Trip Distribution IN																
Trip Distribution OUT																
Warehouse Truck Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trip Distribution IN				5%			5%								(5%)	(5%)
Trip Distribution OUT																
Warehouse Car Trips	0	0	0	1	0	1	0	0	0	0	0	0	0	0	3	0
Trip Distribution IN				5%			5%								(5%)	(5%)
Trip Distribution OUT																
Office Trips	0	0	0	1	0	1	0	0	0	0	0	0	0	0	4	0
Trip Distribution IN				5%			5%								(5%)	(5%)
Trip Distribution OUT																
Retail Trips	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2	0
Pass-By Distribution IN																
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	0	4	0	4	0	0	0	0	0	0	0	0	9	0
Balancing Adjustment																
Total Vehicular Project Trips	0	0	0	4	0	4	0	0	0	0	0	0	0	0	9	0
2025 Build Traffic	0	0	486	6	0	7	251	0	0	0	0	0	0	10	0	16
2025 Build Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
2034 Build Traffic (Design Year)	0	0	701	6	0	7	375	0	0	0	0	0	0	10	0	17
2034 Build Heavy Vehicle % (Design Year)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%

INTERSECTION VOLUME DEVELOPMENT

INTERSECTION #7
Farmwell Road/Site Driveway at Farmwell Road

	AM PEAK HOUR															
	Farmwell Road Northbound				Site Driveway Southbound				Farmwell Road Eastbound				Farmwell Road Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	1	0	1	0	0	0	0	0	0	1	9	0	3	1	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0			
Conflicting Pedestrians	0				0				0				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				0				0			
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	33%	2%	2%
Peak Hour Factor	0.89				0.89				0.89				0.89			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	1	0	1	0	0	0	0	0	0	1	9	0	3	1	0
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	1	0	1	0	0	0	0	0	0	1	10	0	3	1	0
Background Growth Trips (Design Year)	0	1	0	1	0	0	0	0	0	0	1	11	0	3	1	0
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)																
Allen Park TIA (2034)																
River's Edge TIA (2034)																
Total Approved Development Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2025 No-Build Traffic	0	1	0	1	0	0	0	0	0	0	1	10	0	3	1	0
2034 No-Build Traffic (Design Year)	0	1	0	1	0	0	0	0	0	0	1	11	0	3	1	0
Trip Distribution IN			100%				(100%)									
Trip Distribution OUT																
Warehouse Truck Trips	0	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0
Trip Distribution IN			90%				(90%)	(10%)			10%					
Trip Distribution OUT																
Warehouse Car Trips	0	0	49	0	0	0	13	1	0	5	0	0	0	0	0	0
Trip Distribution IN			90%				(90%)	(10%)			10%					
Trip Distribution OUT																
Office Trips	0	0	82	0	0	0	8	1	0	9	0	0	0	0	0	0
Trip Distribution IN			90%				(90%)	(10%)			10%					
Trip Distribution OUT																
Retail Trips	0	0	28	0	0	0	18	2	0	3	0	0	0	0	0	0
Pass-By Distribution IN			100%				(100%)									
Pass-By Distribution OUT																
Pass-By Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	165	0	0	0	43	4	0	17	0	0	0	0	0	0
Balancing Adjustment																
Total Vehicular Project Trips	0	0	165	0	0	0	43	4	0	17	0	0	0	0	0	0
2025 Build Traffic	0	1	165	1	0	0	43	4	0	17	1	10	0	3	1	0
2025 Build Heavy Vehicle %	2%	2%	4%	2%	2%	2%	9%	2%	2%	2%	2%	2%	2%	38%	2%	2%
2034 Build Traffic (Design Year)	0	1	165	1	0	0	43	4	0	17	1	11	0	3	1	0
2034 Build Heavy Vehicle % (Design Year)	2%	2%	4%	2%	2%	2%	9%	2%	2%	2%	2%	2%	2%	36%	2%	2%

	PM PEAK HOUR															
	Farmwell Road Northbound				Site Driveway Southbound				Farmwell Road Eastbound				Farmwell Road Westbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right
Observed 2021 Traffic Volumes	0	7	0	11	0	0	0	0	0	0	1	8	0	11	5	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0				0				0				0			
Conflicting Pedestrians	0				0				0				0			
Bicycles	0				0				0				0			
Conflicting Bicycles	0				0				0				0			
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	100%	2%	2%	27%	2%	2%
Peak Hour Factor	0.95				0.95				0.95				0.95			
Adjustment Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adjusted 2021 Volumes	0	7	0	11	0	0	0	0	0	0	1	8	0	11	5	0
Annual Growth Rate	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Growth Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Annual Growth Rate (Design Year)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Growth Factor (Design Year)	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Background Growth Trips	0	8	0	12	0	0	0	0	0	0	1	9	0	12	6	0
Background Growth Trips (Design Year)	0	9	0	13	0	0	0	0	0	0	1	10	0	13	7	0
New Road Adjustment																
Legacy Oaks TIA (2025 & 2034)																
Allen Park TIA (2034)																
River's Edge TIA (2034)																
Total Approved Development Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2025 No-Build Traffic	0	8	0	12	0	0	0	0	0	0	1	9	0	12	6	0
2034 No-Build Traffic (Design Year)	0	9	0	13	0	0	0	0	0	0	1	10	0	13	7	0
Trip Distribution IN			100%				(100%)									
Trip Distribution OUT																
Warehouse Truck Trips	0	0	8	0	0	0	6	0	0	0	0	0	0	0	0	0
Trip Distribution IN			90%				(90%)	(10%)			10%					
Trip Distribution OUT																
Warehouse Car Trips	0	0	13	0	0	0	47	5	0	1	0	0	0	0	0	0
Trip Distribution IN			90%				(90%)	(10%)			10%					
Trip Distribution OUT																
Office Trips	0	0	15	0	0	0	75	8	0	2	0	0	0	0	0	0
Trip Distribution IN			90%				(90%)	(10%)			10%					
Trip Distribution OUT																
Retail Trips	0	0	41	0	0	0	44	5	0	5	0	0	0	0	0	0
Pass-By Distribution IN			100%				(100%)									
Pass-By Distribution OUT																
Pass-By Trips	0	0	31	0	0	0	31	0	0	0	0	0	0	0	0	0
Project Trips (Unbalanced)	0	0	108	0	0	0	203	18	0	8	0	0	0	0	0	0
Balancing Adjustment																
Total Vehicular Project Trips	0	0	107	0	0	0	203	18	0	8	0	0	0	0	0	0
2025 Build Traffic	0	8	107	12	0	0	203	18	0	8	1	9	0	12	6	0
2025 Build Heavy Vehicle %	2%	2%	7%	2%	2%	2%	3%	2%	2%	2%	113%	2%	2%	28%	2%	2%
2034 Build Traffic (Design Year)	0	9	107	13	0	0	203	18	0	8	1	10	0	13	7	0
2034 Build Heavy Vehicle % (Design Year)	2%	2%	7%	2%	2%	2%	3%	2%	2%	2%	109%	2%	2%	25%	2%	2%

Appendix F:
Synchro & SimTraffic Output:
Existing (2021)

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Existing AM (2021)
02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	5	125	658	5	6	1292	52	4	4	4	86	4	305
Future Volume (vph)	5	125	658	5	6	1292	52	4	4	4	86	4	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%			-1%			1%			4%	
Storage Length (ft)		375		0	150		75	0		0	0		0
Storage Lanes		1		0	1		1	0		0	0		2
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1743	3227	0	1778	3455	1591	0	1742	0	0	1725	2731
Flt Permitted		0.110			0.354				0.850			0.394	
Satd. Flow (perm)	0	202	3227	0	663	3455	1591	0	1505	0	0	713	2731
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			1				145		4				335
Link Speed (mph)			45			45			25			45	
Link Distance (ft)			1108			1778			230			106	
Travel Time (s)			16.8			26.9			6.3			1.6	
Confl. Peds. (#/hr)				1	1								
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	10%	20%	2%	5%	2%	2%	2%	2%	3%	2%	2%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	142	728	0	7	1420	57	0	12	0	0	99	335
Turn Type	D.P+P	D.P+P	NA		D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	6			3			4	4
Permitted Phases	6	6			2		6	3			4		
Detector Phase	5	5	2		1	6	6	3	3		4	4	4
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0		7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	70.0		15.0	70.0	70.0	20.0	20.0		15.0	15.0	15.0
Total Split (%)	12.5%	12.5%	58.3%		12.5%	58.3%	58.3%	16.7%	16.7%		12.5%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.6		3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6		-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		89.8	92.2		93.8	79.8	79.8		8.1			10.0	10.0
Actuated g/C Ratio		0.75	0.77		0.78	0.66	0.66		0.07			0.08	0.08
v/c Ratio		0.51	0.29		0.01	0.62	0.05		0.11			1.68	0.63
Control Delay		23.5	5.8		2.7	6.3	0.1		44.9			401.8	11.2
Queue Delay		0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		23.5	5.8		2.7	6.3	0.1		44.9			401.8	11.2
LOS		C	A		A	A	A		D			F	B
Approach Delay			8.7			6.1			44.9			100.3	
Approach LOS			A			A			D			F	
Queue Length 50th (ft)		15	48		1	106	0		6			-112	0
Queue Length 95th (ft)		70	174		m2	138	1		26			#226	49
Internal Link Dist (ft)			1028			1698			150			26	
Turn Bay Length (ft)		375			150		75						
Base Capacity (vph)		279	2479		613	2296	1106		191			59	534
Starvation Cap Reductn		0	0		0	0	0		0			0	0
Spillback Cap Reductn		0	0		0	0	0		0			0	0
Storage Cap Reductn		0	0		0	0	0		0			0	0
Reduced v/c Ratio		0.51	0.29		0.01	0.62	0.05		0.06			1.68	0.63

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	110 (92%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.68
Intersection Signal Delay:	21.7
Intersection LOS:	C
Intersection Capacity Utilization:	76.1%
ICU Level of Service:	D

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
 2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Existing AM (2021)
 02/02/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↗	↖	↑↑	↗		↕			↕	
Traffic Volume (vph)	4	753	8	14	1333	4	24	4	28	10	4	4
Future Volume (vph)	4	753	8	14	1333	4	24	4	28	10	4	4
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		225	200		150	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			25			25		
Satd. Flow (prot)	1770	3312	1583	1671	3438	1583	0	1669	0	0	1683	0
Flt Permitted	0.950			0.950				0.979			0.972	
Satd. Flow (perm)	1770	3312	1583	1671	3438	1583	0	1669	0	0	1683	0
Link Speed (mph)		45			45			25			30	
Link Distance (ft)		1778			1589			405			118	
Travel Time (s)		26.9			24.1			11.0			2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	9%	2%	8%	5%	2%	4%	2%	4%	10%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	846	9	16	1498	4	0	62	0	0	19	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.2% ICU Level of Service A
Analysis Period (min)	15

Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Existing AM (2021)
02/02/2022

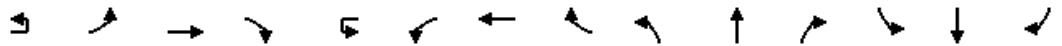


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↗	↖	↑↑	↗		↕			↕	
Traffic Volume (veh/h)	4	753	8	14	1333	4	24	4	28	10	4	4
Future Volume (Veh/h)	4	753	8	14	1333	4	24	4	28	10	4	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	4	846	9	16	1498	4	27	4	31	11	4	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh		1			1							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1502			855			1641	2388	423	1994	2393	749
vC1, stage 1 conf vol							854	854		1530	1530	
vC2, stage 2 conf vol							787	1534		464	863	
vCu, unblocked vol	1502			855			1641	2388	423	1994	2393	749
tC, single (s)	4.1			4.3			7.6	6.5	7.0	7.7	6.5	6.9
tC, 2 stage (s)							6.6	5.5		6.7	5.5	
tF (s)	2.2			2.3			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			98			84	97	95	88	97	99
cM capacity (veh/h)	442			743			173	118	574	90	119	354
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	4	423	423	9	16	749	749	4	62	19		
Volume Left	4	0	0	0	16	0	0	0	27	11		
Volume Right	0	0	0	9	0	0	0	4	31	4		
cSH	442	1700	1700	1700	743	1700	1700	1700	254	113		
Volume to Capacity	0.01	0.25	0.25	0.01	0.02	0.44	0.44	0.00	0.24	0.17		
Queue Length 95th (ft)	1	0	0	0	2	0	0	0	23	14		
Control Delay (s)	13.2	0.0	0.0	0.0	9.9	0.0	0.0	0.0	23.7	43.1		
Lane LOS	B				A				C	E		
Approach Delay (s)	0.1				0.1				23.7	43.1		
Approach LOS									C	E		
Intersection Summary												
Average Delay				1.0								
Intersection Capacity Utilization			47.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection												
Int Delay, s/veh	4.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↗	↘	↑↑	↗		↔			↔	
Traffic Vol, veh/h	4	753	8	14	1333	4	24	4	28	10	4	4
Future Vol, veh/h	4	753	8	14	1333	4	24	4	28	10	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	225	-	225	200	-	150	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	9	2	8	5	2	4	2	4	10	2	2
Mvmt Flow	4	846	9	16	1498	4	27	4	31	11	4	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1502	0	0	855	0	0	1637	2388	423	1963	2393	749
Stage 1	-	-	-	-	-	-	854	854	-	1530	1530	-
Stage 2	-	-	-	-	-	-	783	1534	-	433	863	-
Critical Hdwy	4.14	-	-	4.26	-	-	7.58	6.54	6.98	7.7	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.58	5.54	-	6.7	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.58	5.54	-	6.7	5.54	-
Follow-up Hdwy	2.22	-	-	2.28	-	-	3.54	4.02	3.34	3.6	4.02	3.32
Pot Cap-1 Maneuver	442	-	-	743	-	-	65	34	574	34	33	354
Stage 1	-	-	-	-	-	-	316	373	-	113	177	-
Stage 2	-	-	-	-	-	-	349	177	-	550	370	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	442	-	-	743	-	-	56	33	574	28	32	354
Mov Cap-2 Maneuver	-	-	-	-	-	-	56	33	-	28	32	-
Stage 1	-	-	-	-	-	-	313	370	-	112	173	-
Stage 2	-	-	-	-	-	-	328	173	-	509	367	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			99.6			193.5		
HCM LOS							F			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	94	442	-	-	743	-	-	36				
HCM Lane V/C Ratio	0.669	0.01	-	-	0.021	-	-	0.562				
HCM Control Delay (s)	99.6	13.2	-	-	9.9	-	-	193.5				
HCM Lane LOS	F	B	-	-	A	-	-	F				
HCM 95th %tile Q(veh)	3.3	0	-	-	0.1	-	-	1.9				

Knightsdale Gateway
3: Hodge Road & US 64 Bus (Knightsdale Blvd)

Existing AM (2021)
02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↑↑↑	↗		↔↔	↑↑↑	↗	↔↔	↔		↔↔	↑	↗
Traffic Volume (vph)	6	34	665	86	21	116	1112	111	165	26	178	108	18	67
Future Volume (vph)	6	34	665	86	21	116	1112	111	165	26	178	108	18	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3382	4645	1515	0	1732	4967	1561	3401	1635	0	3416	1783	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3382	4645	1515	0	1732	4967	1561	3401	1635	0	3416	1783	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				96				116		185				154
Link Speed (mph)			45				45			35				25
Link Distance (ft)			746				963			562				518
Travel Time (s)			11.3				14.6			10.9				14.1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	10%	5%	10%	5%	6%	5%	4%	2%	2%	2%	6%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	41	693	90	0	143	1158	116	172	212	0	113	19	70
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	62.0	21.0	22.0	22.0	69.0	20.0	21.0	16.0		20.0	15.0	15.0
Total Split (%)	12.5%	12.5%	51.7%	17.5%	18.3%	18.3%	57.5%	16.7%	17.5%	13.3%		16.7%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		9.8	64.1	89.2		14.8	72.0	83.5	20.0	10.5		10.5	9.3	13.8
Actuated g/C Ratio		0.08	0.53	0.74		0.12	0.60	0.70	0.17	0.09		0.09	0.08	0.12
v/c Ratio		0.15	0.28	0.08		0.67	0.39	0.10	0.30	0.68		0.38	0.14	0.22
Control Delay		52.1	16.1	2.8		82.3	7.0	0.4	46.7	22.4		55.0	53.8	1.6
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		52.1	16.1	2.8		82.3	7.0	0.4	46.7	22.4		55.0	53.8	1.6
LOS		D	B	A		F	A	A	D	C		D	D	A
Approach Delay			16.5				14.0			33.3				36.4
Approach LOS			B				B			C				D
Queue Length 50th (ft)		15	115	0		106	74	0	58	20		43	14	0
Queue Length 95th (ft)		m31	m151	m32		170	93	5	99	98		72	39	0
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		281	2482	1156		248	2978	1175	582	325		427	149	319
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.15	0.28	0.08		0.58	0.39	0.10	0.30	0.65		0.26	0.13	0.22

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	60 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	19.0
Intersection Capacity Utilization:	62.2%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	B

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Existing AM (2021)
02/02/2022

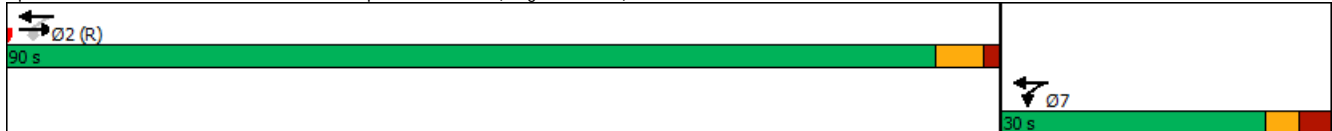


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	914	112	231	1101	0	0	0	0	0	0	273
Future Volume (vph)	0	914	112	231	1101	0	0	0	0	0	0	273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	4823	1373	1695	3423	0	0	0	0	0	0	1564
Flt Permitted				0.285								
Satd. Flow (perm)	0	4823	1345	509	3423	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			118									240
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		963			225			613			525	
Travel Time (s)		14.6			3.4			11.9			10.2	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	7%	17%	7%	6%	2%	2%	2%	6%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	962	118	243	1159	0	0	0	0	0	0	287
Turn Type		NA	Perm	D,P+P	NA							Free
Protected Phases		2		7	2							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		90.0	90.0	30.0								
Total Split (%)		75.0%	75.0%	25.0%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		98.9	98.9	110.0	120.0							120.0
Actuated g/C Ratio		0.82	0.82	0.92	1.00							1.00
v/c Ratio		0.24	0.10	0.42	0.34							0.18
Control Delay		1.0	0.3	8.1	1.2							0.3
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		1.0	0.3	8.1	1.2							0.3
LOS		A	A	A	A							A
Approach Delay		0.9			2.4						0.3	
Approach LOS		A			A						A	
Queue Length 50th (ft)		15	1	24	27							0
Queue Length 95th (ft)		34	m2	91	31							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3976	1129	734	3423							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.24	0.10	0.33	0.34							0.18

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 57 (48%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.42
 Intersection Signal Delay: 1.6 Intersection LOS: A
 Intersection Capacity Utilization 47.7% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Existing AM (2021)
02/02/2022



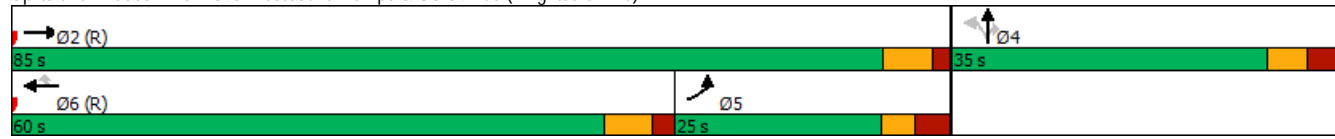
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑			↑↑↑	↔		↔	↔↔			
Traffic Volume (vph)	336	912	0	0	1259	633	60	4	363	0	0	0
Future Volume (vph)	336	912	0	0	1259	633	60	4	363	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3320	4872	0	0	4823	1530	0	1761	2630	0	0	0
Flt Permitted	0.950							0.955				
Satd. Flow (perm)	3318	4872	0	0	4823	1511	0	1761	2630	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						671			284			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	6%	7%	2%	2%	7%	5%	2%	2%	7%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	357	970	0	0	1339	673	0	68	386	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	25.0	85.0			60.0	60.0	35.0	35.0	35.0			
Total Split (%)	20.8%	70.8%			50.0%	50.0%	29.2%	29.2%	29.2%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4	-1.4	-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag					Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	20.0	98.6			73.6	73.6		11.4	11.4			
Actuated g/C Ratio	0.17	0.82			0.61	0.61		0.10	0.10			
v/c Ratio	0.65	0.24			0.45	0.57		0.41	0.76			
Control Delay	44.5	2.2			13.4	3.0		57.2	24.7			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	44.5	2.2			13.4	3.0		57.2	24.7			
LOS	D	A			B	A		E	C			
Approach Delay		13.6				9.9			29.5			
Approach LOS		B				A			C			
Queue Length 50th (ft)	137	35			184	1		51	43			
Queue Length 95th (ft)	164	60			256	52		93	97			
Internal Link Dist (ft)		768				734		653			493	
Turn Bay Length (ft)	500											
Base Capacity (vph)	553	4002			2957	1186		440	870			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.65	0.24			0.45	0.57		0.15	0.44			

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.76
Intersection Signal Delay:	13.6
Intersection LOS:	B
Intersection Capacity Utilization:	67.2%
ICU Level of Service:	C

Analysis Period (min) 15

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			R
Traffic Volume (vph)	4	4	176	4	5	391
Future Volume (vph)	4	4	176	4	5	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1145	0	1822	0	0	3465
Flt Permitted	0.976					0.999
Satd. Flow (perm)	1145	0	1822	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	100%	2%	2%	100%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	197	0	0	435
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	24.3%
Analysis Period (min)	15
	ICU Level of Service A



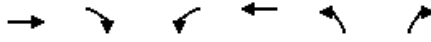
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	R	W	W
Traffic Volume (veh/h)	4	4	176	4	5	391
Future Volume (Veh/h)	4	4	176	4	5	391
Sign Control	Stop		Free			Free
Grade	0%		0%			4%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	4	4	193	4	5	430
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)			106			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	420	195			197	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	383	150			153	
tC, single (s)	8.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	4.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	380	840			1379	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	8	197	148	287		
Volume Left	4	0	5	0		
Volume Right	4	4	0	0		
cSH	524	1700	1379	1700		
Volume to Capacity	0.02	0.12	0.00	0.17		
Queue Length 95th (ft)	1	0	0	0		
Control Delay (s)	12.0	0.0	0.3	0.0		
Lane LOS	B		A			
Approach Delay (s)	12.0	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			24.3%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	4	176	4	5	391
Future Vol, veh/h	4	4	176	4	5	391
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	100	2	2	100	2	2
Mvmt Flow	4	4	193	4	5	430

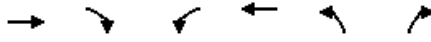
Major/Minor	Minor1	Major1	Major2	Major2	Major2
Conflicting Flow All	420	195	0	0	197
Stage 1	195	-	-	-	-
Stage 2	225	-	-	-	-
Critical Hdwy	8.1	6.23	-	-	4.13
Critical Hdwy Stg 1	6.9	-	-	-	-
Critical Hdwy Stg 2	7.3	-	-	-	-
Follow-up Hdwy	4.45	3.319	-	-	2.219
Pot Cap-1 Maneuver	403	846	-	-	1374
Stage 1	626	-	-	-	-
Stage 2	587	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	401	846	-	-	1374
Mov Cap-2 Maneuver	401	-	-	-	-
Stage 1	626	-	-	-	-
Stage 2	584	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	544	1374	-
HCM Lane V/C Ratio	-	-	0.016	0.004	-
HCM Control Delay (s)	-	-	11.7	7.6	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	4	9	4	4	4	4
Future Volume (vph)	4	9	4	4	4	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1684	0	0	1578	1694	0
Flt. Permitted				0.976	0.976	
Satd. Flow (perm)	1684	0	0	1578	1694	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	316			305	118	
Travel Time (s)	7.2			6.9	2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	33%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	0	0	8	8	0
Sign Control	Stop			Stop	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.8%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↘	↔	↘	↔	↘
Traffic Volume (veh/h)	4	9	4	4	4	4
Future Volume (Veh/h)	4	9	4	4	4	4
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	4	10	4	4	4	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	12	0	22	10	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12	0	22	10	0	
tC, single (s)	6.5	6.2	7.4	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.8	4.0	2.2	
p0 queue free %	100	99	100	100	100	
cM capacity (veh/h)	880	1085	903	883	1623	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	14	8	8			
Volume Left	0	4	4			
Volume Right	10	0	4			
cSH	1017	893	1623			
Volume to Capacity	0.01	0.01	0.00			
Queue Length 95th (ft)	1	1	0			
Control Delay (s)	8.6	9.1	3.6			
Lane LOS	A	A	A			
Approach Delay (s)	8.6	9.1	3.6			
Approach LOS	A	A				
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			13.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	166	118	100	28	223	231	94	47	66	62	55
Average Queue (ft)	67	33	22	4	79	86	11	10	20	25	25
95th Queue (ft)	137	86	67	19	169	175	50	35	49	45	45
Link Distance (ft)		1060	1060		1708	1708		169	2	2	2
Upstream Blk Time (%)									43	84	91
Queuing Penalty (veh)									56	110	119
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)					1	11	0				
Queuing Penalty (veh)					0	6	0				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	WB	NB	SB
Directions Served	UL	L	LTR	LTR
Maximum Queue (ft)	15	35	93	46
Average Queue (ft)	1	5	32	16
95th Queue (ft)	9	22	71	40
Link Distance (ft)			336	19
Upstream Blk Time (%)				21
Queuing Penalty (veh)				3
Storage Bay Dist (ft)	225	200		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	51	70	132	178	217	78	228	201	243	125	58	292
Average Queue (ft)	10	26	61	83	105	22	117	85	88	31	15	126
95th Queue (ft)	36	62	122	153	180	59	201	162	186	95	43	291
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)				0	0							0
Queuing Penalty (veh)				0	0							1

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	436	75	103	123	82	67
Average Queue (ft)	219	72	43	54	22	31
95th Queue (ft)	382	85	85	103	60	58
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	42	37				
Queuing Penalty (veh)	121	61				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	L	T	T
Maximum Queue (ft)	35	26	31	190	21	10
Average Queue (ft)	2	2	2	88	1	0
95th Queue (ft)	20	13	16	161	13	5
Link Distance (ft)	890	890	890	136	136	136
Upstream Blk Time (%)				3		
Queuing Penalty (veh)				13		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	209	187	126	113	123	248	295	257	324	113	192	158
Average Queue (ft)	107	103	41	29	48	131	168	100	151	54	94	41
95th Queue (ft)	183	168	98	79	101	223	258	203	276	103	160	102
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)									0			
Queuing Penalty (veh)									0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	136	54	515	200
Average Queue (ft)	43	16	483	197
95th Queue (ft)	144	55	500	209
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		2	94	
Queuing Penalty (veh)		4	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			95	96
Queuing Penalty (veh)			185	192

Intersection: 7: Farmwell Road

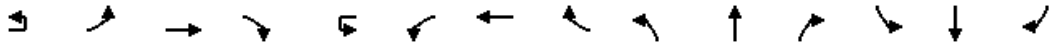
Movement	EB	WB
Directions Served	TR	LT
Maximum Queue (ft)	40	49
Average Queue (ft)	12	8
95th Queue (ft)	37	33
Link Distance (ft)	282	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 872

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Existing PM (2021)
02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔			↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	22	328	1490	4	5	4	1114	101	4	4	4	87	4	132
Future Volume (vph)	22	328	1490	4	5	4	1114	101	4	4	4	87	4	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%			1%			4%	
Storage Length (ft)		375		0		150		75	0		0	0		0
Storage Lanes		1		0		1		1	0		0	0		2
Taper Length (ft)		100				100			25			25		
Satd. Flow (prot)	0	1743	3486	0	0	1778	3557	1591	0	1506	0	0	1742	2731
Flt Permitted		0.146				0.117				0.851			0.394	
Satd. Flow (perm)	0	268	3486	0	0	219	3557	1591	0	1302	0	0	719	2731
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)								122		4				176
Link Speed (mph)			45				45			25			45	
Link Distance (ft)			1108				1778			230			106	
Travel Time (s)			16.8				26.9			6.3			1.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	50%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	372	1589	0	0	9	1185	107	0	12	0	0	97	140
Turn Type	D.P+P	D.P+P	NA		D.P+P	D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	1	6			3			4	4
Permitted Phases	6	6			2	2		6	3			4		
Detector Phase	5	5	2		1	1	6	6	3	3		4	4	4
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0		7.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	85.0		15.0	15.0	80.0	80.0	25.0	25.0		15.0	15.0	15.0
Total Split (%)	14.3%	14.3%	60.7%		10.7%	10.7%	57.1%	57.1%	17.9%	17.9%		10.7%	10.7%	10.7%
Yellow Time (s)	3.0	3.0	4.6		3.0	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6			-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0			5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		109.6	111.6			113.6	79.2	79.2		8.2			10.0	10.0
Actuated g/C Ratio		0.78	0.80			0.81	0.57	0.57		0.06			0.07	0.07
v/c Ratio		0.70	0.57			0.03	0.59	0.11		0.15			1.90	0.39
Control Delay		28.5	8.1			0.5	12.1	2.2		53.5			502.9	6.8
Queue Delay		0.0	0.0			0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		28.5	8.1			0.5	12.1	2.2		53.5			502.9	6.8
LOS		C	A			A	B	A		D			F	A
Approach Delay			11.9				11.2			53.5			209.8	
Approach LOS			B				B			D			F	
Queue Length 50th (ft)		141	150			0	236	2		7			-135	0
Queue Length 95th (ft)		#323	536			m1	396	13		29			#256	19
Internal Link Dist (ft)			1028				1698			150			26	
Turn Bay Length (ft)		375				150		75						
Base Capacity (vph)		530	2780			289	2011	952		189			51	358
Starvation Cap Reductn		0	0			0	0	0		0			0	0
Spillback Cap Reductn		0	0			0	0	0		0			0	0
Storage Cap Reductn		0	0			0	0	0		0			0	0
Reduced v/c Ratio		0.70	0.57			0.03	0.59	0.11		0.06			1.90	0.39

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	23 (16%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.90
Intersection Signal Delay:	25.1
Intersection Capacity Utilization:	78.5%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	D

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
 2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Existing PM (2021)
 02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	5	5	1598	31	33	1187	13	7	4	5	9	4	10
Future Volume (vph)	5	5	1598	31	33	1187	13	7	4	5	9	4	10
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		225		225	200		150			0	0		0
Storage Lanes		1		1	1		1			0	0		0
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1770	3539	1583	1770	3539	1583	0	1747	0	0	1524	0
Flt Permitted		0.950			0.950				0.979			0.982	
Satd. Flow (perm)	0	1770	3539	1583	1770	3539	1583	0	1747	0	0	1524	0
Link Speed (mph)			45			45			25			30	
Link Distance (ft)			1778			1589			405			118	
Travel Time (s)			26.9			24.1			11.0			2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	30%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	10	1682	33	35	1249	14	0	16	0	0	24	0
Sign Control			Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	54.2%
ICU Level of Service	A
Analysis Period (min)	15

Knightsdale Gateway
 2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Existing PM (2021)
 02/02/2022

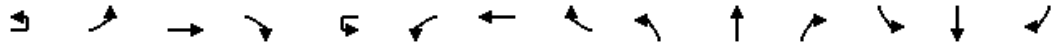


Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↗	↘	↕	↕		↕			↕	
Traffic Volume (veh/h)	5	5	1598	31	33	1187	13	7	4	5	9	4	10
Future Volume (Veh/h)	5	5	1598	31	33	1187	13	7	4	5	9	4	10
Sign Control			Free			Free			Stop			Stop	
Grade			0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	5	1682	33	35	1249	14	7	4	5	9	4	11
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type			Raised			Raised							
Median storage veh			1			1							
Upstream signal (ft)													
pX, platoon unblocked	0.00												
vC, conflicting volume	0	1263			1715			2400	3025	841	2177	3044	624
vC1, stage 1 conf vol								1692	1692		1319	1319	
vC2, stage 2 conf vol								708	1333		858	1725	
vCu, unblocked vol	0	1263			1715			2400	3025	841	2177	3044	624
tC, single (s)	0.0	4.1			4.1			7.5	6.5	6.9	7.5	6.5	7.5
tC, 2 stage (s)								6.5	5.5		6.5	5.5	
tF (s)	0.0	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.6
p0 queue free %	0	99			90			90	95	98	91	94	97
cM capacity (veh/h)	0	546			366			72	81	308	97	68	366
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	5	841	841	33	35	624	624	14	16	24			
Volume Left	5	0	0	0	35	0	0	0	7	9			
Volume Right	0	0	0	33	0	0	0	14	5	11			
cSH	546	1700	1700	1700	366	1700	1700	1700	99	132			
Volume to Capacity	0.01	0.49	0.49	0.02	0.10	0.37	0.37	0.01	0.16	0.18			
Queue Length 95th (ft)	1	0	0	0	8	0	0	0	14	16			
Control Delay (s)	11.7	0.0	0.0	0.0	15.9	0.0	0.0	0.0	48.4	38.2			
Lane LOS	B				C				E	E			
Approach Delay (s)	0.0				0.4				48.4	38.2			
Approach LOS									E	E			
Intersection Summary													
Average Delay			0.8										
Intersection Capacity Utilization			54.2%		ICU Level of Service				A				
Analysis Period (min)			15										

Intersection													
Int Delay, s/veh	7.2												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↑↑	↗	↘	↑↑	↗		↔				↔
Traffic Vol, veh/h	5	5	1598	31	33	1187	13	7	4	5	9	4	10
Future Vol, veh/h	5	5	1598	31	33	1187	13	7	4	5	9	4	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	225	-	225	200	-	150	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	30
Mvmt Flow	5	5	1682	33	35	1249	14	7	4	5	9	4	11
Major/Minor	Major1			Major2			Minor1			Minor2			
Conflicting Flow All	1249	1263	0	0	1715	0	0	2399	3035	841	2182	3054	625
Stage 1	-	-	-	-	-	-	-	1702	1702	-	1319	1319	-
Stage 2	-	-	-	-	-	-	-	697	1333	-	863	1735	-
Critical Hdwy	6.44	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	7.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.52	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.6
Pot Cap-1 Maneuver	229	546	-	-	366	-	-	17	13	308	26	12	366
Stage 1	-	-	-	-	-	-	-	95	146	-	166	225	-
Stage 2	-	-	-	-	-	-	-	398	221	-	316	140	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	317	317	-	-	366	-	-	10	11	308	16	10	366
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	10	11	-	16	10	-
Stage 1	-	-	-	-	-	-	-	92	141	-	160	203	-
Stage 2	-	-	-	-	-	-	-	342	200	-	291	135	-
Approach	EB			WB			NB			SB			
HCM Control Delay, s	0.1			0.4			\$ 622			\$ 445.9			
HCM LOS							F			F			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1					
Capacity (veh/h)	15	317	-	-	366	-	-	23					
HCM Lane V/C Ratio	1.123	0.033	-	-	0.095	-	-	1.053					
HCM Control Delay (s)	\$ 622	16.8	-	-	15.9	-	-	\$ 445.9					
HCM Lane LOS	F	C	-	-	C	-	-	F					
HCM 95th %tile Q(veh)	2.6	0.1	-	-	0.3	-	-	3.1					
Notes													
-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon													

Knightsdale Gateway
3: Hodge Road & US 64 Bus (Knightsdale Blvd)

Existing PM (2021)
02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↑↑↑	↗		↔	↑↑↑	↗	↔↔	↔		↔↔	↑	↗
Traffic Volume (vph)	7	70	1372	232	28	327	1084	229	109	30	185	122	94	63
Future Volume (vph)	7	70	1372	232	28	327	1084	229	109	30	185	122	94	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3344	5009	1560	0	1796	5111	1607	3467	1639	0	3416	1853	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3341	5009	1560	0	1796	5111	1587	3467	1639	0	3416	1853	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				134				246		187				182
Link Speed (mph)			45				45			35			25	
Link Distance (ft)			746				963			562			518	
Travel Time (s)			11.3				14.6			10.9			14.1	
Confl. Peds. (#/hr)		1						1						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	14%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	83	1475	249	0	382	1166	246	117	231	0	131	101	68
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	65.0	25.0	35.0	35.0	80.0	15.0	25.0	25.0		15.0	15.0	20.0
Total Split (%)	14.3%	14.3%	46.4%	17.9%	25.0%	25.0%	57.1%	10.7%	17.9%	17.9%		10.7%	10.7%	14.3%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		10.1	64.9	76.2		30.0	84.7	94.5	11.3	15.4		9.8	13.8	28.9
Actuated g/C Ratio		0.07	0.46	0.54		0.21	0.60	0.68	0.08	0.11		0.07	0.10	0.21
v/c Ratio		0.34	0.64	0.27		0.99	0.38	0.21	0.42	0.67		0.55	0.55	0.14
Control Delay		67.0	25.4	3.9		85.1	6.8	0.4	65.4	23.3		72.0	71.4	0.7
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		67.0	25.4	3.9		85.1	6.8	0.4	65.4	23.3		72.0	71.4	0.7
LOS		E	C	A		F	A	A	E	C		E	E	A
Approach Delay			24.3				22.6			37.5				55.6
Approach LOS			C				C			D				E
Queue Length 50th (ft)		38	382	42		352	83	0	53	37		60	89	0
Queue Length 95th (ft)		m58	m336	m22		#569	104	1	84	124		95	150	0
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		358	2320	998		384	3093	1154	495	394		244	183	518
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.23	0.64	0.25		0.99	0.38	0.21	0.24	0.59		0.54	0.55	0.13

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	84 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.99
Intersection Signal Delay:	26.9
Intersection LOS:	C
Intersection Capacity Utilization:	81.7%
ICU Level of Service:	D

Knightsdale Gateway
3: Hodge Road & US 64 Bus (Knightsdale Blvd)

Existing PM (2021)
02/02/2022

Analysis Period (min) 15

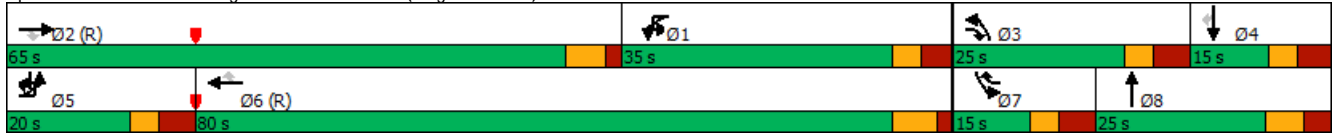
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightsdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Existing PM (2021)
02/02/2022

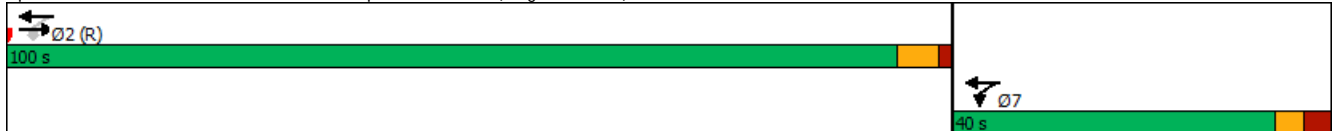


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1597	53	207	1139	0	0	0	0	0	0	553
Future Volume (vph)	0	1597	53	207	1139	0	0	0	0	0	0	553
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	5060	1575	1778	3557	0	0	0	0	0	0	1564
Flt Permitted				0.113								
Satd. Flow (perm)	0	5060	1575	212	3557	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			58									212
Link Speed (mph)		45			45			35				35
Link Distance (ft)		963			225			613				525
Travel Time (s)		14.6			3.4			11.9				10.2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1755	58	227	1252	0	0	0	0	0	0	608
Turn Type		NA	Perm	D.P+P	NA							Free
Protected Phases		2		7	2 7							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2 7							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		100.0	100.0	40.0								
Total Split (%)		71.4%	71.4%	28.6%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		113.7	113.7	130.0	140.0							140.0
Actuated g/C Ratio		0.81	0.81	0.93	1.00							1.00
v/c Ratio		0.43	0.04	0.60	0.35							0.39
Control Delay		1.8	0.4	41.4	2.2							0.7
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		1.8	0.4	41.4	2.2							0.7
LOS		A	A	D	A							A
Approach Delay		1.7			8.2						0.7	
Approach LOS		A			A						A	
Queue Length 50th (ft)		56	0	96	67							0
Queue Length 95th (ft)		m80	m1	187	67							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		4110	1290	595	3557							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.43	0.04	0.38	0.35							0.39

Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 72 (51%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 4.0 Intersection LOS: A
 Intersection Capacity Utilization 93.0% ICU Level of Service F
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Existing PM (2021)
02/02/2022

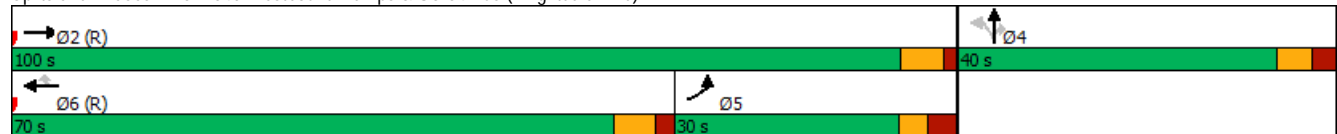


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕		↕	↕↕			
Traffic Volume (vph)	292	2170	0	0	1272	526	75	4	515	0	0	0
Future Volume (vph)	292	2170	0	0	1272	526	75	4	515	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3384	5111	0	0	5060	1575	0	1745	2759	0	0	0
Flt Permitted	0.950							0.955				
Satd. Flow (perm)	3384	5111	0	0	5060	1575	0	1745	2759	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						537			76			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	298	2214	0	0	1298	537	0	81	526	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4		-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	25.0	101.8			71.8	71.8		28.2	28.2			
Actuated g/C Ratio	0.18	0.73			0.51	0.51		0.20	0.20			
v/c Ratio	0.49	0.60			0.50	0.50		0.23	0.86			
Control Delay	44.9	3.6			23.8	3.5		46.9	59.6			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	44.9	3.6			23.8	3.5		46.9	59.6			
LOS	D	A			C	A		D	E			
Approach Delay		8.5			17.9			57.9				
Approach LOS		A			B			E				
Queue Length 50th (ft)	134	92			277	0		62	229			
Queue Length 95th (ft)	185	112			353	62		105	288			
Internal Link Dist (ft)		768			734			653		493		
Turn Bay Length (ft)	500											
Base Capacity (vph)	604	3717			2595	1069		436	746			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.49	0.60			0.50	0.50		0.19	0.71			

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	68 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.86
Intersection Signal Delay:	18.0
Intersection Capacity Utilization:	68.3%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	C

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			R
Traffic Volume (vph)	4	6	429	4	4	219
Future Volume (vph)	4	6	429	4	4	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1678	0	1861	0	0	3465
Flt Permitted	0.980					0.999
Satd. Flow (perm)	1678	0	1861	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Lane Group Flow (vph)	10	0	460	0	0	237
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	32.8%
Analysis Period (min)	15
	ICU Level of Service A



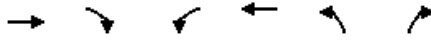
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	R	R	T
Traffic Volume (veh/h)	4	6	429	4	4	219
Future Volume (Veh/h)	4	6	429	4	4	219
Sign Control	Stop		Free		Free	
Grade	0%		0%		4%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	4	6	456	4	4	233
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	106					
pX, platoon unblocked	0.88	0.88			0.88	
vC, conflicting volume	582	458			460	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	453	311			313	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			100	
cM capacity (veh/h)	467	600			1090	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	10	460	82	155		
Volume Left	4	0	4	0		
Volume Right	6	4	0	0		
cSH	539	1700	1090	1700		
Volume to Capacity	0.02	0.27	0.00	0.09		
Queue Length 95th (ft)	1	0	0	0		
Control Delay (s)	11.8	0.0	0.4	0.0		
Lane LOS	B		A			
Approach Delay (s)	11.8	0.0	0.2			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			32.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	6	429	4	4	219
Future Vol, veh/h	4	6	429	4	4	219
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	6	456	4	4	233

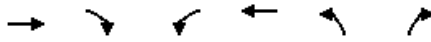
Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	583	458	0	0	460
Stage 1	458	-	-	-	-
Stage 2	125	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13
Critical Hdwy Stg 1	5.43	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219
Pot Cap-1 Maneuver	459	602	-	-	1099
Stage 1	636	-	-	-	-
Stage 2	888	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	457	602	-	-	1099
Mov Cap-2 Maneuver	457	-	-	-	-
Stage 1	636	-	-	-	-
Stage 2	884	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	534	1099	-
HCM Lane V/C Ratio	-	-	0.02	0.004	-
HCM Control Delay (s)	-	-	11.9	8.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	4	8	11	5	7	11
Future Volume (vph)	4	8	11	5	7	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1284	0	0	1534	1674	0
Flt Permitted				0.966	0.982	
Satd. Flow (perm)	1284	0	0	1534	1674	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	316			305	118	
Travel Time (s)	7.2			6.9	2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	100%	2%	27%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	0	0	17	19	0
Sign Control	Stop			Stop	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.5%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	4	8	11	5	7	11
Future Volume (Veh/h)	4	8	11	5	7	11
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	8	12	5	7	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	26	0	30	20	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	26	0	30	20	0	
tC, single (s)	7.5	6.2	7.4	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.9	3.3	3.7	4.0	2.2	
p0 queue free %	99	99	99	99	100	
cM capacity (veh/h)	705	1085	905	870	1623	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	12	17	19			
Volume Left	0	12	7			
Volume Right	8	0	12			
cSH	920	894	1623			
Volume to Capacity	0.01	0.02	0.00			
Queue Length 95th (ft)	1	1	0			
Control Delay (s)	9.0	9.1	2.7			
Lane LOS	A	A	A			
Approach Delay (s)	9.0	9.1	2.7			
Approach LOS	A	A				
Intersection Summary						
Average Delay			6.5			
Intersection Capacity Utilization			17.5%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	369	269	256	40	230	235	167	69	54	47	52
Average Queue (ft)	182	80	76	8	81	91	23	14	26	18	21
95th Queue (ft)	321	194	183	29	183	195	86	48	47	40	44
Link Distance (ft)		1060	1060		1708	1708		169	2	2	2
Upstream Blk Time (%)									77	65	80
Queuing Penalty (veh)									57	48	59
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)	1	0			1	11	0				
Queuing Penalty (veh)	6	0			0	11	2				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	WB	WB	B12	B12	NB	SB
Directions Served	UL	R	L	R	T	T	LTR	LTR
Maximum Queue (ft)	24	8	60	1	102	70	84	50
Average Queue (ft)	4	0	15	0	4	2	25	18
95th Queue (ft)	17	6	42	1	74	70	72	42
Link Distance (ft)					659	659	336	19
Upstream Blk Time (%)						0		35
Queuing Penalty (veh)						0		7
Storage Bay Dist (ft)	225	225	200	150				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	89	100	290	336	344	298	675	916	937	911	100	294
Average Queue (ft)	29	48	162	205	216	77	559	552	559	420	31	123
95th Queue (ft)	68	87	245	295	303	183	831	1210	1214	1153	74	298
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)								26	26	18		
Queuing Penalty (veh)								143	146	100		
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)			2	7	11	0	49	1		0		0
Queuing Penalty (veh)			9	40	26	0	177	2		0		1

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	462	75	113	152	187	65
Average Queue (ft)	236	72	41	72	91	28
95th Queue (ft)	446	87	87	129	169	56
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	4					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	31	51				
Queuing Penalty (veh)	82	55				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	SB
Directions Served	T	T	T	L	T	T	R
Maximum Queue (ft)	104	198	145	233	218	200	388
Average Queue (ft)	4	5	8	145	96	94	160
95th Queue (ft)	92	91	40	234	281	276	533
Link Distance (ft)	890	890	890	136	136	136	481
Upstream Blk Time (%)	0	0		15	28	28	21
Queuing Penalty (veh)	0	0		69	121	125	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	181	189	240	582	391	411	458	364	240	159	319	281
Average Queue (ft)	106	111	67	99	119	207	263	183	109	60	205	167
95th Queue (ft)	165	170	172	293	270	389	441	345	195	120	285	260
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)			0	0	0		0	0				
Queuing Penalty (veh)			0	1	0		0	0				
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	54	62	431	200
Average Queue (ft)	14	26	271	163
95th Queue (ft)	48	70	439	246
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		1	5	
Queuing Penalty (veh)		6	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			87	32
Queuing Penalty (veh)			95	36

Intersection: 7: Farmwell Road

Movement	EB	WB
Directions Served	TR	LT
Maximum Queue (ft)	82	75
Average Queue (ft)	17	19
95th Queue (ft)	58	57
Link Distance (ft)	282	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 1425

Appendix G:
Synchro & SimTraffic Output:
Background (2025)

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Background AM (2025)
02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕		↔	↕	↕		↕			↕	↕
Traffic Volume (vph)	6	141	779	6	7	1517	63	4	4	4	100	4	343
Future Volume (vph)	6	141	779	6	7	1517	63	4	4	4	100	4	343
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%			1%			4%
Storage Length (ft)		375		0	150		75	0		0	0		0
Storage Lanes		1		0	1		1	0		0	0		2
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1743	3226	0	1778	3455	1591	0	1742	0	0	1725	2731
Flt Permitted		0.062			0.300				0.844			0.393	
Satd. Flow (perm)	0	114	3226	0	561	3455	1591	0	1494	0	0	711	2731
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			1				145		4				377
Link Speed (mph)			45			45			25			45	
Link Distance (ft)			1108			1778			230			106	
Travel Time (s)			16.8			26.9			6.3			1.6	
Confl. Peds. (#/hr)				1	1								
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	10%	20%	2%	5%	2%	2%	2%	2%	3%	2%	2%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	162	863	0	8	1667	69	0	12	0	0	114	377
Turn Type	D.P+P	D.P+P	NA		D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	6			3			4	4
Permitted Phases	6	6			2		6	3			4		
Detector Phase	5	5	2		1	6	6	3	3		4	4	4
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0		7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	70.0		15.0	70.0	70.0	20.0	20.0		15.0	15.0	15.0
Total Split (%)	12.5%	12.5%	58.3%		12.5%	58.3%	58.3%	16.7%	16.7%		12.5%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.6		3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6		-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		89.8	92.2		93.8	79.8	79.8		8.1			10.0	10.0
Actuated g/C Ratio		0.75	0.77		0.78	0.66	0.66		0.07			0.08	0.08
v/c Ratio		0.73	0.35		0.02	0.73	0.06		0.12			1.93	0.66
Control Delay		51.4	6.2		2.7	7.9	0.2		44.9			505.0	11.2
Queue Delay		0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		51.4	6.2		2.7	7.9	0.2		44.9			505.0	11.2
LOS		D	A		A	A	A		D			F	B
Approach Delay			13.4			7.6			44.9			125.9	
Approach LOS			B			A			D			F	
Queue Length 50th (ft)		55	60		1	139	0		6			-136	0
Queue Length 95th (ft)		#173	215		m2	380	1		26			#257	51
Internal Link Dist (ft)			1028			1698			150			26	
Turn Bay Length (ft)		375			150		75						
Base Capacity (vph)		221	2478		541	2296	1106		190			59	573
Starvation Cap Reductn		0	0		0	0	0		0			0	0
Spillback Cap Reductn		0	0		0	0	0		0			0	0
Storage Cap Reductn		0	0		0	0	0		0			0	0
Reduced v/c Ratio		0.73	0.35		0.01	0.73	0.06		0.06			1.93	0.66

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	110 (92%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.93
Intersection Signal Delay:	27.3
Intersection LOS:	C
Intersection Capacity Utilization:	84.6%
ICU Level of Service:	E

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
 2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Background AM (2025)
 02/02/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	889	9	17	1567	4	27	4	33	11	4	4
Future Volume (vph)	4	889	9	17	1567	4	27	4	33	11	4	4
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		225	200		150	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			25			25		
Satd. Flow (prot)	1770	3312	1583	1671	3438	1583	0	1665	0	0	1681	0
Flt Permitted	0.950			0.950				0.979			0.971	
Satd. Flow (perm)	1770	3312	1583	1671	3438	1583	0	1665	0	0	1681	0
Link Speed (mph)		45			45			25			30	
Link Distance (ft)		1778			1589			405			118	
Travel Time (s)		26.9			24.1			11.0			2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	9%	2%	8%	5%	2%	4%	2%	4%	10%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	999	10	19	1761	4	0	71	0	0	20	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	54.1%
ICU Level of Service	A
Analysis Period (min)	15

Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Background AM (2025)
02/02/2022

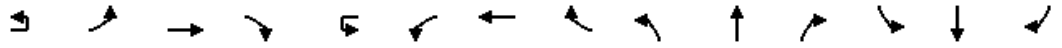


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↗	↖	↑↑	↗		↕			↕	
Traffic Volume (veh/h)	4	889	9	17	1567	4	27	4	33	11	4	4
Future Volume (Veh/h)	4	889	9	17	1567	4	27	4	33	11	4	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	4	999	10	19	1761	4	30	4	37	12	4	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh		1			1							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1765			1009			1932	2810	500	2346	2816	880
vC1, stage 1 conf vol							1007	1007		1799	1799	
vC2, stage 2 conf vol							924	1803		546	1017	
vCu, unblocked vol	1765			1009			1932	2810	500	2346	2816	880
tC, single (s)	4.1			4.3			7.6	6.5	7.0	7.7	6.5	6.9
tC, 2 stage (s)							6.6	5.5		6.7	5.5	
tF (s)	2.2			2.3			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			97			77	95	93	80	95	99
cM capacity (veh/h)	350			647			133	86	511	60	87	290
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	4	500	500	10	19	880	880	4	71	20		
Volume Left	4	0	0	0	19	0	0	0	30	12		
Volume Right	0	0	0	10	0	0	0	4	37	4		
cSH	350	1700	1700	1700	647	1700	1700	1700	206	77		
Volume to Capacity	0.01	0.29	0.29	0.01	0.03	0.52	0.52	0.00	0.34	0.26		
Queue Length 95th (ft)	1	0	0	0	2	0	0	0	36	23		
Control Delay (s)	15.4	0.0	0.0	0.0	10.7	0.0	0.0	0.0	31.3	67.3		
Lane LOS	C				B				D	F		
Approach Delay (s)	0.1				0.1				31.3	67.3		
Approach LOS									D	F		
Intersection Summary												
Average Delay					1.3							
Intersection Capacity Utilization			54.1%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection												
Int Delay, s/veh	14											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↗	↖	↑↑	↗		↔			↔	
Traffic Vol, veh/h	4	889	9	17	1567	4	27	4	33	11	4	4
Future Vol, veh/h	4	889	9	17	1567	4	27	4	33	11	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	225	-	225	200	-	150	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	9	2	8	5	2	4	2	4	10	2	2
Mvmt Flow	4	999	10	19	1761	4	30	4	37	12	4	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1765	0	0	1009	0	0	1928	2810	500	2309	2816	881
Stage 1	-	-	-	-	-	-	1007	1007	-	1799	1799	-
Stage 2	-	-	-	-	-	-	921	1803	-	510	1017	-
Critical Hdwy	4.14	-	-	4.26	-	-	7.58	6.54	6.98	7.7	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.58	5.54	-	6.7	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.58	5.54	-	6.7	5.54	-
Follow-up Hdwy	2.22	-	-	2.28	-	-	3.54	4.02	3.34	3.6	4.02	3.32
Pot Cap-1 Maneuver	350	-	-	647	-	-	39	18	511	18	18	290
Stage 1	-	-	-	-	-	-	254	317	-	76	130	-
Stage 2	-	-	-	-	-	-	287	130	-	494	313	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	350	-	-	647	-	-	~ 30	17	511	13	17	290
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 30	17	-	13	17	-
Stage 1	-	-	-	-	-	-	251	314	-	75	126	-
Stage 2	-	-	-	-	-	-	264	126	-	446	310	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			\$ 372.1			\$ 625		
HCM LOS							F			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	53	350	-	-	647	-	-	17				
HCM Lane V/C Ratio	1.357	0.013	-	-	0.03	-	-	1.256				
HCM Control Delay (s)	\$ 372.1	15.4	-	-	10.7	-	-	\$ 625				
HCM Lane LOS	F	C	-	-	B	-	-	F				
HCM 95th %tile Q(veh)	6.5	0	-	-	0.1	-	-	3.1				
Notes												
-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

Knightdale Gateway
3: Hodge Road & US 64 Bus (Knightdale Blvd)

Background AM (2025)
02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↑↑↑	↗		↔↔	↑↑↑	↗	↔↔	↔		↔↔	↑	↗
Traffic Volume (vph)	7	80	748	97	24	131	1252	217	186	36	200	269	31	143
Future Volume (vph)	7	80	748	97	24	131	1252	217	186	36	200	269	31	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3382	4645	1515	0	1732	4967	1561	3401	1642	0	3416	1783	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3382	4645	1515	0	1732	4967	1561	3401	1642	0	3416	1783	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				101				226		181				154
Link Speed (mph)			45				45			35				25
Link Distance (ft)			746				963			562				518
Travel Time (s)			11.3				14.6			10.9				14.1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	10%	5%	10%	5%	6%	5%	4%	2%	2%	2%	6%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	90	779	101	0	161	1304	226	194	246	0	280	32	149
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	62.0	21.0	22.0	22.0	69.0	20.0	21.0	16.0		20.0	15.0	15.0
Total Split (%)	12.5%	12.5%	51.7%	17.5%	18.3%	18.3%	57.5%	16.7%	17.5%	13.3%		16.7%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		10.0	60.2	84.9		15.3	65.5	79.8	19.7	10.2		14.3	10.3	16.8
Actuated g/C Ratio		0.08	0.50	0.71		0.13	0.55	0.66	0.16	0.08		0.12	0.09	0.14
v/c Ratio		0.32	0.33	0.09		0.73	0.48	0.20	0.35	0.81		0.69	0.21	0.42
Control Delay		54.4	18.5	3.6		88.8	9.3	0.7	48.1	36.4		60.1	54.3	7.7
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		54.4	18.5	3.6		88.8	9.3	0.7	48.1	36.4		60.1	54.3	7.7
LOS		D	B	A		F	A	A	D	D		E	D	A
Approach Delay			20.3				15.7			41.5				42.7
Approach LOS			C				B			D				D
Queue Length 50th (ft)		35	148	2		120	95	0	74	48		108	23	0
Queue Length 95th (ft)		m57	m170	m29		#208	117	13	109	#171		155	57	39
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		281	2328	1110		245	2710	1121	581	314		427	160	352
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.32	0.33	0.09		0.66	0.48	0.20	0.33	0.78		0.66	0.20	0.42

Intersection Summary	
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	60 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	23.7
Intersection Capacity Utilization:	68.6%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	C

- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Background AM (2025)
02/02/2022

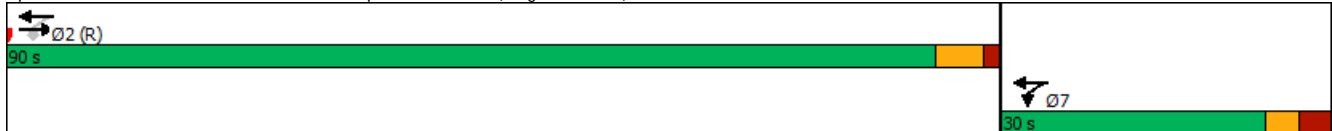


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1153	149	260	1295	0	0	0	0	0	0	342
Future Volume (vph)	0	1153	149	260	1295	0	0	0	0	0	0	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	4823	1373	1695	3423	0	0	0	0	0	0	1564
Flt Permitted				0.213								
Satd. Flow (perm)	0	4823	1345	380	3423	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			157									182
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		963			225			613			525	
Travel Time (s)		14.6			3.4			11.9			10.2	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	7%	17%	7%	6%	2%	2%	2%	6%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1214	157	274	1363	0	0	0	0	0	0	360
Turn Type		NA	Perm	D,P+P	NA							Free
Protected Phases		2		7	2							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		90.0	90.0	30.0								
Total Split (%)		75.0%	75.0%	25.0%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		96.6	96.6	110.0	120.0							120.0
Actuated g/C Ratio		0.80	0.80	0.92	1.00							1.00
v/c Ratio		0.31	0.14	0.55	0.40							0.23
Control Delay		3.2	1.2	22.8	1.9							0.3
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		3.2	1.2	22.8	1.9							0.3
LOS		A	A	C	A							A
Approach Delay		3.0			5.4						0.3	
Approach LOS		A			A						A	
Queue Length 50th (ft)		59	0	74	48							0
Queue Length 95th (ft)		95	m8	161	47							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3882	1113	638	3423							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.31	0.14	0.43	0.40							0.23

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 57 (48%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 3.9
 Intersection LOS: A
 Intersection Capacity Utilization 55.3%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Background AM (2025)
02/02/2022



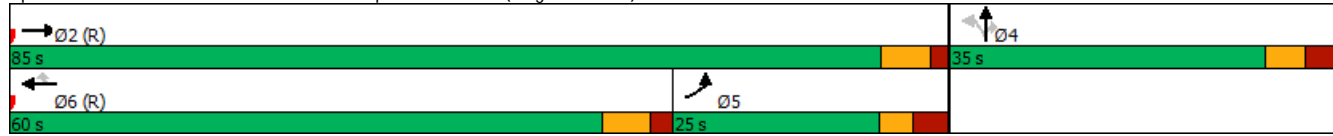
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑			↑↑↑	↔		↔	↔↔			
Traffic Volume (vph)	434	1094	0	0	1459	712	83	4	409	0	0	0
Future Volume (vph)	434	1094	0	0	1459	712	83	4	409	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3320	4872	0	0	4823	1530	0	1759	2630	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3319	4872	0	0	4823	1511	0	1759	2630	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						656			190			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	6%	7%	2%	2%	7%	5%	2%	2%	7%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	462	1164	0	0	1552	757	0	92	435	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	25.0	85.0			60.0	60.0	35.0	35.0	35.0			
Total Split (%)	20.8%	70.8%			50.0%	50.0%	29.2%	29.2%	29.2%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4	-1.4	-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag					Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	20.0	93.1			68.1	68.1	16.9	16.9	16.9			
Actuated g/C Ratio	0.17	0.78			0.57	0.57	0.14	0.14	0.14			
v/c Ratio	0.84	0.31			0.57	0.66	0.37	0.81	0.81			
Control Delay	53.3	3.3			18.3	5.9	49.3	40.0	40.0			
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	53.3	3.3			18.3	5.9	49.3	40.0	40.0			
LOS	D	A			B	A	D	D	D			
Approach Delay		17.5			14.3		41.6					
Approach LOS		B			B		D					
Queue Length 50th (ft)	169	58			267	35	65	106	106			
Queue Length 95th (ft)	#261	89			360	161	110	161	161			
Internal Link Dist (ft)		768			734		653			493		
Turn Bay Length (ft)	500											
Base Capacity (vph)	553	3778			2735	1140	439	800	800			
Starvation Cap Reductn	0	0			0	0	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	0.84	0.31			0.57	0.66	0.21	0.54	0.54			

Intersection Summary
 Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 18.7
 Intersection Capacity Utilization 74.9%

Intersection LOS: B
ICU Level of Service D

Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			R
Traffic Volume (vph)	4	4	202	4	6	443
Future Volume (vph)	4	4	202	4	6	443
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1145	0	1828	0	0	3465
Flt Permitted	0.976					0.999
Satd. Flow (perm)	1145	0	1828	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	100%	2%	2%	100%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	226	0	0	494
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	26.5%
ICU Level of Service	A
Analysis Period (min)	15



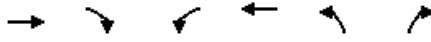
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	R	L	T
Traffic Volume (veh/h)	4	4	202	4	6	443
Future Volume (Veh/h)	4	4	202	4	6	443
Sign Control	Stop		Free			Free
Grade	0%		0%			4%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	4	4	222	4	7	487
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)			106			
pX, platoon unblocked	0.96	0.96			0.96	
vC, conflicting volume	482	224			226	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	441	173			175	
tC, single (s)	8.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	4.5	3.3			2.2	
p0 queue free %	99	100			99	
cM capacity (veh/h)	339	808			1345	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	8	226	169	325		
Volume Left	4	0	7	0		
Volume Right	4	4	0	0		
cSH	478	1700	1345	1700		
Volume to Capacity	0.02	0.13	0.01	0.19		
Queue Length 95th (ft)	1	0	0	0		
Control Delay (s)	12.7	0.0	0.4	0.0		
Lane LOS	B		A			
Approach Delay (s)	12.7	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			26.5%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	4	202	4	6	443
Future Vol, veh/h	4	4	202	4	6	443
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	100	2	2	100	2	2
Mvmt Flow	4	4	222	4	7	487

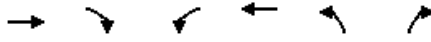
Major/Minor	Minor1	Major1	Major2	Major2	Major2	Major2
Conflicting Flow All	482	224	0	0	226	0
Stage 1	224	-	-	-	-	-
Stage 2	258	-	-	-	-	-
Critical Hdwy	8.1	6.23	-	-	4.13	-
Critical Hdwy Stg 1	6.9	-	-	-	-	-
Critical Hdwy Stg 2	7.3	-	-	-	-	-
Follow-up Hdwy	4.45	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	363	815	-	-	1341	-
Stage 1	603	-	-	-	-	-
Stage 2	560	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	360	815	-	-	1341	-
Mov Cap-2 Maneuver	360	-	-	-	-	-
Stage 1	603	-	-	-	-	-
Stage 2	556	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.3	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	499	1341	-
HCM Lane V/C Ratio	-	-	0.018	0.005	-
HCM Control Delay (s)	-	-	12.3	7.7	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (vph)	4	10	4	4	4	4
Future Volume (vph)	4	10	4	4	4	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1678	0	0	1578	1694	0
Flt. Permitted				0.976	0.976	
Satd. Flow (perm)	1678	0	0	1578	1694	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	316			305	118	
Travel Time (s)	7.2			6.9	2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	33%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	0	8	8	0
Sign Control	Stop			Stop	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.8%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↘	↔	↘	↔	↘
Traffic Volume (veh/h)	4	10	4	4	4	4
Future Volume (Veh/h)	4	10	4	4	4	4
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	4	11	4	4	4	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	12	0	23	10	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12	0	23	10	0	
tC, single (s)	6.5	6.2	7.4	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.8	4.0	2.2	
p0 queue free %	100	99	100	100	100	
cM capacity (veh/h)	880	1085	901	883	1623	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	15	8	8			
Volume Left	0	4	4			
Volume Right	11	0	4			
cSH	1022	892	1623			
Volume to Capacity	0.01	0.01	0.00			
Queue Length 95th (ft)	1	1	0			
Control Delay (s)	8.6	9.1	3.6			
Lane LOS	A	A	A			
Approach Delay (s)	8.6	9.1	3.6			
Approach LOS	A	A				
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			13.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Background AM (2025)

02/02/2022

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	225	118	128	28	313	317	161	46	64	70	50
Average Queue (ft)	102	40	26	4	126	136	24	12	22	26	25
95th Queue (ft)	217	92	77	19	250	263	95	37	53	48	44
Link Distance (ft)		1060	1060		1708	1708		169	2	2	2
Upstream Blk Time (%)									46	82	91
Queuing Penalty (veh)									69	122	136
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)					6	18	0				
Queuing Penalty (veh)					0	12	0				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	WB	NB	SB
Directions Served	UL	L	LTR	LTR
Maximum Queue (ft)	19	41	154	45
Average Queue (ft)	2	7	51	15
95th Queue (ft)	11	27	124	39
Link Distance (ft)			336	19
Upstream Blk Time (%)				25
Queuing Penalty (veh)				4
Storage Bay Dist (ft)	225	200		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	93	108	159	178	207	90	248	314	336	211	93	300
Average Queue (ft)	30	47	80	99	123	28	131	132	136	70	35	215
95th Queue (ft)	74	90	138	162	195	69	219	241	247	169	78	369
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)			0	0	0							1
Queuing Penalty (veh)			0	0	0							3

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	493	75	198	225	102	86
Average Queue (ft)	343	74	99	131	38	44
95th Queue (ft)	542	79	169	203	83	70
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	13					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	30	69				
Queuing Penalty (veh)	98	129				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	L	T	T
Maximum Queue (ft)	87	89	92	222	40	26
Average Queue (ft)	8	8	10	106	2	1
95th Queue (ft)	48	47	53	184	18	14
Link Distance (ft)	890	890	890	136	136	136
Upstream Blk Time (%)				6		
Queuing Penalty (veh)				30		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Queuing and Blocking Report
Background AM (2025)

02/02/2022

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	292	286	142	138	154	304	343	255	397	150	204	169
Average Queue (ft)	152	146	53	43	63	166	199	130	195	72	110	57
95th Queue (ft)	261	252	116	102	121	270	294	220	337	132	180	136
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500											
Storage Blk Time (%)	0											
Queuing Penalty (veh)	0											

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	111	54	510	200
Average Queue (ft)	33	24	483	197
95th Queue (ft)	113	68	496	207
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		2	96	
Queuing Penalty (veh)		4	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			95	96
Queuing Penalty (veh)			209	218

Intersection: 7: Farmwell Road

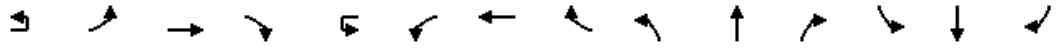
Movement	EB	WB
Directions Served	TR	LT
Maximum Queue (ft)	48	50
Average Queue (ft)	14	10
95th Queue (ft)	43	37
Link Distance (ft)	282	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 1033

Knightdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Background PM (2025)
02/02/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕			↔	↕	↗		↕			↕	↗
Traffic Volume (vph)	25	369	1743	0	6	4	1301	117	4	4	4	103	4	149
Future Volume (vph)	25	369	1743	0	6	4	1301	117	4	4	4	103	4	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%			1%				4%
Storage Length (ft)		375		0		150		75	0		0	0		0
Storage Lanes		1		0		1		1	0		0	0		2
Taper Length (ft)		100				100			25			25		
Satd. Flow (prot)	0	1743	3486	0	0	1778	3557	1591	0	1506	0	0	1742	2731
Flt Permitted		0.081				0.076				0.844			0.393	
Satd. Flow (perm)	0	149	3486	0	0	142	3557	1591	0	1291	0	0	717	2731
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)								122		4				176
Link Speed (mph)			45				45			25			45	
Link Distance (ft)			1108				1778			230			106	
Travel Time (s)			16.8				26.9			6.3			1.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	50%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	420	1854	0	0	10	1384	124	0	12	0	0	114	159
Turn Type	D.P+P	D.P+P	NA		D.P+P	D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	1	6			3			4	4
Permitted Phases	6	6			2	2		6	3			4		
Detector Phase	5	5	2		1	1	6	6	3	3		4	4	4
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0		7.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	85.0		15.0	15.0	80.0	80.0	25.0	25.0		15.0	15.0	15.0
Total Split (%)	14.3%	14.3%	60.7%		10.7%	10.7%	57.1%	57.1%	17.9%	17.9%		10.7%	10.7%	10.7%
Yellow Time (s)	3.0	3.0	4.6		3.0	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6			-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0			5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		109.6	111.6			113.6	75.0	75.0		8.2			10.0	10.0
Actuated g/C Ratio		0.78	0.80			0.81	0.54	0.54		0.06			0.07	0.07
v/c Ratio		0.82	0.67			0.05	0.73	0.14		0.15			2.24	0.44
Control Delay		49.6	9.8			1.1	16.0	2.3		53.7			641.5	10.3
Queue Delay		0.0	0.0			0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		49.6	9.8			1.1	16.0	2.3		53.7			641.5	10.3
LOS		D	A			A	B	A		D			F	B
Approach Delay			17.2				14.8			53.7			273.9	
Approach LOS			B				B			D			F	
Queue Length 50th (ft)		259	203			0	501	8		7			~167	0
Queue Length 95th (ft)		#546	726			m1	505	21		29			#297	31
Internal Link Dist (ft)			1028				1698			150			26	
Turn Bay Length (ft)		375				150		75						
Base Capacity (vph)		510	2780			232	1905	908		187			51	358
Starvation Cap Reductn		0	0			0	0	0		0			0	0
Spillback Cap Reductn		0	0			0	0	0		0			0	0
Storage Cap Reductn		0	0			0	0	0		0			0	0
Reduced v/c Ratio		0.82	0.67			0.04	0.73	0.14		0.06			2.24	0.44

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	23 (16%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	130
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	2.24
Intersection Signal Delay:	33.6
Intersection Capacity Utilization:	86.1%
Analysis Period (min)	15
Intersection LOS:	C
ICU Level of Service:	E

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)





Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	6	6	1870	35	38	1386	15	8	4	7	10	4	11
Future Volume (vph)	6	6	1870	35	38	1386	15	8	4	7	10	4	11
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		225		225	200		150			0	0		0
Storage Lanes		1		1	1		1			0	0		0
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1770	3539	1583	1770	3539	1583	0	1732	0	0	1529	0
Flt Permitted		0.950			0.950				0.979			0.980	
Satd. Flow (perm)	0	1770	3539	1583	1770	3539	1583	0	1732	0	0	1529	0
Link Speed (mph)			45			45			25			30	
Link Distance (ft)			1778			1589			405			118	
Travel Time (s)			26.9			24.1			11.0			2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	30%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	12	1968	37	40	1459	16	0	19	0	0	27	0
Sign Control			Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	61.7%
ICU Level of Service	B
Analysis Period (min)	15

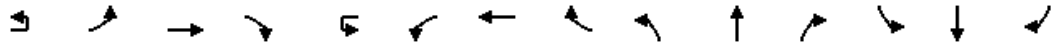
Knightdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Background PM (2025)
02/02/2022



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↗	↖	↕	↗		↕			↕	
Traffic Volume (veh/h)	6	6	1870	35	38	1386	15	8	4	7	10	4	11
Future Volume (Veh/h)	6	6	1870	35	38	1386	15	8	4	7	10	4	11
Sign Control			Free			Free			Stop			Stop	
Grade			0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	6	1968	37	40	1459	16	8	4	7	11	4	12
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type			Raised			Raised							
Median storage veh			1			1							
Upstream signal (ft)													
pX, platoon unblocked	0.00												
vC, conflicting volume	0	1475			2005			2804	3535	984	2544	3556	730
vC1, stage 1 conf vol								1980	1980		1539	1539	
vC2, stage 2 conf vol								824	1555		1005	2017	
vCu, unblocked vol	0	1475			2005			2804	3535	984	2544	3556	730
tC, single (s)	0.0	4.1			4.1			7.5	6.5	6.9	7.5	6.5	7.5
tC, 2 stage (s)								6.5	5.5		6.5	5.5	
tF (s)	0.0	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.6
p0 queue free %	0	99			86			83	93	97	83	90	96
cM capacity (veh/h)	0	453			282			48	57	248	67	41	308
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	6	984	984	37	40	730	730	16	19	27			
Volume Left	6	0	0	0	40	0	0	0	8	11			
Volume Right	0	0	0	37	0	0	0	16	7	12			
cSH	453	1700	1700	1700	282	1700	1700	1700	72	89			
Volume to Capacity	0.01	0.58	0.58	0.02	0.14	0.43	0.43	0.01	0.27	0.30			
Queue Length 95th (ft)	1	0	0	0	12	0	0	0	24	28			
Control Delay (s)	13.1	0.0	0.0	0.0	19.9	0.0	0.0	0.0	72.5	61.8			
Lane LOS	B				C				F	F			
Approach Delay (s)	0.0				0.5				72.5	61.8			
Approach LOS									F	F			
Intersection Summary													
Average Delay			1.1										
Intersection Capacity Utilization			61.7%		ICU Level of Service				B				
Analysis Period (min)			15										

Intersection													
Int Delay, s/veh	39.6												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↑↑	↗	↘	↑↑	↗		↕				↕
Traffic Vol, veh/h	6	6	1870	35	38	1386	15	8	4	7	10	4	11
Future Vol, veh/h	6	6	1870	35	38	1386	15	8	4	7	10	4	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	225	-	225	200	-	150	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	30
Mvmt Flow	6	6	1968	37	40	1459	16	8	4	7	11	4	12
Major/Minor	Major1			Major2			Minor1			Minor2			
Conflicting Flow All	1459	1475	0	0	2005	0	0	2804	3547	984	2549	3568	730
Stage 1	-	-	-	-	-	-	-	1992	1992	-	1539	1539	-
Stage 2	-	-	-	-	-	-	-	812	1555	-	1010	2029	-
Critical Hdwy	6.44	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	7.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.52	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.6
Pot Cap-1 Maneuver	168	453	-	-	282	-	-	~ 8	6	248	13	6	308
Stage 1	-	-	-	-	-	-	-	62	104	-	121	176	-
Stage 2	-	-	-	-	-	-	-	339	172	-	257	100	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	239	239	-	-	282	-	-	~ 2	5	248	~ 3	5	308
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 2	5	-	~ 3	5	-
Stage 1	-	-	-	-	-	-	-	59	98	-	114	151	-
Stage 2	-	-	-	-	-	-	-	272	148	-	226	95	-
Approach	EB			WB			NB			SB			
HCM Control Delay, s	0.1			0.5			\$ 3488.7			\$ 2695.2			
HCM LOS	F			F			F			F			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1					
Capacity (veh/h)	4	239	-	-	282	-	-	6					
HCM Lane V/C Ratio	5	0.053	-	-	0.142	-	-	4.386					
HCM Control Delay (s)	\$ 3488.7	20.9	-	-	19.9	-	-	\$ 2695.2					
HCM Lane LOS	F	C	-	-	C	-	-	F					
HCM 95th %tile Q(veh)	3.9	0.2	-	-	0.5	-	-	4.7					
Notes													
-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon													



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	8	162	1533	261	32	368	1211	422	123	46	208	255	114	130
Future Volume (vph)	8	162	1533	261	32	368	1211	422	123	46	208	255	114	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3362	5009	1560	0	1796	5111	1607	3467	1650	0	3416	1853	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3360	5009	1560	0	1796	5111	1587	3467	1650	0	3416	1853	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				97				390		137				182
Link Speed (mph)			45				45			35			25	
Link Distance (ft)			746				963			562			518	
Travel Time (s)			11.3				14.6			10.9			14.1	
Confl. Peds. (#/hr)		1						1						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	14%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	183	1648	281	0	430	1302	454	132	273	0	274	123	140
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	65.0	25.0	35.0	35.0	80.0	15.0	25.0	25.0		15.0	15.0	20.0
Total Split (%)	14.3%	14.3%	46.4%	17.9%	25.0%	25.0%	57.1%	10.7%	17.9%	17.9%		10.7%	10.7%	14.3%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		13.3	62.3	74.8		30.0	79.0	89.0	12.5	17.7		10.0	15.2	33.5
Actuated g/C Ratio		0.10	0.44	0.53		0.21	0.56	0.64	0.09	0.13		0.07	0.11	0.24
v/c Ratio		0.57	0.74	0.32		1.12	0.45	0.39	0.43	0.83		1.12	0.61	0.27
Control Delay		67.3	29.2	6.0		117.6	8.5	1.0	64.0	50.6		151.6	73.3	3.4
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		67.3	29.2	6.0		117.6	8.5	1.0	64.0	50.6		151.6	73.3	3.4
LOS		E	C	A		F	A	A	E	D		F	E	A
Approach Delay			29.4				28.4			55.0				95.0
Approach LOS			C				C			D				F
Queue Length 50th (ft)		84	471	61		-450	110	1	59	122		-147	107	0
Queue Length 95th (ft)		m112	m380	m43		#658	126	2	91	#252		#242	#199	24
Internal Link Dist (ft)			666				883			482			438	
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		360	2230	957		384	2884	1152	495	353		244	200	532
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.51	0.74	0.29		1.12	0.45	0.39	0.27	0.77		1.12	0.61	0.26

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 84 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.12

Intersection Signal Delay: 37.7

Intersection LOS: D

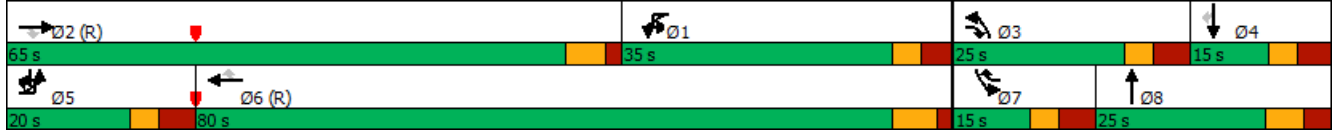
Intersection Capacity Utilization 91.0%

ICU Level of Service E

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightsdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Background PM (2025)
02/02/2022

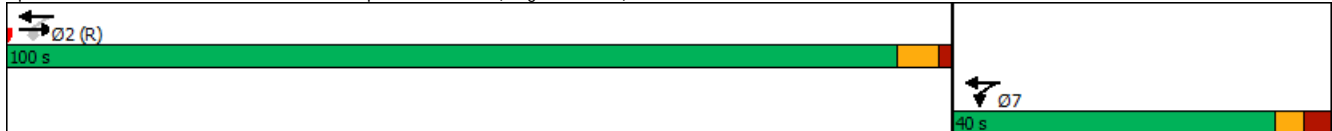


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1889	75	233	1378	0	0	0	0	0	0	681
Future Volume (vph)	0	1889	75	233	1378	0	0	0	0	0	0	681
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	5060	1575	1778	3557	0	0	0	0	0	0	1564
Flt Permitted				0.072								
Satd. Flow (perm)	0	5060	1575	135	3557	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82									149
Link Speed (mph)		45			45			35				35
Link Distance (ft)		963			225			613				525
Travel Time (s)		14.6			3.4			11.9				10.2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2076	82	256	1514	0	0	0	0	0	0	748
Turn Type		NA	Perm	D.P+P	NA							Free
Protected Phases		2		7	2 7							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2 7							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		100.0	100.0	40.0								
Total Split (%)		71.4%	71.4%	28.6%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		107.3	107.3	130.0	140.0							140.0
Actuated g/C Ratio		0.77	0.77	0.93	1.00							1.00
v/c Ratio		0.54	0.07	0.65	0.43							0.48
Control Delay		4.4	1.1	54.5	3.4							1.0
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		4.4	1.1	54.5	3.4							1.0
LOS		A	A	D	A							A
Approach Delay		4.2			10.8						1.0	
Approach LOS		A			B						A	
Queue Length 50th (ft)		139	2	161	116							0
Queue Length 95th (ft)		m158	m3	249	105							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3877	1225	540	3540							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.54	0.07	0.47	0.43							0.48

Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 72 (51%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 6.2
 Intersection Capacity Utilization 105.6%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Background PM (2025)
02/02/2022

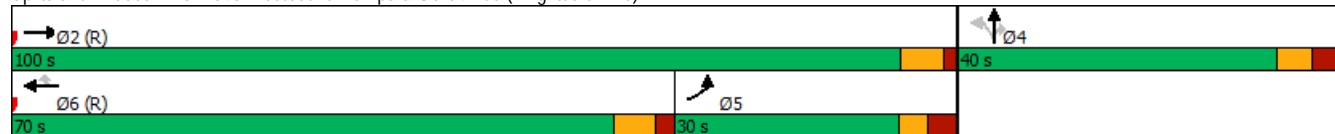


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕↔		↕↔	↕↕↕			
Traffic Volume (vph)	370	2492	0	0	1504	592	108	4	580	0	0	0
Future Volume (vph)	370	2492	0	0	1504	592	108	4	580	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3384	5111	0	0	5060	1575	0	1743	2759	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3384	5111	0	0	5060	1575	0	1743	2759	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						567			76			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	378	2543	0	0	1535	604	0	114	592	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4		-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	25.0	99.2			69.2	69.2		30.8	30.8			
Actuated g/C Ratio	0.18	0.71			0.49	0.49		0.22	0.22			
v/c Ratio	0.63	0.70			0.61	0.57		0.30	0.89			
Control Delay	46.6	4.2			27.6	4.8		46.7	62.0			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	46.6	4.2			27.6	4.8		46.7	62.0			
LOS	D	A			C	A		D	E			
Approach Delay		9.7			21.2			59.5				
Approach LOS		A			C			E				
Queue Length 50th (ft)	175	110			368	17		87	262			
Queue Length 95th (ft)	230	124			439	100		141	335			
Internal Link Dist (ft)		768			734			653		493		
Turn Bay Length (ft)	500											
Base Capacity (vph)	604	3620			2500	1065		435	746			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.63	0.70			0.61	0.57		0.26	0.79			

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	68 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	20.0
Intersection Capacity Utilization:	76.8%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	D

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			R
Traffic Volume (vph)	4	7	486	4	4	251
Future Volume (vph)	4	7	486	4	4	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1672	0	1861	0	0	3465
Flt Permitted	0.982					0.999
Satd. Flow (perm)	1672	0	1861	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	0	521	0	0	271
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	35.8% ICU Level of Service A
Analysis Period (min)	15



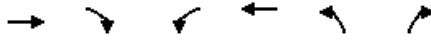
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	R	L	T
Traffic Volume (veh/h)	4	7	486	4	4	251
Future Volume (Veh/h)	4	7	486	4	4	251
Sign Control	Stop		Free			Free
Grade	0%		0%			4%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	4	7	517	4	4	267
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)			106			
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	660	519			521	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	507	340			342	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			100	
cM capacity (veh/h)	417	555			1026	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	11	521	93	178		
Volume Left	4	0	4	0		
Volume Right	7	4	0	0		
cSH	495	1700	1026	1700		
Volume to Capacity	0.02	0.31	0.00	0.10		
Queue Length 95th (ft)	2	0	0	0		
Control Delay (s)	12.4	0.0	0.4	0.0		
Lane LOS	B		A			
Approach Delay (s)	12.4	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			35.8%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	7	486	4	4	251
Future Vol, veh/h	4	7	486	4	4	251
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	7	517	4	4	267

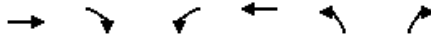
Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	661	519	0	0	521
Stage 1	519	-	-	-	-
Stage 2	142	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13
Critical Hdwy Stg 1	5.43	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219
Pot Cap-1 Maneuver	411	556	-	-	1043
Stage 1	596	-	-	-	-
Stage 2	871	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	409	556	-	-	1043
Mov Cap-2 Maneuver	409	-	-	-	-
Stage 1	596	-	-	-	-
Stage 2	867	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.5	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	492	1043	-
HCM Lane V/C Ratio	-	-	0.024	0.004	-
HCM Control Delay (s)	-	-	12.5	8.5	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	4	9	12	6	8	12
Future Volume (vph)	4	9	12	6	8	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1304	0	0	1543	1674	0
Flt. Permitted				0.967	0.981	
Satd. Flow (perm)	1304	0	0	1543	1674	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	316			305	118	
Travel Time (s)	7.2			6.9	2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	100%	2%	27%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	0	19	21	0
Sign Control	Stop			Stop	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.6%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (veh/h)	4	9	12	6	8	12
Future Volume (Veh/h)	4	9	12	6	8	12
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	9	13	6	8	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	29	0	34	22	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	29	0	34	22	0	
tC, single (s)	7.5	6.2	7.4	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.9	3.3	3.7	4.0	2.2	
p0 queue free %	99	99	99	99	100	
cM capacity (veh/h)	702	1085	899	867	1623	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	13	19	21			
Volume Left	0	13	8			
Volume Right	9	0	13			
cSH	929	888	1623			
Volume to Capacity	0.01	0.02	0.00			
Queue Length 95th (ft)	1	2	0			
Control Delay (s)	8.9	9.1	2.8			
Lane LOS	A	A	A			
Approach Delay (s)	8.9	9.1	2.8			
Approach LOS	A	A				
Intersection Summary						
Average Delay			6.6			
Intersection Capacity Utilization			17.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	454	435	382	36	240	258	141	73	51	58	51
Average Queue (ft)	224	120	110	7	94	102	26	16	24	16	23
95th Queue (ft)	402	336	301	26	191	202	95	52	44	39	45
Link Distance (ft)		1060	1060		1708	1708		169	2	2	2
Upstream Blk Time (%)		0							78	57	90
Queuing Penalty (veh)		0							66	48	76
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)	4	0			2	14	0				
Queuing Penalty (veh)	32	0			0	17	1				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	WB	WB	B12	B12	NB	SB
Directions Served	UL	R	L	R	T	T	LTR	LTR
Maximum Queue (ft)	34	4	72	2	397	478	161	64
Average Queue (ft)	5	0	20	0	18	28	72	24
95th Queue (ft)	22	3	51	2	194	249	185	51
Link Distance (ft)					659	659	336	19
Upstream Blk Time (%)					0	0		72
Queuing Penalty (veh)					0	1		15
Storage Bay Dist (ft)	225	225	200	150				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Queuing and Blocking Report
Background PM (2025)

02/02/2022

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	149	196	351	398	434	300	675	943	956	1063	194	300
Average Queue (ft)	71	87	197	241	256	121	644	822	833	810	85	205
95th Queue (ft)	129	153	298	344	368	279	800	1235	1244	1409	164	375
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)								49	52	52		
Queuing Penalty (veh)								335	361	353		
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)	0	0	5	15	20	0	79	1		0		1
Queuing Penalty (veh)	1	0	27	104	51	1	317	6		0		2

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	496	75	406	412	355	190
Average Queue (ft)	352	74	224	257	137	47
95th Queue (ft)	561	82	431	448	297	119
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	16		5	8	2	0
Queuing Penalty (veh)	0		0	0	0	0
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	24	70				
Queuing Penalty (veh)	75	87				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	SB
Directions Served	T	T	T	L	T	T	R
Maximum Queue (ft)	131	228	97	233	260	266	540
Average Queue (ft)	6	12	13	157	192	192	390
95th Queue (ft)	93	134	54	252	334	334	739
Link Distance (ft)	890	890	890	136	136	136	481
Upstream Blk Time (%)		0		22	57	64	71
Queuing Penalty (veh)		0		118	308	346	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Queuing and Blocking Report
Background PM (2025)

02/02/2022

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	250	258	455	765	606	710	727	694	639	174	368	332
Average Queue (ft)	140	143	116	164	164	392	437	393	281	82	236	194
95th Queue (ft)	218	224	292	438	358	786	810	795	732	150	338	293
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)			0	0	0	7	10	14	8			
Queuing Penalty (veh)			0	1	1	0	0	0	0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	71	63	503	200
Average Queue (ft)	19	26	431	188
95th Queue (ft)	68	70	585	234
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		0	61	
Queuing Penalty (veh)		2	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			94	75
Queuing Penalty (veh)			118	97

Intersection: 7: Farmwell Road

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	123	192	6
Average Queue (ft)	38	70	0
95th Queue (ft)	115	199	4
Link Distance (ft)	282	282	19
Upstream Blk Time (%)		1	0
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 2964

Appendix H:
Synchro & SimTraffic Output:
Background (2034)



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↔	↔	↕	↕	↔	↔	↔		↕	↕
Traffic Volume (vph)	7	167	823	7	44	1647	83	120	6	83	139	6	435
Future Volume (vph)	7	167	823	7	44	1647	83	120	6	83	139	6	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%			-1%			1%			4%	
Storage Length (ft)		375		375	500		100	0		0	0		0
Storage Lanes		1		1	1		1	1		0	0		2
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1743	3233	1326	1778	3455	1591	1761	1596	0	0	1725	2731
Flt Permitted		0.061			0.258			0.950				0.954	
Satd. Flow (perm)	0	112	3233	1298	483	3455	1591	1761	1596	0	0	1725	2731
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)				138			145		91				237
Link Speed (mph)			45			45			25			45	
Link Distance (ft)			1108			1778			230			106	
Travel Time (s)			16.8			26.9			6.3			1.6	
Confl. Peds. (#/hr)				1	1								
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	10%	20%	2%	5%	2%	2%	2%	2%	3%	2%	2%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	192	904	8	48	1810	91	132	98	0	0	160	478
Turn Type	D.P+P	D.P+P	NA	Perm	D.P+P	NA	Perm	Split	NA		Split	NA	Prot
Protected Phases	5	5	2		1	6		3	3		4	4	4
Permitted Phases	6	6		2	2		6						
Detector Phase	5	5	2	2	1	6	6	3	3		4	4	4
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0	20.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	73.0	73.0	14.0	72.0	72.0	16.0	16.0		17.0	17.0	17.0
Total Split (%)	12.5%	12.5%	60.8%	60.8%	11.7%	60.0%	60.0%	13.3%	13.3%		14.2%	14.2%	14.2%
Yellow Time (s)	3.0	3.0	4.6	4.6	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0	2.0	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6	0.0	-0.8	-1.6	-1.6	0.0	-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0	6.6	5.0	5.0	5.0	6.1	5.0			5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		77.0	71.8	70.2	78.0	67.0	67.0	9.9	11.0			12.0	12.0
Actuated g/C Ratio		0.64	0.60	0.58	0.65	0.56	0.56	0.08	0.09			0.10	0.10
v/c Ratio		0.93	0.47	0.01	0.12	0.94	0.10	0.91	0.43			0.93	0.98
Control Delay		87.1	15.0	0.0	4.2	20.9	0.8	109.1	18.3			106.4	64.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		87.1	15.0	0.0	4.2	20.9	0.8	109.1	18.3			106.4	64.4
LOS		F	B	A	A	C	A	F	B			F	E
Approach Delay			27.4			19.6			70.4			74.9	
Approach LOS			C			B			E			E	
Queue Length 50th (ft)		97	205	0	5	329	1	103	5			125	110
Queue Length 95th (ft)		#242	257	0	m8	#693	m4	#225	58			#259	#235
Internal Link Dist (ft)			1028			1698			150			26	
Turn Bay Length (ft)		375		375	500		100						
Base Capacity (vph)		207	1933	816	414	1929	952	145	228			172	486
Starvation Cap Reductn		0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio		0.93	0.47	0.01	0.12	0.94	0.10	0.91	0.43			0.93	0.98

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	110 (92%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	33.8
Intersection LOS:	C
Intersection Capacity Utilization:	93.7%
ICU Level of Service:	F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Background AM (2034)
04/27/2022

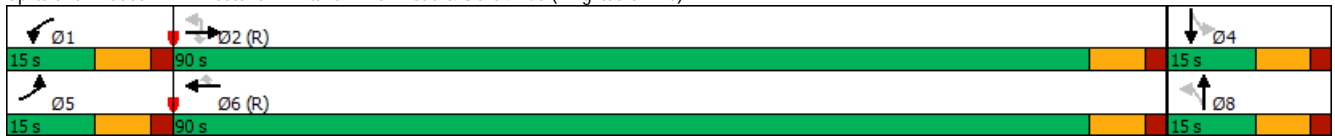


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↗	↖	↑↑	↗		↕			↕	
Traffic Volume (vph)	4	1076	13	18	1757	4	30	4	36	12	4	4
Future Volume (vph)	4	1076	13	18	1757	4	30	4	36	12	4	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		225	200		150	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			25			25		
Satd. Flow (prot)	1770	3312	1583	1671	3438	1583	0	1667	0	0	1678	0
Flt Permitted	0.950			0.950				0.849			0.735	
Satd. Flow (perm)	1770	3312	1583	1671	3438	1583	0	1445	0	0	1272	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			100		34			4	
Link Speed (mph)		45			45			25			30	
Link Distance (ft)		1778			1589			405			118	
Travel Time (s)		26.9			24.1			11.0			2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	9%	2%	8%	5%	2%	4%	2%	4%	10%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	1209	15	20	1974	4	0	78	0	0	21	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	15.0	20.0	20.0	15.0	20.0	20.0	15.0	15.0		15.0	15.0	
Total Split (s)	15.0	90.0	90.0	15.0	90.0	90.0	15.0	15.0		15.0	15.0	
Total Split (%)	12.5%	75.0%	75.0%	12.5%	75.0%	75.0%	12.5%	12.5%		12.5%	12.5%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effect Green (s)	9.0	98.2	98.2	9.4	101.4	101.4		9.6			9.6	
Actuated g/C Ratio	0.08	0.82	0.82	0.08	0.84	0.84		0.08			0.08	
v/c Ratio	0.03	0.45	0.01	0.15	0.68	0.00		0.53			0.20	
Control Delay	49.0	4.3	0.0	69.8	4.9	0.0		45.8			49.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	49.0	4.3	0.0	69.8	4.9	0.0		45.8			49.0	
LOS	D	A	A	E	A	A		D			D	
Approach Delay		4.4			5.5			45.8			49.0	
Approach LOS		A			A			D			D	
Queue Length 50th (ft)	3	78	0	16	40	0		33			12	
Queue Length 95th (ft)	m7	m159	m0	m31	793	m0		84			38	
Internal Link Dist (ft)		1698			1509			325			38	
Turn Bay Length (ft)	225		225	200		150						
Base Capacity (vph)	147	2711	1314	139	2905	1353		151			109	
Starvation Cap Reductn	0	0	0	0	0	0		0			0	
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.03	0.45	0.01	0.14	0.68	0.00		0.52			0.19	

Intersection Summary

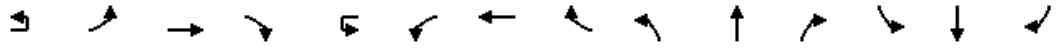
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 82 (68%), Referenced to phase 2:EBTU and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 6.3 Intersection LOS: A
 Intersection Capacity Utilization 62.7% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)



Knightdale Gateway
3: Hodge Road & US 64 Bus (Knightdale Blvd)

Background AM (2034)
04/27/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	8	93	907	116	26	143	1410	229	207	39	219	280	33	154
Future Volume (vph)	8	93	907	116	26	143	1410	229	207	39	219	280	33	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3382	4645	1515	0	1732	4967	1561	3401	1642	0	3416	1783	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3382	4645	1515	0	1732	4967	1561	3401	1642	0	3416	1783	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				121				239		184				154
Link Speed (mph)			45				45			35				25
Link Distance (ft)			746				963			562				518
Travel Time (s)			11.3				14.6			10.9				14.1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	10%	5%	10%	5%	6%	5%	4%	2%	2%	2%	6%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	105	945	121	0	176	1469	239	216	269	0	292	34	160
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	62.0	21.0	22.0	22.0	69.0	20.0	21.0	16.0		20.0	15.0	15.0
Total Split (%)	12.5%	12.5%	51.7%	17.5%	18.3%	18.3%	57.5%	16.7%	17.5%	13.3%		16.7%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9			-1.5	-1.5	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		10.0	59.2	84.7		15.8	64.9	79.3	20.6	10.7		14.4	10.0	16.5
Actuated g/C Ratio		0.08	0.49	0.71		0.13	0.54	0.66	0.17	0.09		0.12	0.08	0.14
v/c Ratio		0.37	0.41	0.11		0.78	0.55	0.21	0.37	0.86		0.71	0.23	0.46
Control Delay		62.9	23.2	0.8		91.3	11.7	1.2	47.8	43.6		61.0	55.2	9.1
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		62.9	23.2	0.8		91.3	11.7	1.2	47.8	43.6		61.0	55.2	9.1
LOS		E	C	A		F	B	A	D	D		E	E	A
Approach Delay			24.5				17.8			45.5				43.5
Approach LOS			C				B			D				D
Queue Length 50th (ft)		35	170	5		142	108	0	82	64		113	25	3
Queue Length 95th (ft)		0	321	8		#237	194	39	121	#211		160	59	47
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		281	2289	1111		245	2687	1119	597	318		427	156	349
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.37	0.41	0.11		0.72	0.55	0.21	0.36	0.85		0.68	0.22	0.46

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	60 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.86
Intersection Signal Delay:	26.2
Intersection Capacity Utilization:	73.3%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	D

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Background AM (2034)
04/27/2022

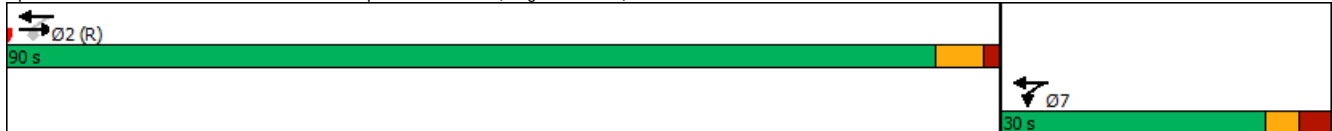


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1324	175	284	1445	0	0	0	0	0	0	378
Future Volume (vph)	0	1324	175	284	1445	0	0	0	0	0	0	378
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	4823	1373	1695	3423	0	0	0	0	0	0	1564
Flt Permitted				0.171								
Satd. Flow (perm)	0	4823	1345	305	3423	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			184									147
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		963			225			613			525	
Travel Time (s)		14.6			3.4			11.9			10.2	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	7%	17%	7%	6%	2%	2%	2%	6%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1394	184	299	1521	0	0	0	0	0	0	398
Turn Type		NA	Perm	D,P+P	NA							Free
Protected Phases		2		7	2							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		90.0	90.0	30.0								
Total Split (%)		75.0%	75.0%	25.0%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		93.3	93.3	110.0	120.0							120.0
Actuated g/C Ratio		0.78	0.78	0.92	1.00							1.00
v/c Ratio		0.37	0.17	0.63	0.44							0.25
Control Delay		3.9	1.1	34.8	2.8							0.4
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		3.9	1.1	34.8	2.8							0.4
LOS		A	A	C	A							A
Approach Delay		3.5			8.0						0.4	
Approach LOS		A			A						A	
Queue Length 50th (ft)		70	0	115	67							0
Queue Length 95th (ft)		108	m7	192	63							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3751	1087	579	3386							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.37	0.17	0.52	0.45							0.25

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 57 (48%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 5.4
 Intersection LOS: A
 Intersection Capacity Utilization 61.0%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Background AM (2034)
04/27/2022



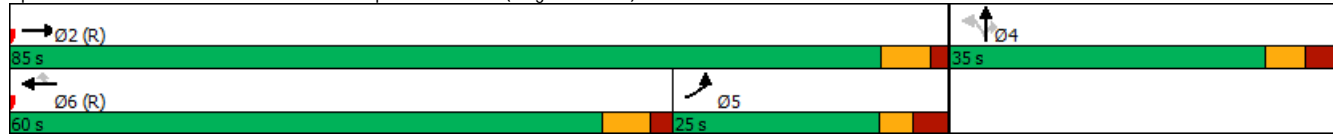
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕↔		↕↔	↕↕↕			
Traffic Volume (vph)	480	1254	0	0	1620	779	95	4	447	0	0	0
Future Volume (vph)	480	1254	0	0	1620	779	95	4	447	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3320	4872	0	0	4823	1530	0	1759	2630	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3319	4872	0	0	4823	1511	0	1759	2630	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						653			134			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	6%	7%	2%	2%	7%	5%	2%	2%	7%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	511	1334	0	0	1723	829	0	105	476	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	25.0	85.0			60.0	60.0	35.0	35.0	35.0			
Total Split (%)	20.8%	70.8%			50.0%	50.0%	29.2%	29.2%	29.2%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4		-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Lead/Lag					Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	20.0	88.7			63.7	63.7		21.3	21.3			
Actuated g/C Ratio	0.17	0.74			0.53	0.53		0.18	0.18			
v/c Ratio	0.92	0.37			0.67	0.75		0.34	0.82			
Control Delay	62.3	5.0			23.0	9.7		44.6	45.9			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	62.3	5.0			23.0	9.7		44.6	45.9			
LOS	E	A			C	A		D	D			
Approach Delay		20.9			18.7			45.7				
Approach LOS		C			B			D				
Queue Length 50th (ft)	185	87			343	77		72	148			
Queue Length 95th (ft)	#295	126			453	294		117	202			
Internal Link Dist (ft)		768			734			653		493		
Turn Bay Length (ft)	500											
Base Capacity (vph)	553	3600			2559	1108		439	758			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.92	0.37			0.67	0.75		0.24	0.63			

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	65
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	22.7
Intersection LOS:	C
Intersection Capacity Utilization:	80.4%
ICU Level of Service:	D

Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	4	254	4	7	579
Future Volume (vph)	4	4	254	4	7	579
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1145	0	1834	0	0	3465
Flt Permitted	0.976					0.999
Satd. Flow (perm)	1145	0	1834	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	100%	2%	2%	100%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	283	0	0	644
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	30.9%
ICU Level of Service	A
Analysis Period (min)	15



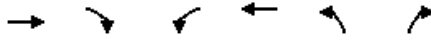
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	R	R	T
Traffic Volume (veh/h)	4	4	254	4	7	579
Future Volume (Veh/h)	4	4	254	4	7	579
Sign Control	Stop		Free			Free
Grade	0%		0%			4%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	4	4	279	4	8	636
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)			106			
pX, platoon unblocked	0.95	0.95			0.95	
vC, conflicting volume	615	281			283	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	565	212			214	
tC, single (s)	8.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	4.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	264	751			1281	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	8	283	220	424		
Volume Left	4	0	8	0		
Volume Right	4	4	0	0		
cSH	390	1700	1281	1700		
Volume to Capacity	0.02	0.17	0.01	0.25		
Queue Length 95th (ft)	2	0	0	0		
Control Delay (s)	14.4	0.0	0.3	0.0		
Lane LOS	B		A			
Approach Delay (s)	14.4	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			30.9%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	4	254	4	7	579
Future Vol, veh/h	4	4	254	4	7	579
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	100	2	2	100	2	2
Mvmt Flow	4	4	279	4	8	636

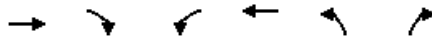
Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	615	281	0	0	283
Stage 1	281	-	-	-	-
Stage 2	334	-	-	-	-
Critical Hdwy	8.1	6.23	-	-	4.13
Critical Hdwy Stg 1	6.9	-	-	-	-
Critical Hdwy Stg 2	7.3	-	-	-	-
Follow-up Hdwy	4.45	3.319	-	-	2.219
Pot Cap-1 Maneuver	290	757	-	-	1278
Stage 1	559	-	-	-	-
Stage 2	502	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	287	757	-	-	1278
Mov Cap-2 Maneuver	287	-	-	-	-
Stage 1	559	-	-	-	-
Stage 2	497	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.8	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	416	1278	-
HCM Lane V/C Ratio	-	-	0.021	0.006	-
HCM Control Delay (s)	-	-	13.8	7.8	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (vph)	4	11	4	4	4	4
Future Volume (vph)	4	11	4	4	4	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1675	0	0	1578	1694	0
Flt. Permitted				0.976	0.976	
Satd. Flow (perm)	1675	0	0	1578	1694	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	316			305	118	
Travel Time (s)	7.2			6.9	2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	33%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	0	0	8	8	0
Sign Control	Stop			Stop	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.8%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	4	11	4	4	4	4
Future Volume (Veh/h)	4	11	4	4	4	4
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	4	12	4	4	4	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)					118	
pX, platoon unblocked						
vC, conflicting volume	12	0	24	10	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12	0	24	10	0	
tC, single (s)	6.5	6.2	7.4	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.8	4.0	2.2	
p0 queue free %	100	99	100	100	100	
cM capacity (veh/h)	880	1085	899	883	1623	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	16	8	8			
Volume Left	0	4	4			
Volume Right	12	0	4			
cSH	1025	891	1623			
Volume to Capacity	0.02	0.01	0.00			
Queue Length 95th (ft)	1	1	0			
Control Delay (s)	8.6	9.1	3.6			
Lane LOS	A	A	A			
Approach Delay (s)	8.6	9.1	3.6			
Approach LOS	A	A				
Intersection Summary						
Average Delay			7.5			
Intersection Capacity Utilization			13.8%	ICU Level of Service		A
Analysis Period (min)			15			

Queuing and Blocking Report
Background AM (2034)

04/26/2022

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	UL	T	T	R	L	TR	LT	R
Maximum Queue (ft)	474	863	829	25	72	498	509	200	175	113	75	76
Average Queue (ft)	353	447	360	2	20	229	237	51	96	42	26	27
95th Queue (ft)	585	1046	964	11	53	436	449	169	168	82	56	54
Link Distance (ft)		1060	1060			1700	1700		160	160	2	2
Upstream Blk Time (%)		4	0						4	0	58	75
Queuing Penalty (veh)		0	0						0	0	113	146
Storage Bay Dist (ft)	375			375	500			100				
Storage Blk Time (%)	51	0				1	31	0				
Queuing Penalty (veh)	209	0				0	26	2				

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	R
Maximum Queue (ft)	63
Average Queue (ft)	21
95th Queue (ft)	40
Link Distance (ft)	2
Upstream Blk Time (%)	89
Queuing Penalty (veh)	173
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	B12	B12	NB	SB
Directions Served	UL	T	T	R	L	T	T	R	T	T	LTR	LTR
Maximum Queue (ft)	18	178	215	14	59	141	152	6	66	64	117	42
Average Queue (ft)	2	51	61	1	16	42	54	0	2	2	45	14
95th Queue (ft)	12	134	157	8	45	106	126	3	66	64	94	36
Link Distance (ft)		1700	1700			1527	1527		659	659	336	19
Upstream Blk Time (%)									0			21
Queuing Penalty (veh)									0			3
Storage Bay Dist (ft)	225			225	200			150				
Storage Blk Time (%)		0	0				0					
Queuing Penalty (veh)		0	0				0					

Queuing and Blocking Report
Background AM (2034)

04/26/2022

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	89	98	196	225	275	135	301	341	486	283	97	300
Average Queue (ft)	33	46	85	110	140	25	151	180	194	122	42	247
95th Queue (ft)	72	86	167	195	239	82	258	295	350	254	85	368
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)			0	0	2							4
Queuing Penalty (veh)			1	1	3							13

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	512	75	193	216	94	92
Average Queue (ft)	388	74	107	132	35	47
95th Queue (ft)	564	80	174	199	77	76
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	23					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	25	75				
Queuing Penalty (veh)	89	156				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	L	T	T
Maximum Queue (ft)	115	103	124	227	44	31
Average Queue (ft)	17	17	22	133	2	2
95th Queue (ft)	71	68	82	217	20	15
Link Distance (ft)	890	890	890	136	136	136
Upstream Blk Time (%)				11		
Queuing Penalty (veh)				67		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Queuing and Blocking Report
Background AM (2034)

04/26/2022

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	329	322	189	239	195	359	428	498	582	154	226	201
Average Queue (ft)	188	181	75	67	88	204	240	180	270	77	128	76
95th Queue (ft)	295	290	153	166	156	317	359	365	494	136	200	163
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)								0	0			
Queuing Penalty (veh)								0	0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	98	60	510	200
Average Queue (ft)	26	35	483	196
95th Queue (ft)	82	77	497	207
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		4	93	
Queuing Penalty (veh)		11	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			92	93
Queuing Penalty (veh)			268	277

Intersection: 7: Farmwell Road

Movement	EB	WB
Directions Served	TR	LT
Maximum Queue (ft)	42	62
Average Queue (ft)	13	10
95th Queue (ft)	39	40
Link Distance (ft)	282	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 1557

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Background PM (2034)
04/27/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↗		↔	↕	↗	↖	↕			↖	↗
Traffic Volume (vph)	27	502	1882	4	7	76	1414	197	61	5	63	162	9	206
Future Volume (vph)	27	502	1882	4	7	76	1414	197	61	5	63	162	9	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%			1%			4%	
Storage Length (ft)		375		375		500		100	0		0	0		0
Storage Lanes		1		1		1		1	1		0	0		2
Taper Length (ft)		100				100			25			25		
Satd. Flow (prot)	0	1743	3486	1560	0	1778	3557	1591	1197	1594	0	0	1743	2731
Flt Permitted		0.071				0.047			0.950				0.955	
Satd. Flow (perm)	0	130	3486	1560	0	88	3557	1591	1197	1594	0	0	1743	2731
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				125				122		67				219
Link Speed (mph)			45				45			25			45	
Link Distance (ft)			1108				1778			230			106	
Travel Time (s)			16.8				26.9			6.3			1.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	50%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	563	2002	4	0	88	1504	210	65	72	0	0	182	219
Turn Type	D.P+P	D.P+P	NA	Perm	D.P+P	D.P+P	NA	Perm	Split	NA		Split	NA	Prot
Protected Phases	5	5	2		1	1	6		3	3		4	4	4
Permitted Phases	6	6		2	2	2		6						
Detector Phase	5	5	2	2	1	1	6	6	3	3		4	4	4
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0	20.0	14.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	43.0	43.0	91.0	91.0	14.0	14.0	62.0	62.0	15.0	15.0		20.0	20.0	20.0
Total Split (%)	30.7%	30.7%	65.0%	65.0%	10.0%	10.0%	44.3%	44.3%	10.7%	10.7%		14.3%	14.3%	14.3%
Yellow Time (s)	3.0	3.0	4.6	4.6	3.0	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0	2.0	2.8	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6	0.0		-0.8	-1.6	-1.6	0.0	-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0	6.6		5.0	5.0	5.0	6.1	5.0			5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		95.1	86.1	84.5		95.1	57.0	57.0	8.8	9.9			15.0	15.0
Actuated g/C Ratio		0.68	0.62	0.60		0.68	0.41	0.41	0.06	0.07			0.11	0.11
v/c Ratio		1.07	0.93	0.00		0.52	1.04	0.29	0.87	0.41			0.98	0.45
Control Delay		98.9	34.0	0.0		34.5	60.2	8.6	135.4	23.1			122.1	10.1
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		98.9	34.0	0.0		34.5	60.2	8.6	135.4	23.1			122.1	10.1
LOS		F	C	A		C	E	A	F	C			F	B
Approach Delay			48.2				52.9			76.4			60.9	
Approach LOS			D				D			E			E	
Queue Length 50th (ft)		-516	825	0		30	-767	8	60	4			168	0
Queue Length 95th (ft)		#750	970	0		76	#902	73	#153	56			#326	43
Internal Link Dist (ft)			1028				1698			150			26	
Turn Bay Length (ft)		375		375		500		100						
Base Capacity (vph)		527	2143	991		168	1448	720	76	176			186	488
Starvation Cap Reductn		0	0	0		0	0	0	0	0			0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0			0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0			0	0
Reduced v/c Ratio		1.07	0.93	0.00		0.52	1.04	0.29	0.86	0.41			0.98	0.45

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	23 (16%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	140
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.07
Intersection Signal Delay:	51.7
Intersection Capacity Utilization:	98.1%
Analysis Period (min):	15
Intersection LOS:	D
ICU Level of Service:	F

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Background PM (2034)
04/27/2022

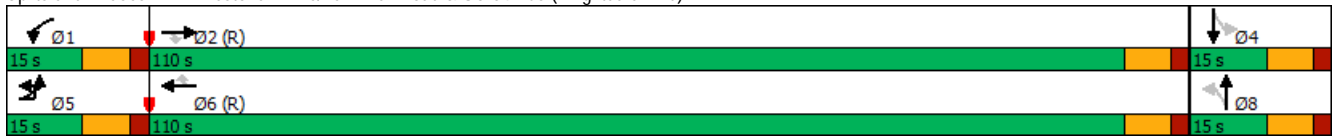


Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↗	↖	↕	↗		↕			↕	
Traffic Volume (vph)	7	7	2147	40	41	1652	16	11	4	8	11	4	12
Future Volume (vph)	7	7	2147	40	41	1652	16	11	4	8	11	4	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		225		225	200		150			0	0		0
Storage Lanes		1		1	1		1			0	0		0
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1770	3539	1583	1770	3539	1583	0	1736	0	0	1526	0
Flt Permitted		0.950			0.950				0.849			0.855	
Satd. Flow (perm)	0	1770	3539	1583	1770	3539	1583	0	1510	0	0	1332	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)				86			86			8			13
Link Speed (mph)			45			45			25				30
Link Distance (ft)			1778			1589			405				118
Travel Time (s)			26.9			24.1			11.0				2.7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	30%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	14	2260	42	43	1739	17	0	24	0	0	29	0
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	5	2		1	6			8				4
Permitted Phases				2			6	8			4		
Detector Phase	5	5	2	2	1	6	6	8	8		4	4	
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	15.0	15.0	20.0	20.0	15.0	20.0	20.0	15.0	15.0		15.0	15.0	
Total Split (s)	15.0	15.0	110.0	110.0	15.0	110.0	110.0	15.0	15.0		15.0	15.0	
Total Split (%)	10.7%	10.7%	78.6%	78.6%	10.7%	78.6%	78.6%	10.7%	10.7%		10.7%	10.7%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		9.3	115.1	115.1	9.9	122.3	122.3		9.4				9.4
Actuated g/C Ratio		0.07	0.82	0.82	0.07	0.87	0.87		0.07				0.07
v/c Ratio		0.12	0.78	0.03	0.35	0.56	0.01		0.22				0.29
Control Delay		75.2	6.3	0.0	76.6	11.4	0.4		51.1				47.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0				0.0
Total Delay		75.2	6.3	0.0	76.6	11.4	0.4		51.1				47.8
LOS		E	A	A	E	B	A		D				D
Approach Delay			6.6			12.8			51.1				47.8
Approach LOS			A			B			D				D
Queue Length 50th (ft)		12	106	0	35	347	0		14				14
Queue Length 95th (ft)		m15	m123	m0	m61	905	m0		46				49
Internal Link Dist (ft)			1698			1509			325				38
Turn Bay Length (ft)		225		225	200		150						
Base Capacity (vph)		126	2910	1316	128	3092	1394		115				107
Starvation Cap Reductn		0	0	0	0	0	0		0				0
Spillback Cap Reductn		0	0	0	0	0	0		0				0
Storage Cap Reductn		0	0	0	0	0	0		0				0
Reduced v/c Ratio		0.11	0.78	0.03	0.34	0.56	0.01		0.21				0.27

Intersection Summary

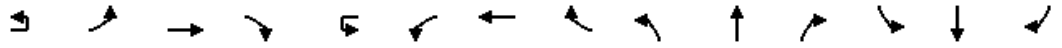
Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 9.8 Intersection LOS: A
 Intersection Capacity Utilization 73.5% ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
3: Hodge Road & US 64 Bus (Knightsdale Blvd)

Background PM (2034)
04/27/2022



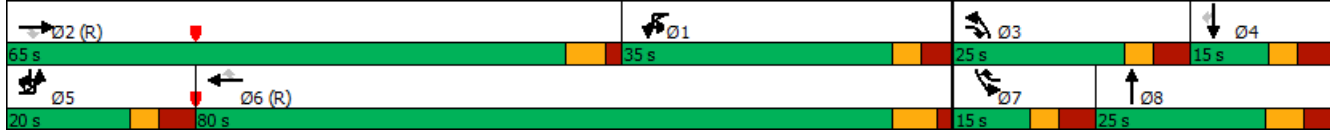
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↑↑↑	↗		↔↔	↑↑↑	↗	↔↔	↔		↔↔	↑	↗
Traffic Volume (vph)	9	178	1768	294	35	402	1443	446	147	49	227	268	124	149
Future Volume (vph)	9	178	1768	294	35	402	1443	446	147	49	227	268	124	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3362	5009	1560	0	1796	5111	1607	3467	1650	0	3416	1853	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3360	5009	1560	0	1796	5111	1587	3467	1650	0	3416	1853	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				83				365		138				182
Link Speed (mph)			45				45			35			25	
Link Distance (ft)			746				963			562			518	
Travel Time (s)			11.3				14.6			10.9			14.1	
Confl. Peds. (#/hr)		1						1						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	14%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	201	1901	316	0	470	1552	480	158	297	0	288	133	160
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	65.0	25.0	35.0	35.0	80.0	15.0	25.0	25.0		15.0	15.0	20.0
Total Split (%)	14.3%	14.3%	46.4%	17.9%	25.0%	25.0%	57.1%	10.7%	17.9%	17.9%		10.7%	10.7%	14.3%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		13.7	60.7	74.9		30.0	77.0	87.0	14.2	19.3		10.0	15.1	33.8
Actuated g/C Ratio		0.10	0.43	0.54		0.21	0.55	0.62	0.10	0.14		0.07	0.11	0.24
v/c Ratio		0.61	0.88	0.36		1.22	0.55	0.43	0.45	0.86		1.18	0.67	0.31
Control Delay		68.8	24.3	5.8		154.6	11.0	1.2	62.6	54.3		169.2	76.9	5.5
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		68.8	24.3	5.8		154.6	11.0	1.2	62.6	54.3		169.2	76.9	5.5
LOS		E	C	A		F	B	A	E	D		F	E	A
Approach Delay			25.5				36.1			57.2				103.0
Approach LOS			C				D			E				F
Queue Length 50th (ft)		86	451	74		-521	134	2	71	147		-161	117	0
Queue Length 95th (ft)		m116	586	m71		#741	202	4	104	#302		#258	#250	42
Internal Link Dist (ft)			666				883			482			438	
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		360	2171	934		384	2811	1125	495	354		244	199	531
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.56	0.88	0.34		1.22	0.55	0.43	0.32	0.84		1.18	0.67	0.30

Intersection Summary	
Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	84 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.22
Intersection Signal Delay:	40.0
Intersection LOS:	D
Intersection Capacity Utilization:	99.3%
ICU Level of Service:	F

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightsdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Background PM (2034)
04/27/2022

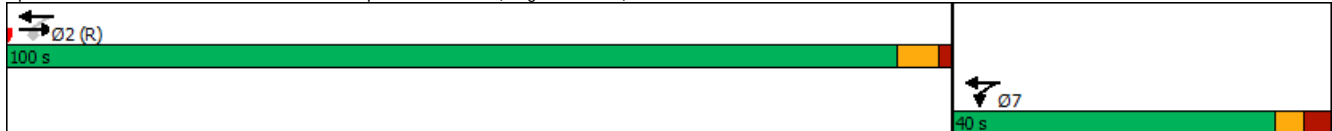


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	2131	97	255	1595	0	0	0	0	0	0	760
Future Volume (vph)	0	2131	97	255	1595	0	0	0	0	0	0	760
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	5060	1575	1778	3557	0	0	0	0	0	0	1564
Flt Permitted				0.047								
Satd. Flow (perm)	0	5060	1575	88	3557	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107									107
Link Speed (mph)		45			45			35				35
Link Distance (ft)		963			225			613				525
Travel Time (s)		14.6			3.4			11.9				10.2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2342	107	280	1753	0	0	0	0	0	0	835
Turn Type		NA	Perm	D.P+P	NA							Free
Protected Phases		2		7	2 7							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2 7							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		100.0	100.0	40.0								
Total Split (%)		71.4%	71.4%	28.6%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		103.0	103.0	130.0	140.0							140.0
Actuated g/C Ratio		0.74	0.74	0.93	1.00							1.00
v/c Ratio		0.63	0.09	0.69	0.49							0.53
Control Delay		6.0	0.9	60.8	5.0							1.3
Queue Delay		0.6	0.0	0.0	0.0							0.0
Total Delay		6.6	0.9	60.8	5.0							1.3
LOS		A	A	E	A							A
Approach Delay		6.3			12.7						1.3	
Approach LOS		A			B						A	
Queue Length 50th (ft)		155	2	207	187							0
Queue Length 95th (ft)		m202	m3	296	164							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3722	1186	506	3544							1564
Starvation Cap Reductn		872	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.82	0.09	0.55	0.49							0.53

Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 72 (51%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 8.0 Intersection LOS: A
 Intersection Capacity Utilization 116.1% ICU Level of Service H
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Background PM (2034)
04/27/2022



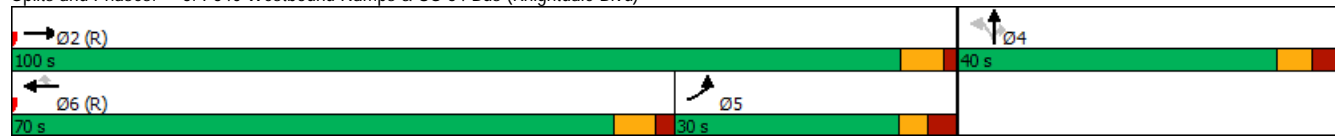
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕		↕	↕↕			
Traffic Volume (vph)	407	2788	0	0	1726	647	125	4	634	0	0	0
Future Volume (vph)	407	2788	0	0	1726	647	125	4	634	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3384	5111	0	0	5060	1575	0	1743	2759	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3384	5111	0	0	5060	1575	0	1743	2759	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						540			76			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	415	2845	0	0	1761	660	0	132	647	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4		-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	25.0	97.2			67.2	67.2		32.8	32.8			
Actuated g/C Ratio	0.18	0.69			0.48	0.48		0.23	0.23			
v/c Ratio	0.69	0.80			0.73	0.64		0.32	0.92			
Control Delay	44.9	5.2			31.6	7.9		46.2	64.9			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	44.9	5.2			31.6	7.9		46.2	64.9			
LOS	D	A			C	A		D	E			
Approach Delay		10.2			25.2			61.7				
Approach LOS		B			C			E				
Queue Length 50th (ft)	191	132			473	62		98	289			
Queue Length 95th (ft)	235	138			533	192		160	#397			
Internal Link Dist (ft)		768			734			653			493	
Turn Bay Length (ft)	500											
Base Capacity (vph)	604	3548			2428	1036		435	746			
Starvation Cap Reductn	0	5			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.69	0.80			0.73	0.64		0.30	0.87			

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	68 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	22.0
Intersection Capacity Utilization:	84.4%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	E

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			R
Traffic Volume (vph)	4	8	701	4	4	375
Future Volume (vph)	4	8	701	4	4	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1664	0	1861	0	0	3468
Flt Permitted	0.985					
Satd. Flow (perm)	1664	0	1861	0	0	3468
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	0	750	0	0	403
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.1% ICU Level of Service A
Analysis Period (min)	15



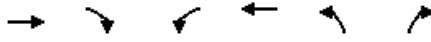
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Volume (veh/h)	4	8	701	4	4	375
Future Volume (Veh/h)	4	8	701	4	4	375
Sign Control	Stop		Free			Free
Grade	0%		0%			4%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	4	9	746	4	4	399
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (ft)			106			
pX, platoon unblocked	0.72	0.72			0.72	
vC, conflicting volume	956	748			750	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	740	450			453	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			99	
cM capacity (veh/h)	251	398			791	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	13	750	137	266		
Volume Left	4	0	4	0		
Volume Right	9	4	0	0		
cSH	337	1700	791	1700		
Volume to Capacity	0.04	0.44	0.01	0.16		
Queue Length 95th (ft)	3	0	0	0		
Control Delay (s)	16.1	0.0	0.3	0.0		
Lane LOS	C		A			
Approach Delay (s)	16.1	0.0	0.1			
Approach LOS	C					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization		47.1%		ICU Level of Service	A	
Analysis Period (min)		15				

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	8	701	4	4	375
Future Vol, veh/h	4	8	701	4	4	375
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	9	746	4	4	399

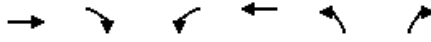
Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	956	748	0	0	750
Stage 1	748	-	-	-	-
Stage 2	208	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13
Critical Hdwy Stg 1	5.43	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219
Pot Cap-1 Maneuver	271	411	-	-	857
Stage 1	467	-	-	-	-
Stage 2	807	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	269	411	-	-	857
Mov Cap-2 Maneuver	269	-	-	-	-
Stage 1	467	-	-	-	-
Stage 2	802	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.7	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	350	857	-
HCM Lane V/C Ratio	-	-	0.036	0.005	-
HCM Control Delay (s)	-	-	15.7	9.2	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	4	10	13	7	9	13
Future Volume (vph)	4	10	13	7	9	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1336	0	0	1550	1678	0
Flt Permitted				0.968	0.981	
Satd. Flow (perm)	1336	0	0	1550	1678	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	316			305	118	
Travel Time (s)	7.2			6.9	2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	100%	2%	27%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	0	21	23	0
Sign Control	Stop			Stop	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.8%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↘	↔	↔	↙	↘
Traffic Volume (veh/h)	4	10	13	7	9	13
Future Volume (Veh/h)	4	10	13	7	9	13
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	11	14	7	9	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)					118	
pX, platoon unblocked						
vC, conflicting volume	32	0	38	25	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32	0	38	25	0	
tC, single (s)	7.5	6.2	7.4	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.9	3.3	3.7	4.0	2.2	
p0 queue free %	99	99	98	99	99	
cM capacity (veh/h)	698	1085	891	863	1623	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	15	21	23			
Volume Left	0	14	9			
Volume Right	11	0	14			
cSH	945	881	1623			
Volume to Capacity	0.02	0.02	0.01			
Queue Length 95th (ft)	1	2	0			
Control Delay (s)	8.9	9.2	2.9			
Lane LOS	A	A	A			
Approach Delay (s)	8.9	9.2	2.9			
Approach LOS	A	A				
Intersection Summary						
Average Delay			6.6			
Intersection Capacity Utilization			17.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Background PM (2034)

04/26/2022

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	UL	T	T	R	L	TR	LT	R
Maximum Queue (ft)	475	1110	1093	101	368	683	705	200	197	138	67	38
Average Queue (ft)	462	953	911	4	72	272	288	80	99	50	28	7
95th Queue (ft)	533	1373	1352	68	259	611	648	215	194	105	50	27
Link Distance (ft)		1060	1060			1700	1700		160	160	2	2
Upstream Blk Time (%)		37	7						10	0	86	25
Queuing Penalty (veh)		0	0						0	0	109	32
Storage Bay Dist (ft)	375			375	500			100				
Storage Blk Time (%)	60	4	6			5	35	0				
Queuing Penalty (veh)	567	20	0			4	70	3				

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	R
Maximum Queue (ft)	69
Average Queue (ft)	26
95th Queue (ft)	60
Link Distance (ft)	2
Upstream Blk Time (%)	87
Queuing Penalty (veh)	110
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Background PM (2034)

04/26/2022

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	B12	B12	B12	NB
Directions Served	UL	T	T	R	L	T	T	R	T	T		LTR
Maximum Queue (ft)	48	181	190	18	80	180	178	9	602	623	186	62
Average Queue (ft)	10	53	60	2	26	40	46	0	42	53	4	20
95th Queue (ft)	32	138	151	10	65	128	134	4	304	353	89	51
Link Distance (ft)		1700	1700			1527	1527		659	659	659	336
Upstream Blk Time (%)									0	0		
Queuing Penalty (veh)									1	1		
Storage Bay Dist (ft)	225			225	200			150				
Storage Blk Time (%)		0	0			0	0					
Queuing Penalty (veh)		0	0			0	0					

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	LTR
Maximum Queue (ft)	59
Average Queue (ft)	17
95th Queue (ft)	44
Link Distance (ft)	19
Upstream Blk Time (%)	26
Queuing Penalty (veh)	6
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Background PM (2034)

04/26/2022

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	153	194	373	406	422	288	675	937	954	1061	219	300
Average Queue (ft)	76	89	204	246	256	139	640	825	845	834	85	225
95th Queue (ft)	133	154	335	369	390	311	807	1198	1208	1421	166	390
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)								48	52	58		
Queuing Penalty (veh)								377	407	455		
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)		0	7	15	18	0	76	1		0		1
Queuing Penalty (veh)		1	41	120	54	1	367	4		0		3

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	498	75	418	438	323	186
Average Queue (ft)	378	74	262	294	142	50
95th Queue (ft)	583	78	482	498	335	120
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	31		13	16	4	0
Queuing Penalty (veh)	0		0	0	0	0
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	21	76				
Queuing Penalty (veh)	74	111				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	SB
Directions Served	T	T	T	L	T	T	R
Maximum Queue (ft)	145	321	190	235	265	263	539
Average Queue (ft)	9	24	26	160	187	191	391
95th Queue (ft)	44	166	128	262	339	334	741
Link Distance (ft)	890	890	890	136	136	136	481
Upstream Blk Time (%)		0	0	22	58	65	71
Queuing Penalty (veh)		0	0	136	358	403	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	278	283	535	726	627	802	812	811	807	206	369	341
Average Queue (ft)	148	150	170	228	212	578	608	573	489	101	249	207
95th Queue (ft)	234	238	392	555	434	962	961	972	1003	179	342	303
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)			0	0	0	22	31	37	21			
Queuing Penalty (veh)			0	2	1	0	0	0	0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	102	69	518	200
Average Queue (ft)	43	42	483	190
95th Queue (ft)	156	82	507	237
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		0	87	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			92	62
Queuing Penalty (veh)			172	119

Intersection: 7: Farmwell Road

Movement	EB	WB
Directions Served	TR	LT
Maximum Queue (ft)	60	75
Average Queue (ft)	16	18
95th Queue (ft)	51	53
Link Distance (ft)	282	282
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 4128

Appendix I:
Synchro & SimTraffic Output:
Build-out (2025)

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025)
05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	6	150	816	6	7	1528	63	4	4	4	100	4	345
Future Volume (vph)	6	150	816	6	7	1528	63	4	4	4	100	4	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%			-1%			1%			4%	
Storage Length (ft)		375		0	150		75	0		0	0		0
Storage Lanes		1		0	1		1	0		0	0		2
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1743	3256	0	1778	3455	1591	0	1742	0	0	1725	2731
Flt Permitted		0.060			0.285				0.844			0.393	
Satd. Flow (perm)	0	110	3256	0	533	3455	1591	0	1494	0	0	711	2731
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			1				145		4				379
Link Speed (mph)			45			45			25			45	
Link Distance (ft)			1108			1778			230			106	
Travel Time (s)			16.8			26.9			6.3			1.6	
Confl. Peds. (#/hr)				1	1								
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	9%	19%	2%	5%	2%	2%	2%	2%	3%	2%	2%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	172	904	0	8	1679	69	0	12	0	0	114	379
Turn Type	D.P+P	D.P+P	NA		D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	6			3			4	4
Permitted Phases	6	6			2		6	3			4		
Detector Phase	5	5	2		1	6	6	3	3		4	4	4
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0		7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	70.0		15.0	70.0	70.0	20.0	20.0		15.0	15.0	15.0
Total Split (%)	12.5%	12.5%	58.3%		12.5%	58.3%	58.3%	16.7%	16.7%		12.5%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.6		3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6		-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		89.8	92.2		93.8	79.8	79.8		8.1			10.0	10.0
Actuated g/C Ratio		0.75	0.77		0.78	0.66	0.66		0.07			0.08	0.08
v/c Ratio		0.79	0.36		0.02	0.73	0.06		0.12			1.93	0.66
Control Delay		58.3	6.3		2.6	7.8	0.1		44.9			505.0	11.2
Queue Delay		0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		58.3	6.3		2.6	7.8	0.1		44.9			505.0	11.2
LOS		E	A		A	A	A		D			F	B
Approach Delay			14.6			7.4			44.9			125.4	
Approach LOS			B			A			D			F	
Queue Length 50th (ft)		66	63		1	133	0		6			-136	0
Queue Length 95th (ft)		#197	228		m2	405	1		26			#257	51
Internal Link Dist (ft)			1028			1698			150			26	
Turn Bay Length (ft)		375			150		75						
Base Capacity (vph)		218	2501		521	2296	1106		190			59	575
Starvation Cap Reductn		0	0		0	0	0		0			0	0
Spillback Cap Reductn		0	0		0	0	0		0			0	0
Storage Cap Reductn		0	0		0	0	0		0			0	0
Reduced v/c Ratio		0.79	0.36		0.02	0.73	0.06		0.06			1.93	0.66

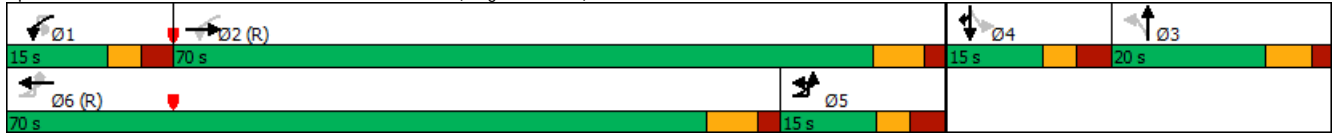
Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	110 (92%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.93
Intersection Signal Delay:	27.3
Intersection LOS:	C
Intersection Capacity Utilization:	85.4%
ICU Level of Service:	E

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
 2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025)
 05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	889	9	17	1567	120	27	10	33	41	4	13
Future Volume (vph)	37	889	9	17	1567	120	27	10	33	41	4	13
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		225	200		150	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			25			25		
Satd. Flow (prot)	1719	3312	1583	1687	3438	1568	0	1690	0	0	1628	0
Flt Permitted	0.950			0.950				0.981			0.966	
Satd. Flow (perm)	1719	3312	1583	1687	3438	1568	0	1690	0	0	1628	0
Link Speed (mph)		45			45			25			30	
Link Distance (ft)		1778			1589			405			118	
Travel Time (s)		26.9			24.1			11.0			2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	5%	9%	2%	7%	5%	3%	4%	2%	3%	8%	2%	15%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	999	10	19	1761	135	0	78	0	0	65	0
Sign Control		Free			Free			Stop			Stop	

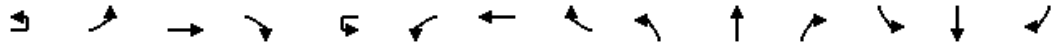
Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	55.7%
Analysis Period (min)	15
	ICU Level of Service B

Intersection												
Int Delay, s/veh	24.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑	↗	↘	↑↑	↗		↕			↕	
Traffic Vol, veh/h	37	889	9	17	1567	120	27	10	33	41	4	13
Future Vol, veh/h	37	889	9	17	1567	120	27	10	33	41	4	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	225	-	225	200	-	150	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	9	2	7	5	3	4	2	3	8	2	15
Mvmt Flow	42	999	10	19	1761	135	30	11	37	46	4	15
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1896	0	0	1009	0	0	2004	3017	500	2388	2892	881
Stage 1	-	-	-	-	-	-	1083	1083	-	1799	1799	-
Stage 2	-	-	-	-	-	-	921	1934	-	589	1093	-
Critical Hdwy	4.2	-	-	4.24	-	-	7.58	6.54	6.96	7.66	6.54	7.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.58	5.54	-	6.66	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.58	5.54	-	6.66	5.54	-
Follow-up Hdwy	2.25	-	-	2.27	-	-	3.54	4.02	3.33	3.58	4.02	3.45
Pot Cap-1 Maneuver	299	-	-	653	-	-	34	13	514	~ 16	16	265
Stage 1	-	-	-	-	-	-	228	292	-	77	130	-
Stage 2	-	-	-	-	-	-	287	111	-	447	288	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	299	-	-	653	-	-	~ 21	~ 11	514	-	13	265
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 21	~ 11	-	-	13	-
Stage 1	-	-	-	-	-	-	196	251	-	66	126	-
Stage 2	-	-	-	-	-	-	254	108	-	341	248	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.8			0.1			\$ 969.2					
HCM LOS							F					
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	31	299	-	-	653	-	-	-				
HCM Lane V/C Ratio	2.537	0.139	-	-	0.029	-	-	-				
HCM Control Delay (s)	\$ 969.2	19	-	-	10.7	-	-	-				
HCM Lane LOS	F	C	-	-	B	-	-	-				
HCM 95th %tile Q(veh)	9.2	0.5	-	-	0.1	-	-	-				
Notes												
-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

Knightsdale Gateway
3: Hodge Road & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025)
05/11/2022



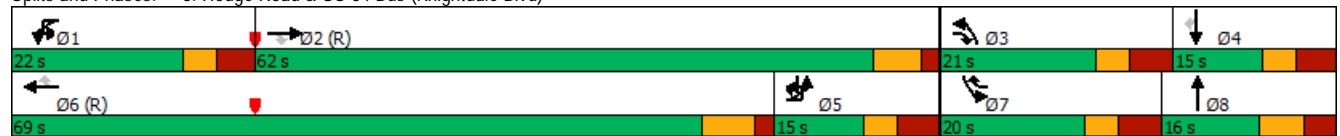
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	7	80	778	97	24	131	1370	217	186	36	200	269	31	143
Future Volume (vph)	7	80	778	97	24	131	1370	217	186	36	200	269	31	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3382	4645	1515	0	1735	5014	1591	3401	1642	0	3416	1818	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3382	4645	1515	0	1735	5014	1591	3401	1642	0	3416	1818	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				101				226		181				154
Link Speed (mph)			45				45			35				25
Link Distance (ft)			746				963			562				518
Travel Time (s)			11.3				14.6			10.9				14.1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	10%	5%	9%	5%	5%	3%	4%	2%	2%	2%	4%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	90	810	101	0	161	1427	226	194	246	0	280	32	149
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	62.0	21.0	22.0	22.0	69.0	20.0	21.0	16.0		20.0	15.0	15.0
Total Split (%)	12.5%	12.5%	51.7%	17.5%	18.3%	18.3%	57.5%	16.7%	17.5%	13.3%		16.7%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9			-1.5	-1.5	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		10.0	60.2	84.9			15.3	65.5	79.8	19.7		14.3	10.3	16.8
Actuated g/C Ratio		0.08	0.50	0.71			0.13	0.55	0.66	0.16		0.12	0.09	0.14
v/c Ratio		0.32	0.35	0.09			0.73	0.52	0.20	0.35		0.69	0.21	0.42
Control Delay		54.2	18.4	3.4			87.7	10.0	0.8	48.1		60.1	54.1	7.7
Queue Delay		0.0	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		54.2	18.4	3.4			87.7	10.0	0.8	48.1		60.1	54.1	7.7
LOS		D	B	A			F	B	A	D		E	D	A
Approach Delay			20.1				15.8			41.5				42.7
Approach LOS			C				B			D				D
Queue Length 50th (ft)		34	154	3			121	108	0	74		108	23	0
Queue Length 95th (ft)		m58	m176	m27			#207	151	23	109		155	57	39
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200			575		375	200				
Base Capacity (vph)		281	2329	1111			245	2736	1141	314		427	163	352
Starvation Cap Reductn		0	0	0			0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0			0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.32	0.35	0.09			0.66	0.52	0.20	0.33		0.66	0.20	0.42

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	60 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	23.3
Intersection Capacity Utilization:	70.9%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	C

- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025)
05/11/2022

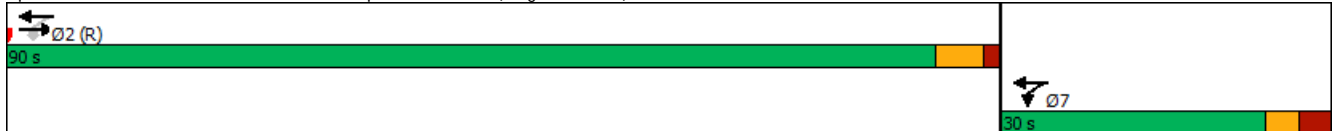


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1177	155	260	1395	0	0	0	0	0	0	360
Future Volume (vph)	0	1177	155	260	1395	0	0	0	0	0	0	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	4869	1410	1695	3423	0	0	0	0	0	0	1564
Flt Permitted				0.206								
Satd. Flow (perm)	0	4869	1380	368	3423	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			163									158
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		963			225			613			525	
Travel Time (s)		14.6			3.4			11.9			10.2	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	6%	14%	7%	6%	2%	2%	2%	6%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1239	163	274	1468	0	0	0	0	0	0	379
Turn Type		NA	Perm	D,P+P	NA							Free
Protected Phases		2		7	2							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		90.0	90.0	30.0								
Total Split (%)		75.0%	75.0%	25.0%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		95.5	95.5	110.0	120.0							120.0
Actuated g/C Ratio		0.80	0.80	0.92	1.00							1.00
v/c Ratio		0.32	0.14	0.55	0.43							0.24
Control Delay		3.3	1.2	22.2	2.4							0.4
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		3.3	1.2	22.2	2.4							0.4
LOS		A	A	C	A							A
Approach Delay		3.1			5.5						0.4	
Approach LOS		A			A						A	
Queue Length 50th (ft)		60	0	69	62							0
Queue Length 95th (ft)		96	m8	157	62							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3876	1131	629	3416							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.32	0.14	0.44	0.43							0.24

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 57 (48%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 4.0
 Intersection Capacity Utilization 55.7%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025)
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕↔		↕↔	↕↕↕			
Traffic Volume (vph)	439	1113	0	0	1531	712	111	4	409	0	0	0
Future Volume (vph)	439	1113	0	0	1531	712	111	4	409	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3352	4918	0	0	4869	1530	0	1759	2630	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3351	4918	0	0	4869	1511	0	1759	2630	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						656			183			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	6%	2%	2%	6%	5%	2%	2%	7%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	467	1184	0	0	1629	757	0	122	435	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	25.0	85.0			60.0	60.0	35.0	35.0	35.0			
Total Split (%)	20.8%	70.8%			50.0%	50.0%	29.2%	29.2%	29.2%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4	-1.4	-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag					Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	20.0	92.8			67.8	67.8		17.2	17.2			
Actuated g/C Ratio	0.17	0.77			0.56	0.56		0.14	0.14			
v/c Ratio	0.84	0.31			0.59	0.67		0.48	0.81			
Control Delay	53.0	3.4			18.9	6.0		52.5	40.7			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	53.0	3.4			18.9	6.0		52.5	40.7			
LOS	D	A			B	A		D	D			
Approach Delay		17.4			14.8			43.3				
Approach LOS		B			B			D				
Queue Length 50th (ft)	168	61			288	35		88	110			
Queue Length 95th (ft)	#261	92			386	163		140	164			
Internal Link Dist (ft)		768			734			653			493	
Turn Bay Length (ft)	500											
Base Capacity (vph)	558	3801			2749	1138		439	794			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.84	0.31			0.59	0.67		0.28	0.55			

Intersection Summary

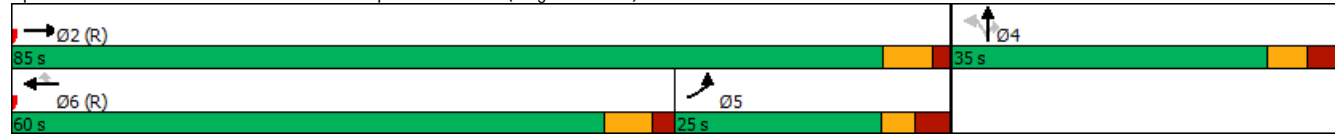
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 19.2
 Intersection Capacity Utilization 75.6%

Intersection LOS: B
 ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			R
Traffic Volume (vph)	4	4	202	10	14	443
Future Volume (vph)	4	4	202	10	14	443
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1440	0	1844	0	0	3465
Flt Permitted	0.976					0.999
Satd. Flow (perm)	1440	0	1844	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	38%	2%	2%	11%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	233	0	0	502
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	32.4%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	4	202	10	14	443
Future Vol, veh/h	4	4	202	10	14	443
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	38	2	2	11	2	2
Mvmt Flow	4	4	222	11	15	487

Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	502	228	0	0	233
Stage 1	228	-	-	-	-
Stage 2	274	-	-	-	-
Critical Hdwy	7.17	6.23	-	-	4.13
Critical Hdwy Stg 1	5.97	-	-	-	-
Critical Hdwy Stg 2	6.37	-	-	-	-
Follow-up Hdwy	3.861	3.319	-	-	2.219
Pot Cap-1 Maneuver	444	811	-	-	1333
Stage 1	720	-	-	-	-
Stage 2	663	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	437	811	-	-	1333
Mov Cap-2 Maneuver	437	-	-	-	-
Stage 1	720	-	-	-	-
Stage 2	653	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.4	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	568	1333	-
HCM Lane V/C Ratio	-	-	0.015	0.012	-
HCM Control Delay (s)	-	-	11.4	7.7	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-

Knightdale Gateway
7: Farmwell Road & Site Access

Build-out AM (2025)
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	17	4	10	4	4	4	4	165	4	4	43	4
Future Volume (vph)	17	4	10	4	4	4	4	165	4	4	43	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	1733	0	0	1566	0	0	1821	0	0	1735	0
Flt Permitted		0.973			0.984			0.999			0.996	
Satd. Flow (perm)	0	1733	0	0	1566	0	0	1821	0	0	1735	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		316			305			118			529	
Travel Time (s)		7.2			6.9			2.7			12.0	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	38%	2%	2%	2%	4%	2%	2%	9%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	34	0	0	12	0	0	193	0	0	56	0
Sign Control		Stop			Stop			Free			Yield	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	19.9%						ICU Level of Service A					
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	4	10	4	4	4	4	165	4	4	43	4
Future Vol, veh/h	17	4	10	4	4	4	4	165	4	4	43	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Yield	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	38	2	2	2	4	2	2	9	2
Mvmt Flow	19	4	11	4	4	4	4	185	4	4	48	4

Major/Minor	Minor2		Minor1			Major1			
Conflicting Flow All	199	197	0	203	195	187	0	0	0
Stage 1	0	0	-	195	195	-	-	-	-
Stage 2	199	197	-	8	0	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.48	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	-	-	-	6.48	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.842	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	760	699	-	684	700	855	-	-	-
Stage 1	-	-	-	731	739	-	-	-	-
Stage 2	803	738	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	752	699	-	-	700	855	-	-	-
Mov Cap-2 Maneuver	752	699	-	-	700	-	-	-	-
Stage 1	-	-	-	731	739	-	-	-	-
Stage 2	794	738	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s			
HCM LOS	-	-	-

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

7: Farmwell Road & Site Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	60.1	76.9	120.6
Total Del/Veh (s)	96.5	129.2	223.9	162.4	33.8	21.3	0.2	0.6	0.1	550.1	575.6	654.0

7: Farmwell Road & Site Access Performance by movement

Movement	All
Denied Del/Veh (s)	15.6
Total Del/Veh (s)	133.3

7: Farmwell Road & Site Access Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	80.2	15.6
Total Del/Veh (s)	141.4	79.4	0.6	581.8	133.3

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	255	149	121	73	317	328	162	58	69	52	47
Average Queue (ft)	109	47	31	6	148	159	26	14	23	26	25
95th Queue (ft)	221	111	86	44	273	287	100	43	52	45	43
Link Distance (ft)		1060	1060		1711	1711		169	2	2	2
Upstream Blk Time (%)									51	81	91
Queuing Penalty (veh)									76	121	136
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)					7	21	0				
Queuing Penalty (veh)					1	13	2				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	WB	WB	WB	WB	B12	B12	NB	SB
Directions Served	UL	T	L	T	T	R	T	T	LTR	LTR
Maximum Queue (ft)	72	2	41	2	3	26	119	139	306	60
Average Queue (ft)	19	0	9	0	0	2	4	12	136	27
95th Queue (ft)	54	2	31	1	2	17	86	160	304	46
Link Distance (ft)		1711		1527	1527		659	659	336	18
Upstream Blk Time (%)								0	5	86
Queuing Penalty (veh)								0	0	49
Storage Bay Dist (ft)	225		200			150				
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	84	95	161	182	223	92	246	303	362	276	92	300
Average Queue (ft)	29	44	80	98	123	28	129	161	171	99	36	208
95th Queue (ft)	67	81	140	162	199	71	221	265	292	225	77	368
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)			0	0	1					0		2
Queuing Penalty (veh)			0	0	1					0		5

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	501	76	171	208	88	84
Average Queue (ft)	336	74	95	123	28	43
95th Queue (ft)	539	79	159	188	67	73
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	14					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	30	66				
Queuing Penalty (veh)	99	123				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	L	T	T
Maximum Queue (ft)	78	68	85	216	44	49
Average Queue (ft)	8	9	11	108	2	2
95th Queue (ft)	44	43	55	194	23	21
Link Distance (ft)	890	890	890	136	136	136
Upstream Blk Time (%)				7		
Queuing Penalty (veh)				39		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	290	273	150	132	149	316	361	273	447	192	216	162
Average Queue (ft)	153	147	58	48	68	178	218	150	209	95	110	56
95th Queue (ft)	253	243	121	108	125	281	317	240	362	165	182	131
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	87	54	514	200
Average Queue (ft)	23	24	483	197
95th Queue (ft)	74	68	499	209
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		1	95	
Queuing Penalty (veh)		3	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			94	95
Queuing Penalty (veh)			209	224

Intersection: 7: Farmwell Road & Site Access

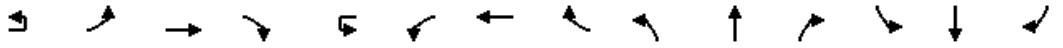
Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	150	92	15	369
Average Queue (ft)	48	20	1	220
95th Queue (ft)	130	71	10	505
Link Distance (ft)	287	276	18	499
Upstream Blk Time (%)			1	17
Queuing Penalty (veh)			2	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 1102

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025)
05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕			↔	↕	↗		↕			↕	↗
Traffic Volume (vph)	25	373	1762	4	6	4	1340	117	4	4	4	103	4	158
Future Volume (vph)	25	373	1762	4	6	4	1340	117	4	4	4	103	4	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%			1%			4%	
Storage Length (ft)		375		0		150		75	0		0	0		0
Storage Lanes		1		0		1		1	0		0	0		2
Taper Length (ft)		100				100			25			25		
Satd. Flow (prot)	0	1743	3486	0	0	1778	3557	1591	0	1480	0	0	1742	2731
Flt Permitted		0.071				0.072				0.844			0.393	
Satd. Flow (perm)	0	130	3486	0	0	135	3557	1591	0	1270	0	0	717	2731
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)								122		4				176
Link Speed (mph)			45				45			25			45	
Link Distance (ft)			1108				1778			230			106	
Travel Time (s)			16.8				26.9			6.3			1.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	56%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	424	1878	0	0	10	1426	124	0	12	0	0	114	168
Turn Type	D.P+P	D.P+P	NA		D.P+P	D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	1	6			3			4	4
Permitted Phases	6	6			2	2		6	3			4		
Detector Phase	5	5	2		1	1	6	6	3	3		4	4	4
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0		7.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	85.0		15.0	15.0	80.0	80.0	25.0	25.0		15.0	15.0	15.0
Total Split (%)	14.3%	14.3%	60.7%		10.7%	10.7%	57.1%	57.1%	17.9%	17.9%		10.7%	10.7%	10.7%
Yellow Time (s)	3.0	3.0	4.6		3.0	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6			-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0			5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		109.6	111.6			113.6	75.0	75.0		8.2			10.0	10.0
Actuated g/C Ratio		0.78	0.80			0.81	0.54	0.54		0.06			0.07	0.07
v/c Ratio		0.85	0.68			0.05	0.75	0.14		0.15			2.24	0.47
Control Delay		54.1	10.0			1.1	17.2	2.2		53.7			641.5	11.9
Queue Delay		0.0	0.0			0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		54.1	10.0			1.1	17.2	2.2		53.7			641.5	11.9
LOS		D	B			A	B	A		D			F	B
Approach Delay			18.1				15.9			53.7			266.5	
Approach LOS			B				B			D			F	
Queue Length 50th (ft)		276	208			0	531	8		7			-167	0
Queue Length 95th (ft)		#575	747			m1	559	23		29			#297	36
Internal Link Dist (ft)			1028				1698			150			26	
Turn Bay Length (ft)		375				150		75						
Base Capacity (vph)		500	2779			227	1905	908		184			51	358
Starvation Cap Reductn		0	0			0	0	0		0			0	0
Spillback Cap Reductn		0	0			0	0	0		0			0	0
Storage Cap Reductn		0	0			0	0	0		0			0	0
Reduced v/c Ratio		0.85	0.68			0.04	0.75	0.14		0.07			2.24	0.47

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	23 (16%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	140
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	2.24
Intersection Signal Delay:	34.3
Intersection Capacity Utilization:	87.4%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	E

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
 2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025)
 05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	6	40	1855	35	38	1370	84	8	4	7	150	8	66
Future Volume (vph)	6	40	1855	35	38	1370	84	8	4	7	150	8	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		225		225	200		150		0	0	0		0
Storage Lanes		1		1	1		1		0	0	0		0
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1683	3539	1583	1770	3539	1524	0	1732	0	0	1689	0
Flt Permitted		0.950			0.950				0.979			0.967	
Satd. Flow (perm)	0	1683	3539	1583	1770	3539	1524	0	1732	0	0	1689	0
Link Speed (mph)			45			45			25			30	
Link Distance (ft)			1778			1589			405			118	
Travel Time (s)			26.9			24.1			11.0			2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	8%	2%	2%	2%	2%	6%	2%	2%	2%	3%	2%	8%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	48	1953	37	40	1442	88	0	19	0	0	235	0
Sign Control			Free			Free			Stop			Stop	

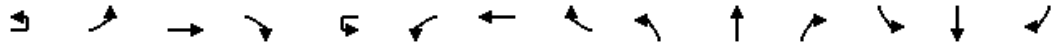
Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	77.4%
ICU Level of Service	D
Analysis Period (min)	15

Intersection													
Int Delay, s/veh	26.4												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↕	↕	↕	↕		↕			↕	
Traffic Vol, veh/h	6	40	1855	35	38	1370	84	8	4	7	150	8	66
Future Vol, veh/h	6	40	1855	35	38	1370	84	8	4	7	150	8	66
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	225	-	225	200	-	150	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	8	2	2	2	2	6	2	2	2	3	2	8
Mvmt Flow	6	42	1953	37	40	1442	88	8	4	7	158	8	69
Major/Minor	Major1			Major2			Minor1			Minor2			
Conflicting Flow All	1442	1530	0	0	1990	0	0	2854	3659	977	2597	3608	721
Stage 1	-	-	-	-	-	-	-	2049	2049	-	1522	1522	-
Stage 2	-	-	-	-	-	-	-	805	1610	-	1075	2086	-
Critical Hdwy	6.44	4.26	-	-	4.14	-	-	7.54	6.54	6.94	7.56	6.54	7.06
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.54	5.54	-	6.56	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.54	5.54	-	6.56	5.54	-
Follow-up Hdwy	2.52	2.28	-	-	2.22	-	-	3.52	4.02	3.32	3.53	4.02	3.38
Pot Cap-1 Maneuver	*700	772	-	-	286	-	-	*~ 5	~ 1	250	*~ 12	*~ 1	*522
Stage 1	-	-	-	-	-	-	-	*57	97	-	*500	*439	-
Stage 2	-	-	-	-	-	-	-	*501	372	-	*233	*93	-
Platoon blocked, %	1	1	-	-	-	-	-	1	1	-	1	1	1
Mov Cap-1 Maneuver	*747	747	-	-	286	-	-	*~ 3	~ 1	250	*~ 9	*~ 1	*522
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	*42	63	-	*~ 113	*38	-
Stage 1	-	-	-	-	-	-	-	*53	91	-	*468	*378	-
Stage 2	-	-	-	-	-	-	-	*365	320	-	*202	*87	-
Approach	EB			WB			NB			SB			
HCM Control Delay, s	0.2			0.5			80.1			\$ 421.4			
HCM LOS	F			F			F			F			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1					
Capacity (veh/h)	67	747	-	-	286	-	-	135					
HCM Lane V/C Ratio	0.299	0.065	-	-	0.14	-	-	1.747					
HCM Control Delay (s)	80.1	10.2	-	-	19.6	-	-	\$ 421.4					
HCM Lane LOS	F	B	-	-	C	-	-	F					
HCM 95th %tile Q(veh)	1.1	0.2	-	-	0.5	-	-	17.6					
Notes													
-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon													

Knightsdale Gateway
3: Hodge Road & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025)
05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↕↕↕	↗		↔	↕↕↕	↗	↔↔	↔		↔↔	↕	↗
Traffic Volume (vph)	8	162	1658	261	32	368	1264	422	123	46	208	255	114	130
Future Volume (vph)	8	162	1658	261	32	368	1264	422	123	46	208	255	114	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3362	5009	1560	0	1796	5111	1607	3467	1650	0	3416	1853	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3360	5009	1560	0	1796	5111	1587	3467	1650	0	3416	1853	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				97				390		137				182
Link Speed (mph)			45				45			35			25	
Link Distance (ft)			746				963			562			518	
Travel Time (s)			11.3				14.6			10.9			14.1	
Confl. Peds. (#/hr)		1						1						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	14%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	183	1783	281	0	430	1359	454	132	273	0	274	123	140
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	65.0	25.0	35.0	35.0	80.0	15.0	25.0	25.0		15.0	15.0	20.0
Total Split (%)	14.3%	14.3%	46.4%	17.9%	25.0%	25.0%	57.1%	10.7%	17.9%	17.9%		10.7%	10.7%	14.3%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		13.3	62.3	74.8		30.0	79.0	89.0	12.5	17.7		10.0	15.2	33.5
Actuated g/C Ratio		0.10	0.44	0.53		0.21	0.56	0.64	0.09	0.13		0.07	0.11	0.24
v/c Ratio		0.57	0.80	0.32		1.12	0.47	0.39	0.43	0.83		1.12	0.61	0.27
Control Delay		67.6	31.8	6.1		117.6	8.8	1.0	64.0	50.6		151.6	73.3	3.4
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		67.6	31.8	6.1		117.6	8.8	1.0	64.0	50.6		151.6	73.3	3.4
LOS		E	C	A		F	A	A	E	D		F	E	A
Approach Delay			31.5				28.1			55.0				95.0
Approach LOS			C				C			D				F
Queue Length 50th (ft)		83	528	58		-451	117	1	59	122		-147	107	0
Queue Length 95th (ft)		m114	m462	m46		#657	141	3	91	#252		#242	#199	24
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		360	2230	957		384	2884	1152	495	353		244	200	532
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.51	0.80	0.29		1.12	0.47	0.39	0.27	0.77		1.12	0.61	0.26

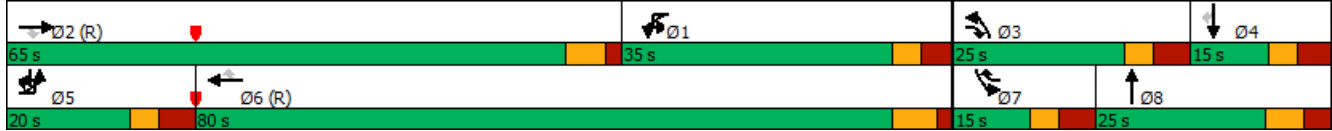
Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	84 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.12
Intersection Signal Delay:	38.1
Intersection LOS:	D
Intersection Capacity Utilization:	93.4%
ICU Level of Service:	F

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightsdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025)
05/11/2022

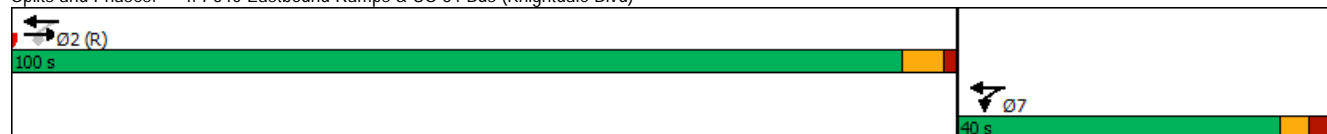


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1985	104	233	1423	0	0	0	0	0	0	689
Future Volume (vph)	0	1985	104	233	1423	0	0	0	0	0	0	689
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	5060	1575	1778	3557	0	0	0	0	0	0	1564
Flt Permitted				0.062								
Satd. Flow (perm)	0	5060	1575	116	3557	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			114									139
Link Speed (mph)		45			45			35				35
Link Distance (ft)		963			225			613				525
Travel Time (s)		14.6			3.4			11.9				10.2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2181	114	256	1564	0	0	0	0	0	0	757
Turn Type		NA	Perm	D.P+P	NA							Free
Protected Phases		2		7	2 7							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2 7							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		100.0	100.0	40.0								
Total Split (%)		71.4%	71.4%	28.6%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		106.3	106.3	130.0	140.0							140.0
Actuated g/C Ratio		0.76	0.76	0.93	1.00							1.00
v/c Ratio		0.57	0.09	0.66	0.44							0.48
Control Delay		4.4	0.9	56.7	3.6							1.1
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		4.4	0.9	56.7	3.6							1.1
LOS		A	A	E	A							A
Approach Delay		4.2			11.1						1.1	
Approach LOS		A			B						A	
Queue Length 50th (ft)		140	2	169	126							0
Queue Length 95th (ft)		m156	m4	255	116							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3840	1223	526	3536							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.57	0.09	0.49	0.44							0.48

Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 72 (51%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 6.3
 Intersection Capacity Utilization 107.4%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025)
05/11/2022

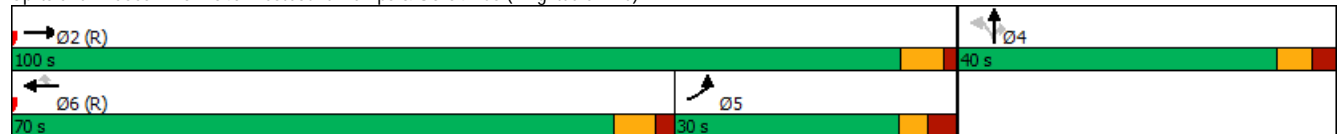


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕		↕	↕↕			
Traffic Volume (vph)	389	2569	0	0	1536	592	121	4	580	0	0	0
Future Volume (vph)	389	2569	0	0	1536	592	121	4	580	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3417	5111	0	0	5060	1575	0	1727	2759	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3417	5111	0	0	5060	1575	0	1727	2759	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						556			76			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	4%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	397	2621	0	0	1567	604	0	127	592	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4		-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	25.0	99.2			69.2	69.2		30.8	30.8			
Actuated g/C Ratio	0.18	0.71			0.49	0.49		0.22	0.22			
v/c Ratio	0.65	0.72			0.63	0.57		0.33	0.89			
Control Delay	45.9	4.2			27.9	5.1		47.5	62.0			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	45.9	4.2			27.9	5.1		47.5	62.0			
LOS	D	A			C	A		D	E			
Approach Delay		9.7			21.6			59.4				
Approach LOS		A			C			E				
Queue Length 50th (ft)	185	109			380	23		97	262			
Queue Length 95th (ft)	242	124			452	111		155	335			
Internal Link Dist (ft)		768			734			653			493	
Turn Bay Length (ft)	500											
Base Capacity (vph)	610	3620			2500	1059		431	746			
Starvation Cap Reductn	0	18			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.65	0.73			0.63	0.57		0.29	0.79			

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	68 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	20.1
Intersection Capacity Utilization:	78.3%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	D

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T	R		R
Traffic Volume (vph)	10	16	486	6	7	251
Future Volume (vph)	10	16	486	6	7	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1678	0	1859	0	0	3465
Flt Permitted	0.981					0.999
Satd. Flow (perm)	1678	0	1859	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	523	0	0	274
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	35.9%
Analysis Period (min)	15
	ICU Level of Service A

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	16	486	6	7	251
Future Vol, veh/h	10	16	486	6	7	251
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	17	517	6	7	267

Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	668	520	0	0	523
Stage 1	520	-	-	-	-
Stage 2	148	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13
Critical Hdwy Stg 1	5.43	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219
Pot Cap-1 Maneuver	407	555	-	-	1042
Stage 1	596	-	-	-	-
Stage 2	865	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	404	555	-	-	1042
Mov Cap-2 Maneuver	404	-	-	-	-
Stage 1	596	-	-	-	-
Stage 2	858	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	485	1042	-
HCM Lane V/C Ratio	-	-	0.057	0.007	-
HCM Control Delay (s)	-	-	12.9	8.5	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Knightdale Gateway
7: Farmwell Road & Site Access

Build-out PM (2025)
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	8	4	9	12	6	4	8	107	12	4	203	18
Future Volume (vph)	8	4	9	12	6	4	8	107	12	4	203	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	1426	0	0	1548	0	0	1760	0	0	1824	0
Flt Permitted		0.981			0.973			0.997			0.999	
Satd. Flow (perm)	0	1426	0	0	1548	0	0	1760	0	0	1824	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		316			305			118			529	
Travel Time (s)		7.2			6.9			2.7			12.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	113%	2%	28%	2%	2%	2%	7%	2%	2%	3%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	21	0	0	23	0	0	134	0	0	237	0
Sign Control		Stop			Stop			Free			Yield	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	22.9%						ICU Level of Service A					
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	4	9	12	6	4	8	107	12	4	203	18
Future Vol, veh/h	8	4	9	12	6	4	8	107	12	4	203	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Yield	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	113	2	28	2	2	2	7	2	2	3	2
Mvmt Flow	8	4	9	13	6	4	8	113	13	4	214	19

Major/Minor	Minor2		Minor1			Major1		
Conflicting Flow All	141	142	0	143	136	120	0	0
Stage 1	0	0	-	136	136	-	-	-
Stage 2	141	142	-	7	0	-	-	-
Critical Hdwy	7.12	7.63	6.22	7.38	6.52	6.22	4.12	-
Critical Hdwy Stg 1	-	-	-	6.38	5.52	-	-	-
Critical Hdwy Stg 2	6.12	6.63	-	-	-	-	-	-
Follow-up Hdwy	3.518	5.017	3.318	3.752	4.018	3.318	2.218	-
Pot Cap-1 Maneuver	829	585	-	770	755	931	-	-
Stage 1	-	-	-	809	784	-	-	-
Stage 2	862	609	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	820	585	-	-	755	931	-	-
Mov Cap-2 Maneuver	820	585	-	-	755	-	-	-
Stage 1	-	-	-	809	784	-	-	-
Stage 2	851	609	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s			
HCM LOS	-	-	-

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

7: Farmwell Road & Site Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	85.9	32.8	33.5	111.1	163.7	106.2	0.0	0.0	0.0	2010.5	1823.7	1648.0
Total Del/Veh (s)	587.1	533.4	688.7	955.4	710.5	755.5	0.4	1.2	0.3		2284.3	2227.9

7: Farmwell Road & Site Access Performance by movement

Movement	All
Denied Del/Veh (s)	1103.6
Total Del/Veh (s)	605.3

7: Farmwell Road & Site Access Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	51.7	124.3	0.0	1812.0	1103.6
Total Del/Veh (s)	616.5	858.7	1.1	2299.5	605.3

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	430	433	329	41	236	234	84	72	41	46	60
Average Queue (ft)	211	118	103	7	89	95	17	16	23	18	22
95th Queue (ft)	374	295	234	28	181	188	63	53	39	38	46
Link Distance (ft)		1060	1060		1711	1711		169	2	2	2
Upstream Blk Time (%)									80	66	90
Queuing Penalty (veh)									69	57	78
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)	2	0			2	14	0				
Queuing Penalty (veh)	17	0			0	17	1				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	B12	B12	NB	SB
Directions Served	UL	T	T	R	L	T	T	R	T	T	LTR	LTR
Maximum Queue (ft)	79	21	1	7	74	70	71	34	453	551	138	50
Average Queue (ft)	21	1	0	0	21	11	11	5	20	34	59	24
95th Queue (ft)	63	21	1	4	55	143	144	44	204	277	153	40
Link Distance (ft)		1711	1711			1527	1527		659	659	336	18
Upstream Blk Time (%)									0	0		96
Queuing Penalty (veh)									0	1		215
Storage Bay Dist (ft)	225			225	200			150				
Storage Blk Time (%)							2	2				
Queuing Penalty (veh)							1	11				

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	140	199	370	399	418	300	675	947	957	1057	210	300
Average Queue (ft)	66	85	202	244	253	115	650	830	841	829	83	201
95th Queue (ft)	121	148	313	352	366	278	779	1218	1230	1423	161	380
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)								49	54	58		
Queuing Penalty (veh)								348	380	409		
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)		0	5	16	20	0	78	1		0		1
Queuing Penalty (veh)		0	28	114	52	1	331	4		0		2

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	502	75	372	396	255	125
Average Queue (ft)	352	74	203	236	117	43
95th Queue (ft)	558	79	361	394	228	92
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	17		1	2	0	0
Queuing Penalty (veh)	0		0	0	0	0
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	22	72				
Queuing Penalty (veh)	69	89				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	SB
Directions Served	T	T	T	L	T	T	R
Maximum Queue (ft)	52	94	179	229	262	266	537
Average Queue (ft)	3	7	19	149	189	190	387
95th Queue (ft)	23	44	150	249	336	337	733
Link Distance (ft)	890	890	890	136	136	136	481
Upstream Blk Time (%)			0	20	59	67	70
Queuing Penalty (veh)			0	108	326	368	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	247	245	404	706	609	773	774	772	752	199	352	297
Average Queue (ft)	143	143	113	165	175	513	546	511	408	98	225	184
95th Queue (ft)	217	213	274	443	401	939	942	956	939	168	310	266
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)			0	0	0	13	22	29	17			
Queuing Penalty (veh)			0	1	1	0	0	0	0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	148	58	504	200
Average Queue (ft)	55	24	439	189
95th Queue (ft)	169	68	580	239
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		0	61	
Queuing Penalty (veh)		2	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			94	78
Queuing Penalty (veh)			118	103

Intersection: 7: Farmwell Road & Site Access

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	244	261	4	524
Average Queue (ft)	114	154	1	507
95th Queue (ft)	280	323	6	533
Link Distance (ft)	287	276	18	499
Upstream Blk Time (%)	13	24	2	100
Queuing Penalty (veh)	0	0	3	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 3324

Appendix J:
Synchro & SimTraffic Output:
Build-out (2025) – Improved

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025) - Improved
05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	6	150	816	6	7	1528	63	4	4	4	100	4	345
Future Volume (vph)	6	150	816	6	7	1528	63	4	4	4	100	4	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%			-1%			1%			4%	
Storage Length (ft)		375		0	150		75	0		0	0		0
Storage Lanes		1		0	1		1	0		0	0		2
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1743	3256	0	1778	3455	1591	0	1742	0	0	1725	2731
Flt Permitted		0.060			0.285				0.844			0.393	
Satd. Flow (perm)	0	110	3256	0	533	3455	1591	0	1494	0	0	711	2731
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			1				145		4				379
Link Speed (mph)			45			45			25			45	
Link Distance (ft)			1108			1778			230			106	
Travel Time (s)			16.8			26.9			6.3			1.6	
Confl. Peds. (#/hr)				1	1								
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	9%	19%	2%	5%	2%	2%	2%	2%	3%	2%	2%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	172	904	0	8	1679	69	0	12	0	0	114	379
Turn Type	D.P+P	D.P+P	NA		D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	6			3			4	4
Permitted Phases	6	6			2		6	3			4		
Detector Phase	5	5	2		1	6	6	3	3		4	4	4
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0		7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	70.0		15.0	70.0	70.0	20.0	20.0		15.0	15.0	15.0
Total Split (%)	12.5%	12.5%	58.3%		12.5%	58.3%	58.3%	16.7%	16.7%		12.5%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.6		3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6		-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		89.8	92.2		93.8	79.8	79.8		8.1			10.0	10.0
Actuated g/C Ratio		0.75	0.77		0.78	0.66	0.66		0.07			0.08	0.08
v/c Ratio		0.79	0.36		0.02	0.73	0.06		0.12			1.93	0.66
Control Delay		58.3	6.3		0.6	4.9	0.1		44.9			505.0	11.2
Queue Delay		0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		58.3	6.3		0.6	4.9	0.1		44.9			505.0	11.2
LOS		E	A		A	A	A		D			F	B
Approach Delay			14.6			4.7			44.9			125.4	
Approach LOS			B			A			D			F	
Queue Length 50th (ft)		66	63		0	48	0		6			-136	0
Queue Length 95th (ft)		#197	228		m0	120	m0		26			#257	51
Internal Link Dist (ft)			1028			1698			150			26	
Turn Bay Length (ft)		375			150		75						
Base Capacity (vph)		218	2501		521	2296	1106		190			59	575
Starvation Cap Reductn		0	0		0	0	0		0			0	0
Spillback Cap Reductn		0	0		0	0	0		0			0	0
Storage Cap Reductn		0	0		0	0	0		0			0	0
Reduced v/c Ratio		0.79	0.36		0.02	0.73	0.06		0.06			1.93	0.66

Intersection Summary
 Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 110 (92%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.93
 Intersection Signal Delay: 25.9
 Intersection Capacity Utilization 85.4%
 Intersection LOS: C
 ICU Level of Service E

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025) - Improved
05/11/2022

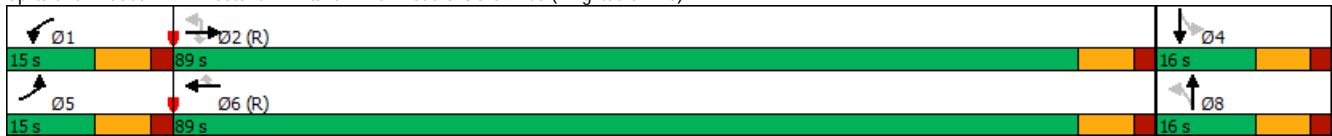


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	889	9	17	1567	120	27	10	33	41	4	13
Future Volume (vph)	37	889	9	17	1567	120	27	10	33	41	4	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		225	200		150	0		0	0		0
Storage Lanes	1		1	1		1	0		0	1		0
Taper Length (ft)	100			100			25			25		
Satd. Flow (prot)	1719	3312	1583	1687	3438	1568	0	1690	0	1671	1493	0
Flt Permitted	0.950			0.950				0.866		0.646		
Satd. Flow (perm)	1719	3312	1583	1687	3438	1568	0	1492	0	1136	1493	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			102		30			15	
Link Speed (mph)		45			45			25			30	
Link Distance (ft)		1778			1589			405			118	
Travel Time (s)		26.9			24.1			11.0			2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	5%	9%	2%	7%	5%	3%	4%	2%	3%	8%	2%	15%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	999	10	19	1761	135	0	78	0	46	19	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	15.0	20.0	20.0	15.0	20.0	20.0	15.0	15.0		15.0	15.0	
Total Split (s)	15.0	89.0	89.0	15.0	89.0	89.0	16.0	16.0		16.0	16.0	
Total Split (%)	12.5%	74.2%	74.2%	12.5%	74.2%	74.2%	13.3%	13.3%		13.3%	13.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effect Green (s)	9.6	97.4	97.4	9.3	91.6	91.6		10.4		10.4	10.4	
Actuated g/C Ratio	0.08	0.81	0.81	0.08	0.76	0.76		0.09		0.09	0.09	
v/c Ratio	0.31	0.37	0.01	0.15	0.67	0.11		0.50		0.47	0.13	
Control Delay	54.5	4.4	0.0	68.9	9.0	1.0		45.0		67.9	28.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	54.5	4.4	0.0	68.9	9.0	1.0		45.0		67.9	28.3	
LOS	D	A	A	E	A	A		D		E	C	
Approach Delay		6.3			9.1			45.0			56.3	
Approach LOS		A			A			D			E	
Queue Length 50th (ft)	32	67	0	15	442	1		35		34	3	
Queue Length 95th (ft)	m63	m150	m0	m33	377	5		86		74	27	
Internal Link Dist (ft)		1698			1509			325			38	
Turn Bay Length (ft)	225		225	200		150						
Base Capacity (vph)	143	2689	1304	140	2623	1221		164		104	150	
Starvation Cap Reductn	0	0	0	0	0	0		0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0		0		0	0	
Storage Cap Reductn	0	0	0	0	0	0		0		0	0	
Reduced v/c Ratio	0.29	0.37	0.01	0.14	0.67	0.11		0.48		0.44	0.13	

Intersection Summary

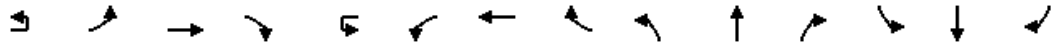
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 71 (59%), Referenced to phase 2:EBTU and 6:WBT, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 10.0 Intersection LOS: B
 Intersection Capacity Utilization 62.4% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)



Knightdale Gateway
3: Hodge Road & US 64 Bus (Knightdale Blvd)

Build-out AM (2025) - Improved
05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	7	80	778	97	24	131	1370	217	186	36	200	269	31	143
Future Volume (vph)	7	80	778	97	24	131	1370	217	186	36	200	269	31	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3382	4645	1515	0	1735	5014	1591	3401	1642	0	3416	1818	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3382	4645	1515	0	1735	5014	1591	3401	1642	0	3416	1818	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				101				226		181				154
Link Speed (mph)			45				45			35				25
Link Distance (ft)			746				963			562				518
Travel Time (s)			11.3				14.6			10.9				14.1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	10%	5%	9%	5%	5%	3%	4%	2%	2%	2%	4%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	90	810	101	0	161	1427	226	194	246	0	280	32	149
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	62.0	21.0	22.0	22.0	69.0	20.0	21.0	16.0		20.0	15.0	15.0
Total Split (%)	12.5%	12.5%	51.7%	17.5%	18.3%	18.3%	57.5%	16.7%	17.5%	13.3%		16.7%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9			-1.5	-1.5	-1.9	-1.9		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		10.0	60.2	84.9			15.3	65.5	79.8	19.7		14.3	10.3	16.8
Actuated g/C Ratio		0.08	0.50	0.71			0.13	0.55	0.66	0.16		0.12	0.09	0.14
v/c Ratio		0.32	0.35	0.09			0.73	0.52	0.20	0.35		0.69	0.21	0.42
Control Delay		54.6	20.1	3.2			87.7	10.0	0.8	48.1		60.1	54.1	7.7
Queue Delay		0.0	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		54.6	20.1	3.2			87.7	10.0	0.8	48.1		60.1	54.1	7.7
LOS		D	C	A			F	B	A	D		E	D	A
Approach Delay			21.5				15.8			41.5				42.7
Approach LOS			C				B			D				D
Queue Length 50th (ft)		35	143	2			121	108	0	74		108	23	0
Queue Length 95th (ft)		52	206	29			#207	151	23	109		155	57	39
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200			575		375	200				
Base Capacity (vph)		281	2329	1111			245	2736	1141	314		427	163	352
Starvation Cap Reductn		0	0	0			0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0			0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.32	0.35	0.09			0.66	0.52	0.20	0.33		0.66	0.20	0.42

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	60 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	23.7
Intersection Capacity Utilization:	70.9%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	C

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025) - Improved
05/11/2022

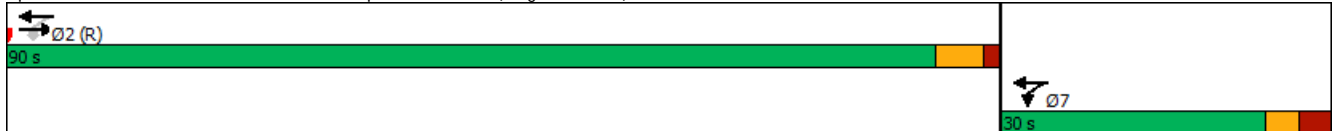


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1177	155	260	1395	0	0	0	0	0	0	360
Future Volume (vph)	0	1177	155	260	1395	0	0	0	0	0	0	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	4869	1410	1695	3423	0	0	0	0	0	0	1564
Flt Permitted				0.206								
Satd. Flow (perm)	0	4869	1380	368	3423	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			163									158
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		963			225			613			525	
Travel Time (s)		14.6			3.4			11.9			10.2	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	6%	14%	7%	6%	2%	2%	2%	6%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1239	163	274	1468	0	0	0	0	0	0	379
Turn Type		NA	Perm	D,P+P	NA							Free
Protected Phases		2		7	2							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		90.0	90.0	30.0								
Total Split (%)		75.0%	75.0%	25.0%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		95.5	95.5	110.0	120.0							120.0
Actuated g/C Ratio		0.80	0.80	0.92	1.00							1.00
v/c Ratio		0.32	0.14	0.55	0.43							0.24
Control Delay		3.3	1.2	22.2	2.4							0.4
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		3.3	1.2	22.2	2.4							0.4
LOS		A	A	C	A							A
Approach Delay		3.1			5.5						0.4	
Approach LOS		A			A						A	
Queue Length 50th (ft)		60	0	69	62							0
Queue Length 95th (ft)		96	m8	157	62							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3876	1131	629	3416							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.32	0.14	0.44	0.43							0.24

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 57 (48%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 4.0
 Intersection LOS: A
 Intersection Capacity Utilization 55.7%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out AM (2025) - Improved
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑			↑↑↑	↔		↔	↔↔			
Traffic Volume (vph)	439	1113	0	0	1531	712	111	4	409	0	0	0
Future Volume (vph)	439	1113	0	0	1531	712	111	4	409	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3352	4918	0	0	4869	1530	0	1759	2630	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3351	4918	0	0	4869	1511	0	1759	2630	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						656			183			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	6%	2%	2%	6%	5%	2%	2%	7%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	467	1184	0	0	1629	757	0	122	435	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	25.0	85.0			60.0	60.0	35.0	35.0	35.0			
Total Split (%)	20.8%	70.8%			50.0%	50.0%	29.2%	29.2%	29.2%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4	-1.4	-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag					Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	20.0	92.8			67.8	67.8		17.2	17.2			
Actuated g/C Ratio	0.17	0.77			0.56	0.56		0.14	0.14			
v/c Ratio	0.84	0.31			0.59	0.67		0.48	0.81			
Control Delay	53.1	2.9			18.9	6.0		52.5	40.7			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	53.1	2.9			18.9	6.0		52.5	40.7			
LOS	D	A			B	A		D	D			
Approach Delay		17.1			14.8			43.3				
Approach LOS		B			B			D				
Queue Length 50th (ft)	176	72			288	35		88	110			
Queue Length 95th (ft)	#259	87			386	163		140	164			
Internal Link Dist (ft)		768			734			653			493	
Turn Bay Length (ft)	500											
Base Capacity (vph)	558	3801			2749	1138		439	794			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.84	0.31			0.59	0.67		0.28	0.55			

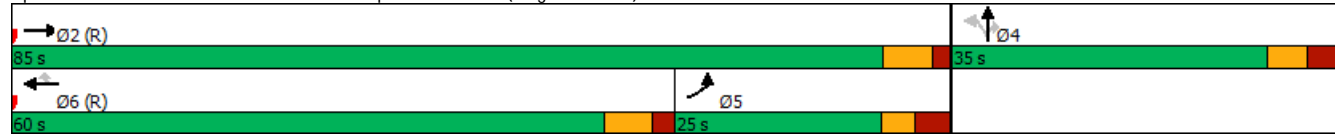
Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	19.1
Intersection LOS:	B
Intersection Capacity Utilization:	75.6%
ICU Level of Service:	D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	4	202	10	14	443
Future Volume (vph)	4	4	202	10	14	443
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1440	0	1844	0	0	3465
Flt Permitted	0.976					0.999
Satd. Flow (perm)	1440	0	1844	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	38%	2%	2%	11%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	233	0	0	502
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	32.4%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	4	202	10	14	443
Future Vol, veh/h	4	4	202	10	14	443
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	38	2	2	11	2	2
Mvmt Flow	4	4	222	11	15	487

Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	502	228	0	0	233
Stage 1	228	-	-	-	-
Stage 2	274	-	-	-	-
Critical Hdwy	7.17	6.23	-	-	4.13
Critical Hdwy Stg 1	5.97	-	-	-	-
Critical Hdwy Stg 2	6.37	-	-	-	-
Follow-up Hdwy	3.861	3.319	-	-	2.219
Pot Cap-1 Maneuver	444	811	-	-	1333
Stage 1	720	-	-	-	-
Stage 2	663	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	437	811	-	-	1333
Mov Cap-2 Maneuver	437	-	-	-	-
Stage 1	720	-	-	-	-
Stage 2	653	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.4	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	568	1333	-
HCM Lane V/C Ratio	-	-	0.015	0.012	-
HCM Control Delay (s)	-	-	11.4	7.7	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-

Knightsdale Gateway
7: Farmwell Road & Site Access

Build-out AM (2025) - Improved
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	17	4	10	4	4	4	4	165	4	4	43	4
Future Volume (vph)	17	4	10	4	4	4	4	165	4	4	43	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		225
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			100		
Satd. Flow (prot)	0	1733	0	0	1566	0	0	1821	0	0	3293	0
Flt Permitted		0.973			0.984			0.999			0.996	
Satd. Flow (perm)	0	1733	0	0	1566	0	0	1821	0	0	3293	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		316			305			118			529	
Travel Time (s)		7.2			6.9			2.7			12.0	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	38%	2%	2%	2%	4%	2%	2%	9%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	34	0	0	12	0	0	193	0	0	56	0
Sign Control		Stop			Stop			Free			Yield	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.2%
Analysis Period (min)	15
	ICU Level of Service A

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	4	10	4	4	4	4	165	4	4	43	4
Future Vol, veh/h	17	4	10	4	4	4	4	165	4	4	43	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Yield	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	225
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1079869440	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	38	2	2	2	4	2	2	9	2
Mvmt Flow	19	4	11	4	4	4	4	185	4	4	48	4

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	199	197	0	203	195	187	0	0	0
Stage 1	0	0	-	195	195	-	-	-	-
Stage 2	199	197	-	8	0	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.48	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	-	-	-	6.48	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.842	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	760	699	-	684	700	855	-	-	-
Stage 1	-	-	-	731	739	-	-	-	-
Stage 2	803	738	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	752	699	-	-	700	855	-	-	-
Mov Cap-2 Maneuver	752	699	-	-	700	-	-	-	-
Stage 1	-	-	-	731	739	-	-	-	-
Stage 2	794	738	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s			
HCM LOS	-	-	-

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

7: Farmwell Road & Site Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.2	1.4	4.1
Total Del/Veh (s)	10.5	9.3	43.9	35.0	7.8	3.9	0.6	0.4	0.4	24.4	33.8	1.3

7: Farmwell Road & Site Access Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	9.2

7: Farmwell Road & Site Access Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	1.5	0.3
Total Del/Veh (s)	21.1	13.8	0.4	31.0	9.2

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	232	169	129	28	276	297	161	53	67	56	56
Average Queue (ft)	96	44	30	4	119	133	27	12	20	26	25
95th Queue (ft)	207	109	85	20	231	249	105	40	50	44	45
Link Distance (ft)		1060	1060		1702	1702		169	2	2	2
Upstream Blk Time (%)									45	85	91
Queuing Penalty (veh)									67	127	136
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)	0				5	19	0				
Queuing Penalty (veh)	2				0	12	1				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	B12	B12	NB	SB
Directions Served	UL	T	T	R	L	T	T	R	T	T	LTR	L
Maximum Queue (ft)	87	149	177	7	79	174	181	70	133	71	122	48
Average Queue (ft)	26	48	53	0	14	63	77	11	5	2	49	24
95th Queue (ft)	65	112	127	5	52	145	156	44	95	71	99	45
Link Distance (ft)		1702	1702			1522	1522		659	659	337	20
Upstream Blk Time (%)									0	0		50
Queuing Penalty (veh)									0	0		14
Storage Bay Dist (ft)	225			225	200			150				
Storage Blk Time (%)			0			0	1					
Queuing Penalty (veh)			0			0	1					

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	TR
Maximum Queue (ft)	44
Average Queue (ft)	13
95th Queue (ft)	38
Link Distance (ft)	20
Upstream Blk Time (%)	11
Queuing Penalty (veh)	3
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
 Build-out AM (2025) - Improved

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Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	89	95	190	224	248	130	230	292	411	231	90	300
Average Queue (ft)	25	41	94	114	142	31	126	151	165	90	35	218
95th Queue (ft)	67	82	169	191	224	79	210	258	316	204	74	373
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)			0	0	1							3
Queuing Penalty (veh)			0	1	1							8

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	503	76	176	204	92	99
Average Queue (ft)	358	74	100	125	34	47
95th Queue (ft)	564	81	160	188	72	77
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	20					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	29	69				
Queuing Penalty (veh)	96	128				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	R	L	T	T
Maximum Queue (ft)	89	105	102	21	217	47	18
Average Queue (ft)	12	15	16	1	110	2	1
95th Queue (ft)	55	71	72	21	201	17	9
Link Distance (ft)	890	890	890	890	136	136	136
Upstream Blk Time (%)					8		
Queuing Penalty (veh)					46		
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	271	250	150	207	148	328	348	335	520	170	218	191
Average Queue (ft)	147	140	51	44	63	177	215	150	223	87	108	57
95th Queue (ft)	233	224	115	138	122	282	311	263	428	151	179	135
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)								0	0			
Queuing Penalty (veh)								0	0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	111	60	512	200
Average Queue (ft)	37	25	483	197
95th Queue (ft)	133	68	498	208
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		3	96	
Queuing Penalty (veh)		7	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			94	95
Queuing Penalty (veh)			209	225

Intersection: 7: Farmwell Road & Site Access

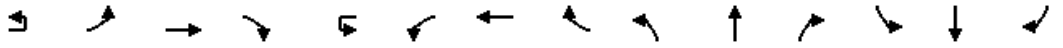
Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	TR
Maximum Queue (ft)	58	58	17	96	33
Average Queue (ft)	23	12	1	24	3
95th Queue (ft)	53	42	11	75	19
Link Distance (ft)	276	276	20	499	
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			0		
Storage Bay Dist (ft)					225
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 1084

Knightsdale Gateway
1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025) - Improved
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Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔			↔	↔	↔		↔			↔	↔
Traffic Volume (vph)	25	373	1762	4	6	4	1340	117	4	4	4	103	4	158
Future Volume (vph)	25	373	1762	4	6	4	1340	117	4	4	4	103	4	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%			1%			4%	
Storage Length (ft)		375		0		150		75	0		0	0		0
Storage Lanes		1		0		1		1	0		0	0		2
Taper Length (ft)		100				100			25			25		
Satd. Flow (prot)	0	1743	3486	0	0	1778	3557	1591	0	1480	0	0	1742	2731
Flt Permitted		0.071				0.072				0.844			0.393	
Satd. Flow (perm)	0	130	3486	0	0	135	3557	1591	0	1270	0	0	717	2731
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)								122		4				176
Link Speed (mph)			45				45			25			45	
Link Distance (ft)			1108				1778			230			106	
Travel Time (s)			16.8				26.9			6.3			1.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	56%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	424	1878	0	0	10	1426	124	0	12	0	0	114	168
Turn Type	D.P+P	D.P+P	NA		D.P+P	D.P+P	NA	Perm	Perm	NA		Perm	NA	Prot
Protected Phases	5	5	2		1	1	6			3			4	4
Permitted Phases	6	6			2	2		6	3			4		
Detector Phase	5	5	2		1	1	6	6	3	3		4	4	4
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0		7.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0		14.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	85.0		15.0	15.0	80.0	80.0	25.0	25.0		15.0	15.0	15.0
Total Split (%)	14.3%	14.3%	60.7%		10.7%	10.7%	57.1%	57.1%	17.9%	17.9%		10.7%	10.7%	10.7%
Yellow Time (s)	3.0	3.0	4.6		3.0	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0		2.8	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6			-0.8	-1.6	-1.6		-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0			5.0	5.0	5.0		5.0			5.0	5.0
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max		None	None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		109.6	111.6			113.6	75.0	75.0		8.2			10.0	10.0
Actuated g/C Ratio		0.78	0.80			0.81	0.54	0.54		0.06			0.07	0.07
v/c Ratio		0.85	0.68			0.05	0.75	0.14		0.15			2.24	0.47
Control Delay		54.1	10.0			1.3	6.4	0.3		53.7			641.5	11.9
Queue Delay		0.0	0.0			0.0	0.0	0.0		0.0			0.0	0.0
Total Delay		54.1	10.0			1.3	6.4	0.3		53.7			641.5	11.9
LOS		D	B			A	A	A		D			F	B
Approach Delay			18.1				5.9			53.7			266.5	
Approach LOS			B				A			D			F	
Queue Length 50th (ft)		276	208			0	36	0		7			-167	0
Queue Length 95th (ft)		#575	747			m1	56	0		29			#297	36
Internal Link Dist (ft)			1028				1698			150			26	
Turn Bay Length (ft)		375				150		75						
Base Capacity (vph)		500	2779			227	1905	908		184			51	358
Starvation Cap Reductn		0	0			0	0	0		0			0	0
Spillback Cap Reductn		0	0			0	0	0		0			0	0
Storage Cap Reductn		0	0			0	0	0		0			0	0
Reduced v/c Ratio		0.85	0.68			0.04	0.75	0.14		0.07			2.24	0.47

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	23 (16%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	140
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	2.24
Intersection Signal Delay:	30.5
Intersection Capacity Utilization:	87.4%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	E

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025) - Improved
05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↗	↖	↕	↗		↕		↖	↗	
Traffic Volume (vph)	6	40	1855	35	38	1370	84	8	4	7	150	8	66
Future Volume (vph)	6	40	1855	35	38	1370	84	8	4	7	150	8	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		225		225	200		150	0		0	0		0
Storage Lanes		1		1	1		1	0		0	1		0
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1683	3539	1583	1770	3539	1524	0	1732	0	1752	1532	0
Flt Permitted		0.950			0.950				0.891		0.745		
Satd. Flow (perm)	0	1683	3539	1583	1770	3539	1524	0	1577	0	1374	1532	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)				86			86		7			69	
Link Speed (mph)			45			45			25			30	
Link Distance (ft)			1778			1589			405			118	
Travel Time (s)			26.9			24.1			11.0			2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	8%	2%	2%	2%	2%	6%	2%	2%	2%	3%	2%	8%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	48	1953	37	40	1442	88	0	19	0	158	77	0
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	5	2		1	6			8			4	
Permitted Phases				2			6	8			4		
Detector Phase	5	5	2	2	1	6	6	8	8		4	4	
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	15.0	15.0	20.0	20.0	15.0	20.0	20.0	15.0	15.0		15.0	15.0	
Total Split (s)	15.0	15.0	96.0	96.0	15.0	96.0	96.0	29.0	29.0		29.0	29.0	
Total Split (%)	10.7%	10.7%	68.6%	68.6%	10.7%	68.6%	68.6%	20.7%	20.7%		20.7%	20.7%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effect Green (s)		9.9	96.7	96.7	9.7	96.6	96.6		21.3		21.3	21.3	
Actuated g/C Ratio		0.07	0.69	0.69	0.07	0.69	0.69		0.15		0.15	0.15	
v/c Ratio		0.40	0.80	0.03	0.33	0.59	0.08		0.08		0.76	0.26	
Control Delay		73.6	13.1	0.1	77.3	15.8	3.4		36.5		79.0	15.7	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay		73.6	13.1	0.1	77.3	15.8	3.4		36.5		79.0	15.7	
LOS		E	B	A	E	B	A		D		E	B	
Approach Delay			14.3			16.6			36.5			58.2	
Approach LOS			B			B			D			E	
Queue Length 50th (ft)		44	718	0	32	613	10		9		137	6	
Queue Length 95th (ft)		m64	m193	m0	71	673	19		34		#221	53	
Internal Link Dist (ft)			1698			1509			325			38	
Turn Bay Length (ft)		225		225	200		150						
Base Capacity (vph)		122	2445	1120	127	2440	1077		276		235	319	
Starvation Cap Reductn		0	0	0	0	0	0		0		0	0	
Spillback Cap Reductn		0	0	0	0	0	0		0		0	0	
Storage Cap Reductn		0	0	0	0	0	0		0		0	0	
Reduced v/c Ratio		0.39	0.80	0.03	0.31	0.59	0.08		0.07		0.67	0.24	

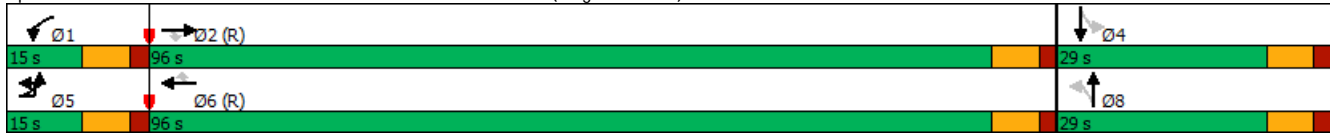
Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 18.0 Intersection LOS: B
 Intersection Capacity Utilization 74.6% ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
3: Hodge Road & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025) - Improved
05/11/2022



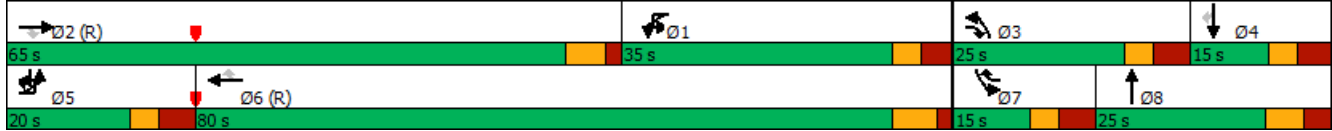
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑↑	↑		↑	↑↑↑	↑	↑↑	↑		↑↑	↑	↑
Traffic Volume (vph)	8	162	1658	261	32	368	1264	422	123	46	208	255	114	130
Future Volume (vph)	8	162	1658	261	32	368	1264	422	123	46	208	255	114	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3362	5009	1560	0	1796	5111	1607	3467	1650	0	3416	1853	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3360	5009	1560	0	1796	5111	1587	3467	1650	0	3416	1853	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				97				390		137				182
Link Speed (mph)			45				45			35			25	
Link Distance (ft)			746				963			562			518	
Travel Time (s)			11.3				14.6			10.9			14.1	
Confl. Peds. (#/hr)		1						1						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	14%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	183	1783	281	0	430	1359	454	132	273	0	274	123	140
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	65.0	25.0	35.0	35.0	80.0	15.0	25.0	25.0		15.0	15.0	20.0
Total Split (%)	14.3%	14.3%	46.4%	17.9%	25.0%	25.0%	57.1%	10.7%	17.9%	17.9%		10.7%	10.7%	14.3%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		13.3	62.3	74.8		30.0	79.0	89.0	12.5	17.7		10.0	15.2	33.5
Actuated g/C Ratio		0.10	0.44	0.53		0.21	0.56	0.64	0.09	0.13		0.07	0.11	0.24
v/c Ratio		0.57	0.80	0.32		1.12	0.47	0.39	0.43	0.83		1.12	0.61	0.27
Control Delay		64.1	25.2	5.5		117.6	8.8	1.0	64.0	50.6		151.6	73.3	3.4
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		64.1	25.2	5.5		117.6	8.8	1.0	64.0	50.6		151.6	73.3	3.4
LOS		E	C	A		F	A	A	E	D		F	E	A
Approach Delay			25.9				28.1			55.0				95.0
Approach LOS			C				C			D				F
Queue Length 50th (ft)		77	539	64		-451	117	1	59	122		-147	107	0
Queue Length 95th (ft)		m102	510	m69		#657	141	3	91	#252		#242	#199	24
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		360	2230	957		384	2884	1152	495	353		244	200	532
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.51	0.80	0.29		1.12	0.47	0.39	0.27	0.77		1.12	0.61	0.26

Intersection Summary	
Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	84 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.12
Intersection Signal Delay:	35.8
Intersection LOS:	D
Intersection Capacity Utilization:	93.4%
ICU Level of Service:	F

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightsdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025) - Improved
05/11/2022

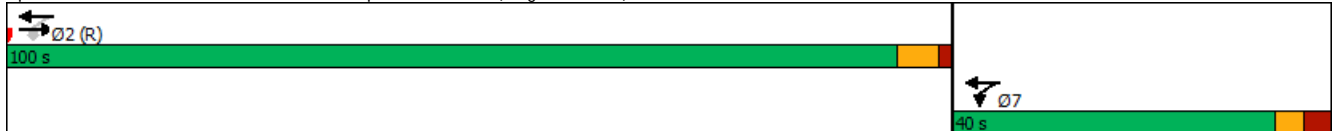


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1985	104	233	1423	0	0	0	0	0	0	689
Future Volume (vph)	0	1985	104	233	1423	0	0	0	0	0	0	689
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	5060	1575	1778	3557	0	0	0	0	0	0	1564
Flt Permitted				0.062								
Satd. Flow (perm)	0	5060	1575	116	3557	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			114									139
Link Speed (mph)		45			45			35				35
Link Distance (ft)		963			225			613				525
Travel Time (s)		14.6			3.4			11.9				10.2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2181	114	256	1564	0	0	0	0	0	0	757
Turn Type		NA	Perm	D.P+P	NA							Free
Protected Phases		2		7	2 7							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2 7							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		100.0	100.0	40.0								
Total Split (%)		71.4%	71.4%	28.6%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		106.3	106.3	130.0	140.0							140.0
Actuated g/C Ratio		0.76	0.76	0.93	1.00							1.00
v/c Ratio		0.57	0.09	0.66	0.44							0.48
Control Delay		4.4	0.9	56.7	3.6							1.1
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		4.4	0.9	56.7	3.6							1.1
LOS		A	A	E	A							A
Approach Delay		4.2			11.1						1.1	
Approach LOS		A			B						A	
Queue Length 50th (ft)		140	2	169	126							0
Queue Length 95th (ft)		m156	m4	255	116							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3840	1223	526	3536							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.57	0.09	0.49	0.44							0.48

Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 72 (51%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 6.3
 Intersection Capacity Utilization 107.4%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out PM (2025) - Improved
05/11/2022

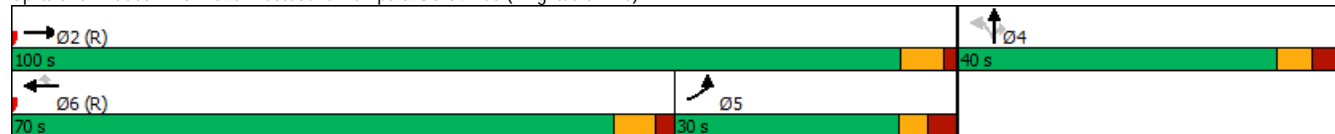


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕		↕	↕↕			
Traffic Volume (vph)	389	2569	0	0	1536	592	121	4	580	0	0	0
Future Volume (vph)	389	2569	0	0	1536	592	121	4	580	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3417	5111	0	0	5060	1575	0	1727	2759	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3417	5111	0	0	5060	1575	0	1727	2759	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						556			76			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	4%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	397	2621	0	0	1567	604	0	127	592	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4		-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	25.0	99.2			69.2	69.2		30.8	30.8			
Actuated g/C Ratio	0.18	0.71			0.49	0.49		0.22	0.22			
v/c Ratio	0.65	0.72			0.63	0.57		0.33	0.89			
Control Delay	45.9	4.2			27.9	5.1		47.5	62.0			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	45.9	4.2			27.9	5.1		47.5	62.0			
LOS	D	A			C	A		D	E			
Approach Delay		9.7			21.6			59.4				
Approach LOS		A			C			E				
Queue Length 50th (ft)	185	109			380	23		97	262			
Queue Length 95th (ft)	242	124			452	111		155	335			
Internal Link Dist (ft)		768			734			653		493		
Turn Bay Length (ft)	500											
Base Capacity (vph)	610	3620			2500	1059		431	746			
Starvation Cap Reductn	0	18			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.65	0.73			0.63	0.57		0.29	0.79			

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	68 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	20.1
Intersection Capacity Utilization:	78.3%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	D

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T	R	L	L
Traffic Volume (vph)	10	16	486	6	7	251
Future Volume (vph)	10	16	486	6	7	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1678	0	1859	0	0	3465
Flt Permitted	0.981					0.999
Satd. Flow (perm)	1678	0	1859	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	523	0	0	274
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	35.9% ICU Level of Service A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	16	486	6	7	251
Future Vol, veh/h	10	16	486	6	7	251
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	17	517	6	7	267

Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	668	520	0	0	523
Stage 1	520	-	-	-	-
Stage 2	148	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13
Critical Hdwy Stg 1	5.43	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219
Pot Cap-1 Maneuver	407	555	-	-	1042
Stage 1	596	-	-	-	-
Stage 2	865	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	404	555	-	-	1042
Mov Cap-2 Maneuver	404	-	-	-	-
Stage 1	596	-	-	-	-
Stage 2	858	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	485	1042	-
HCM Lane V/C Ratio	-	-	0.057	0.007	-
HCM Control Delay (s)	-	-	12.9	8.5	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Knightdale Gateway
7: Farmwell Road & Site Access

Build-out PM (2025) - Improved
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	8	4	9	12	6	4	8	107	12	4	203	18
Future Volume (vph)	8	4	9	12	6	4	8	107	12	4	203	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		225
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			100		
Satd. Flow (prot)	0	1426	0	0	1548	0	0	1760	0	0	3463	0
Flt Permitted		0.981			0.973			0.997			0.999	
Satd. Flow (perm)	0	1426	0	0	1548	0	0	1760	0	0	3463	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		316			305			118			529	
Travel Time (s)		7.2			6.9			2.7			12.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	113%	2%	28%	2%	2%	2%	7%	2%	2%	3%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	21	0	0	23	0	0	134	0	0	237	0
Sign Control		Stop			Stop			Free			Yield	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.0% ICU Level of Service A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	4	9	12	6	4	8	107	12	4	203	18
Future Vol, veh/h	8	4	9	12	6	4	8	107	12	4	203	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Yield	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	225
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1079869440	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	113	2	28	2	2	2	7	2	2	3	2
Mvmt Flow	8	4	9	13	6	4	8	113	13	4	214	19

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	141	142	0	143	136	120	0	0	0
Stage 1	0	0	-	136	136	-	-	-	-
Stage 2	141	142	-	7	0	-	-	-	-
Critical Hdwy	7.12	7.63	6.22	7.38	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	-	-	-	6.38	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	6.63	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	5.017	3.318	3.752	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	829	585	-	770	755	931	-	-	-
Stage 1	-	-	-	809	784	-	-	-	-
Stage 2	862	609	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	820	585	-	-	755	931	-	-	-
Mov Cap-2 Maneuver	820	585	-	-	755	-	-	-	-
Stage 1	-	-	-	809	784	-	-	-	-
Stage 2	851	609	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s			
HCM LOS	-	-	-

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

7: Farmwell Road & Site Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	10.1	12.8	14.3
Total Del/Veh (s)	9.7	11.1	46.1	70.6	15.3	20.7	0.4	0.5	0.3	234.3	176.8	40.6

7: Farmwell Road & Site Access Performance by movement

Movement	All
Denied Del/Veh (s)	7.5
Total Del/Veh (s)	101.0

7: Farmwell Road & Site Access Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	12.9	7.5
Total Del/Veh (s)	25.7	46.4	0.4	165.8	101.0

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	LT	R	R
Maximum Queue (ft)	443	518	475	33	226	248	114	68	52	49	52
Average Queue (ft)	232	129	112	7	81	90	20	13	23	16	22
95th Queue (ft)	415	375	319	26	178	191	62	46	42	36	44
Link Distance (ft)		1060	1060		1702	1702		169	2	2	2
Upstream Blk Time (%)									76	63	91
Queuing Penalty (veh)									66	54	79
Storage Bay Dist (ft)	375			150			75				
Storage Blk Time (%)	5	0			2	17	1				
Queuing Penalty (veh)	48	0			0	19	3				

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	B12	B12	NB	SB
Directions Served	UL	T	T	R	L	T	T	R	T	T	LTR	L
Maximum Queue (ft)	158	332	347	81	85	232	259	83	388	548	63	50
Average Queue (ft)	40	178	186	7	28	100	111	9	28	36	16	28
95th Queue (ft)	100	294	303	61	70	201	212	47	243	283	50	40
Link Distance (ft)		1702	1702			1522	1522		659	659	337	20
Upstream Blk Time (%)									0	0		82
Queuing Penalty (veh)									0	0		91
Storage Bay Dist (ft)	225			225	200			150				
Storage Blk Time (%)		3	4			0	2					
Queuing Penalty (veh)		2	1			0	2					

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	TR
Maximum Queue (ft)	61
Average Queue (ft)	26
95th Queue (ft)	47
Link Distance (ft)	20
Upstream Blk Time (%)	31
Queuing Penalty (veh)	35
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	B12	WB	WB	WB	WB	WB
Directions Served	UL	L	T	T	T	R	T	UL	T	T	T	R
Maximum Queue (ft)	147	232	343	401	430	300	2	675	945	957	1059	201
Average Queue (ft)	75	94	189	234	246	114	0	649	815	829	781	86
95th Queue (ft)	132	167	302	355	374	274	2	783	1223	1234	1407	164
Link Distance (ft)				659	659		1522		890	890	890	
Upstream Blk Time (%)									43	49	50	
Queuing Penalty (veh)									307	345	352	
Storage Bay Dist (ft)	200	200	200			200		575				375
Storage Blk Time (%)	0	0	4	11	14	0		77	1		0	
Queuing Penalty (veh)	0	0	23	78	36	0		324	4		0	

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	L	T	R
Maximum Queue (ft)	300	485	75	400	423	313	135
Average Queue (ft)	178	315	74	245	274	153	46
95th Queue (ft)	364	537	81	447	464	339	122
Link Distance (ft)		469		443	443	443	443
Upstream Blk Time (%)		12		9	12	3	0
Queuing Penalty (veh)		0		0	0	0	0
Storage Bay Dist (ft)	200		50				
Storage Blk Time (%)	1	29	67				
Queuing Penalty (veh)	2	91	83				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	SB
Directions Served	T	T	T	L	T	T	R
Maximum Queue (ft)	113	243	121	243	259	261	536
Average Queue (ft)	7	17	19	168	179	179	361
95th Queue (ft)	84	137	73	262	338	334	735
Link Distance (ft)	890	890	890	136	136	136	481
Upstream Blk Time (%)				23	52	60	66
Queuing Penalty (veh)				126	286	331	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	247	255	705	774	636	708	742	727	643	175	345	312
Average Queue (ft)	143	145	147	189	189	416	455	410	268	89	233	195
95th Queue (ft)	221	225	404	483	413	796	815	800	694	156	319	278
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)			0	0	0	6	11	10	7			
Queuing Penalty (veh)			1	2	1	0	0	0	0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	194	67	503	200
Average Queue (ft)	79	28	444	190
95th Queue (ft)	235	73	570	233
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)	4	1	67	
Queuing Penalty (veh)	0	3	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			94	78
Queuing Penalty (veh)			119	104

Intersection: 7: Farmwell Road & Site Access

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	TR
Maximum Queue (ft)	82	96	20	480	325
Average Queue (ft)	24	27	1	292	115
95th Queue (ft)	64	80	12	557	349
Link Distance (ft)	276	276	20	499	
Upstream Blk Time (%)			0	15	
Queuing Penalty (veh)			0	0	
Storage Bay Dist (ft)					225
Storage Blk Time (%)				49	
Queuing Penalty (veh)				58	

Zone Summary

Zone wide Queuing Penalty: 3076

Appendix K:
Synchro & SimTraffic Output:
Build-out (2034)



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↔	↔	↕	↕	↔	↔	↔	↔	↕	↕
Traffic Volume (vph)	7	176	860	7	44	1658	83	120	6	83	139	6	437
Future Volume (vph)	7	176	860	7	44	1658	83	120	6	83	139	6	437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%		1%			4%	
Storage Length (ft)		375		375	500		100	0		0	0		0
Storage Lanes		1		1	1		1	1		0	0		2
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1743	3292	1371	1778	3455	1591	1761	1596	0	0	1742	2731
Flt Permitted		0.061			0.243			0.950				0.954	
Satd. Flow (perm)	0	112	3292	1343	455	3455	1591	1761	1596	0	0	1742	2731
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)				138			145		91				236
Link Speed (mph)			45			45			25			45	
Link Distance (ft)			1108			1778			230			106	
Travel Time (s)			16.8			26.9			6.3			1.6	
Confl. Peds. (#/hr)				1	1								
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	8%	16%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	201	945	8	48	1822	91	132	98	0	0	160	480
Turn Type	D.P+P	D.P+P	NA	Perm	D.P+P	NA	Perm	Split	NA		Split	NA	Prot
Protected Phases	5	5	2		1	6		3	3		4	4	4
Permitted Phases	6	6		2	2		6						
Detector Phase	5	5	2	2	1	6	6	3	3		4	4	4
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0	20.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	73.0	73.0	14.0	72.0	72.0	16.0	16.0		17.0	17.0	17.0
Total Split (%)	12.5%	12.5%	60.8%	60.8%	11.7%	60.0%	60.0%	13.3%	13.3%		14.2%	14.2%	14.2%
Yellow Time (s)	3.0	3.0	4.6	4.6	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0	2.0	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6	0.0	-0.8	-1.6	-1.6	0.0	-1.1			-1.3	-1.3
Total Lost Time (s)		5.0	5.0	6.6	5.0	5.0	5.0	6.1	5.0			5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)		77.0	71.8	70.2	78.0	67.0	67.0	9.9	11.0			12.0	12.0
Actuated g/C Ratio		0.64	0.60	0.58	0.65	0.56	0.56	0.08	0.09			0.10	0.10
v/c Ratio		0.97	0.48	0.01	0.13	0.94	0.10	0.91	0.43			0.92	0.99
Control Delay		97.2	15.2	0.0	4.0	20.9	1.0	109.1	18.3			103.8	66.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		97.2	15.2	0.0	4.0	20.9	1.0	109.1	18.3			103.8	66.1
LOS		F	B	A	A	C	A	F	B			F	E
Approach Delay			29.4			19.6			70.4			75.5	
Approach LOS			C			B			E			E	
Queue Length 50th (ft)		105	216	0	5	175	1	103	5			125	112
Queue Length 95th (ft)		#260	270	0	m7	#854	m3	#225	58			#258	#236
Internal Link Dist (ft)			1028			1698			150			26	
Turn Bay Length (ft)		375		375	500		100						
Base Capacity (vph)		207	1968	842	398	1929	952	145	228			174	485
Starvation Cap Reductn		0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio		0.97	0.48	0.01	0.12	0.94	0.10	0.91	0.43			0.92	0.99

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	110 (92%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.99
Intersection Signal Delay:	34.3
Intersection LOS:	C
Intersection Capacity Utilization:	94.6%
ICU Level of Service:	F

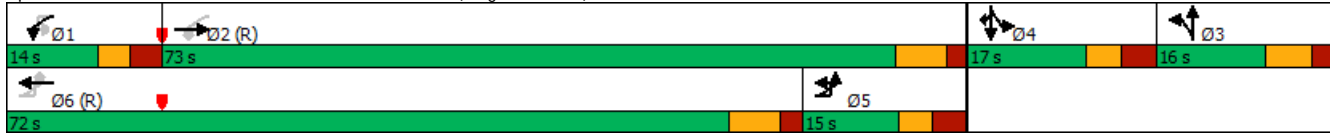
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Build-out AM (2034)
05/11/2022

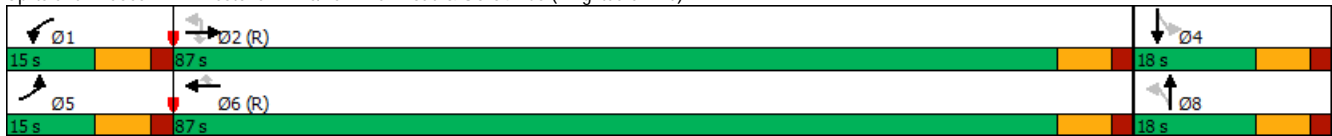


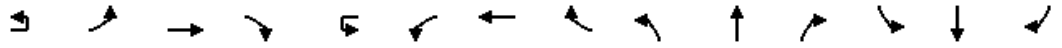
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↗	↖	↕	↗		↕			↕	
Traffic Volume (vph)	37	1076	13	18	1757	120	30	10	36	42	4	13
Future Volume (vph)	37	1076	13	18	1757	120	30	10	36	42	4	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		225	200		150	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			25			25		
Satd. Flow (prot)	1719	3374	1583	1703	3471	1568	0	1688	0	0	1639	0
Flt Permitted	0.950			0.950				0.865			0.689	
Satd. Flow (perm)	1719	3374	1583	1703	3471	1568	0	1490	0	0	1169	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			100		30			10	
Link Speed (mph)		45			45			25			30	
Link Distance (ft)		1778			1589			405			118	
Travel Time (s)		26.9			24.1			11.0			2.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	5%	7%	2%	6%	4%	3%	4%	2%	3%	7%	2%	15%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	1209	15	20	1974	135	0	85	0	0	66	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	15.0	20.0	20.0	15.0	20.0	20.0	15.0	15.0		15.0	15.0	
Total Split (s)	15.0	87.0	87.0	15.0	87.0	87.0	18.0	18.0		18.0	18.0	
Total Split (%)	12.5%	72.5%	72.5%	12.5%	72.5%	72.5%	15.0%	15.0%		15.0%	15.0%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effect Green (s)	9.6	96.1	96.1	9.3	90.3	90.3		11.7			11.7	
Actuated g/C Ratio	0.08	0.80	0.80	0.08	0.75	0.75		0.10			0.10	
v/c Ratio	0.31	0.45	0.01	0.15	0.76	0.11		0.49			0.54	
Control Delay	51.7	5.0	0.0	70.7	12.1	0.8		43.9			59.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	51.7	5.0	0.0	70.7	12.1	0.8		43.9			59.8	
LOS	D	A	A	E	B	A		D			E	
Approach Delay		6.4			11.9			43.9			59.8	
Approach LOS		A			B			D			E	
Queue Length 50th (ft)	32	96	0	16	741	5		40			41	
Queue Length 95th (ft)	m63	m177	m0	m29	832	9		92			89	
Internal Link Dist (ft)		1698			1509			325			38	
Turn Bay Length (ft)	225		225	200		150						
Base Capacity (vph)	143	2702	1288	141	2610	1204		188			135	
Starvation Cap Reductn	0	0	0	0	0	0		0			0	
Spillback Cap Reductn	0	0	0	0	0	0		0			0	
Storage Cap Reductn	0	0	0	0	0	0		0			0	
Reduced v/c Ratio	0.29	0.45	0.01	0.14	0.76	0.11		0.45			0.49	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 82 (68%), Referenced to phase 2:EBTU and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 11.6 Intersection LOS: B
 Intersection Capacity Utilization 62.7% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	8	93	937	116	26	143	1528	229	207	39	219	280	33	154
Future Volume (vph)	8	93	937	116	26	143	1528	229	207	39	219	280	33	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3382	4731	1530	0	1737	5014	1607	3401	1642	0	3416	1835	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3382	4731	1530	0	1737	5014	1607	3401	1642	0	3416	1835	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				121				239		184				154
Link Speed (mph)			45				45			35				25
Link Distance (ft)			746				963			562				518
Travel Time (s)			11.3				14.6			10.9				14.1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	8%	4%	8%	5%	5%	2%	4%	2%	2%	2%	3%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	105	976	121	0	176	1592	239	216	269	0	292	34	160
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	15.0	15.0	62.0	21.0	22.0	22.0	69.0	20.0	21.0	16.0		20.0	15.0	15.0
Total Split (%)	12.5%	12.5%	51.7%	17.5%	18.3%	18.3%	57.5%	16.7%	17.5%	13.3%		16.7%	12.5%	12.5%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9			-1.5	-1.5	-1.9	-1.9		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		10.0	59.2	84.8		15.7	64.9	79.3	20.6	10.7		14.4	10.0	16.5
Actuated g/C Ratio		0.08	0.49	0.71		0.13	0.54	0.66	0.17	0.09		0.12	0.08	0.14
v/c Ratio		0.37	0.42	0.11		0.77	0.59	0.21	0.37	0.86		0.71	0.22	0.46
Control Delay		62.2	22.9	0.8		89.8	12.6	1.2	47.8	43.6		61.0	54.9	9.1
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		62.2	22.9	0.8		89.8	12.6	1.2	47.8	43.6		61.0	54.9	9.1
LOS		E	C	A		F	B	A	D	D		E	D	A
Approach Delay			24.1				18.0			45.5				43.5
Approach LOS			C				B			D				D
Queue Length 50th (ft)		35	164	4		143	121	0	82	64		113	25	3
Queue Length 95th (ft)		0	324	7		#236	226	39	121	#211		160	59	47
Internal Link Dist (ft)			666				883			482				438
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		281	2333	1121		246	2712	1150	597	318		427	160	349
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.37	0.42	0.11		0.72	0.59	0.21	0.36	0.85		0.68	0.21	0.46

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	60 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	75
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.86
Intersection Signal Delay:	25.9
Intersection Capacity Utilization:	75.6%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	D

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out AM (2034)
05/11/2022

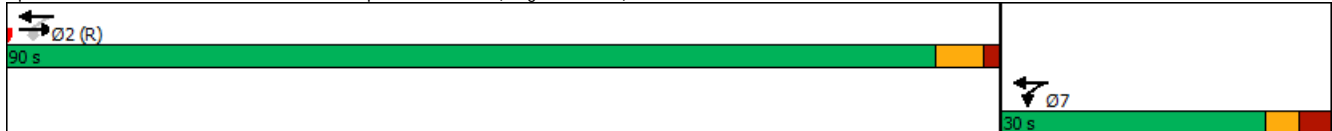


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	1348	181	284	1545	0	0	0	0	0	0	396
Future Volume (vph)	0	1348	181	284	1545	0	0	0	0	0	0	396
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	4915	1435	1695	3455	0	0	0	0	0	0	1564
Flt Permitted				0.165								
Satd. Flow (perm)	0	4915	1405	294	3455	0	0	0	0	0	0	1564
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191									127
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		963			225			613			525	
Travel Time (s)		14.6			3.4			11.9			10.2	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	5%	12%	7%	5%	2%	2%	2%	5%	2%	2%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1419	191	299	1626	0	0	0	0	0	0	417
Turn Type		NA	Perm	D,P+P	NA							Free
Protected Phases		2		7	2							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		90.0	90.0	30.0								
Total Split (%)		75.0%	75.0%	25.0%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		92.5	92.5	110.0	120.0							120.0
Actuated g/C Ratio		0.77	0.77	0.92	1.00							1.00
v/c Ratio		0.37	0.17	0.63	0.47							0.27
Control Delay		3.9	1.0	34.6	3.2							0.4
Queue Delay		0.0	0.0	0.0	0.0							0.0
Total Delay		3.9	1.0	34.6	3.2							0.4
LOS		A	A	C	A							A
Approach Delay		3.5			8.1						0.4	
Approach LOS		A			A						A	
Queue Length 50th (ft)		70	0	114	87							0
Queue Length 95th (ft)		107	m7	193	82							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3790	1127	571	3449							1564
Starvation Cap Reductn		0	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.37	0.17	0.52	0.47							0.27

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 57 (48%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 5.4
 Intersection Capacity Utilization 61.5%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out AM (2034)
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕↔		↕↔	↕↕↕			
Traffic Volume (vph)	485	1273	0	0	1692	779	123	4	447	0	0	0
Future Volume (vph)	485	1273	0	0	1692	779	123	4	447	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3352	4965	0	0	4915	1545	0	1759	2630	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3351	4965	0	0	4915	1526	0	1759	2630	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						653			128			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	2%	2%	5%	4%	2%	2%	7%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	1354	0	0	1800	829	0	135	476	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	25.0	85.0			60.0	60.0	35.0	35.0	35.0			
Total Split (%)	20.8%	70.8%			50.0%	50.0%	29.2%	29.2%	29.2%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4	-1.4	-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag					Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	20.0	88.4			63.4	63.4		21.6	21.6			
Actuated g/C Ratio	0.17	0.74			0.53	0.53		0.18	0.18			
v/c Ratio	0.92	0.37			0.69	0.74		0.43	0.82			
Control Delay	62.5	5.2			23.6	9.6		46.7	46.4			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	62.5	5.2			23.6	9.6		46.7	46.4			
LOS	E	A			C	A		D	D			
Approach Delay		21.0			19.2			46.5				
Approach LOS		C			B			D				
Queue Length 50th (ft)	191	97			365	76		94	151			
Queue Length 95th (ft)	#297	134			481	290		146	205			
Internal Link Dist (ft)		768			734			653		493		
Turn Bay Length (ft)	500											
Base Capacity (vph)	558	3659			2598	1114		439	753			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.92	0.37			0.69	0.74		0.31	0.63			

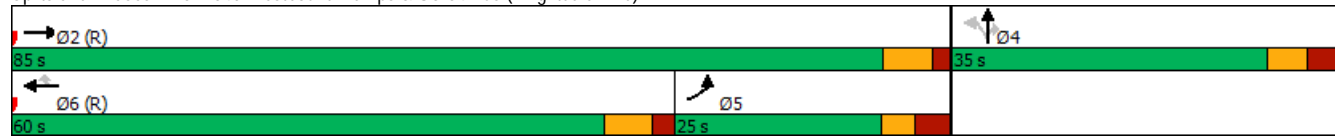
Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	65
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	23.1
Intersection LOS:	C
Intersection Capacity Utilization:	81.7%
ICU Level of Service:	D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			R
Traffic Volume (vph)	4	4	254	10	15	579
Future Volume (vph)	4	4	254	10	15	579
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1452	0	1847	0	0	3465
Flt Permitted	0.976					0.999
Satd. Flow (perm)	1452	0	1847	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	36%	2%	2%	11%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	290	0	0	652
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	36.8%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	4	254	10	15	579
Future Vol, veh/h	4	4	254	10	15	579
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	36	2	2	11	2	2
Mvmt Flow	4	4	279	11	16	636

Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	635	285	0	0	290
Stage 1	285	-	-	-	-
Stage 2	350	-	-	-	-
Critical Hdwy	7.14	6.23	-	-	4.13
Critical Hdwy Stg 1	5.94	-	-	-	-
Critical Hdwy Stg 2	6.34	-	-	-	-
Follow-up Hdwy	3.842	3.319	-	-	2.219
Pot Cap-1 Maneuver	366	753	-	-	1270
Stage 1	679	-	-	-	-
Stage 2	606	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	359	753	-	-	1270
Mov Cap-2 Maneuver	359	-	-	-	-
Stage 1	679	-	-	-	-
Stage 2	594	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.5	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	486	1270	-
HCM Lane V/C Ratio	-	-	0.018	0.013	-
HCM Control Delay (s)	-	-	12.5	7.9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Knightsdale Gateway
7: Farmwell Road & Site Access

Build-out AM (2034)
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	17	4	11	4	4	4	4	165	4	4	43	4
Future Volume (vph)	17	4	11	4	4	4	4	165	4	4	43	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	1731	0	0	1575	0	0	1821	0	0	1735	0
Flt Permitted		0.974			0.984			0.999			0.996	
Satd. Flow (perm)	0	1731	0	0	1575	0	0	1821	0	0	1735	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		316			305			118			529	
Travel Time (s)		7.2			6.9			2.7			12.0	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	36%	2%	2%	2%	4%	2%	2%	9%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	0	0	12	0	0	193	0	0	56	0
Sign Control		Stop			Stop			Free			Yield	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	19.9%						ICU Level of Service A					
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	4	11	4	4	4	4	165	4	4	43	4
Future Vol, veh/h	17	4	11	4	4	4	4	165	4	4	43	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Yield	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1079869440	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	36	2	2	2	4	2	2	9	2
Mvmt Flow	19	4	12	4	4	4	4	185	4	4	48	4

Major/Minor	Minor2		Minor1			Major1		
Conflicting Flow All	199	197	0	203	195	187	0	0
Stage 1	0	0	-	195	195	-	-	-
Stage 2	199	197	-	8	0	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.46	6.52	6.22	4.12	-
Critical Hdwy Stg 1	-	-	-	6.46	5.52	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.824	4.018	3.318	2.218	-
Pot Cap-1 Maneuver	760	699	-	687	700	855	-	-
Stage 1	-	-	-	735	739	-	-	-
Stage 2	803	738	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	752	699	-	-	700	855	-	-
Mov Cap-2 Maneuver	752	699	-	-	700	-	-	-
Stage 1	-	-	-	735	739	-	-	-
Stage 2	794	738	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s			
HCM LOS	-	-	-

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

7: Farmwell Road & Site Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	7.4	7.3	30.0	18.3	7.1	2.8	0.3	0.4	0.2	15.6	32.3	11.8

7: Farmwell Road & Site Access Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	8.3

7: Farmwell Road & Site Access Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.1	0.0
Total Del/Veh (s)	15.4	8.6	0.4	30.3	8.3

Queuing and Blocking Report
Build-out AM (2034)

05/11/2022

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	UL	T	T	R	L	TR	LT	R
Maximum Queue (ft)	458	810	731	17	117	463	465	200	177	128	63	62
Average Queue (ft)	345	383	301	1	26	228	234	55	105	43	27	26
95th Queue (ft)	559	925	829	10	110	402	411	180	184	91	54	51
Link Distance (ft)		1060	1060			1703	1703		160	160	2	2
Upstream Blk Time (%)		1	0						12	0	61	71
Queuing Penalty (veh)		0	0						0	0	119	138
Storage Bay Dist (ft)	375			375	500			100				
Storage Blk Time (%)	42	0				0	33	0				
Queuing Penalty (veh)	177	0				0	28	0				

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	R
Maximum Queue (ft)	50
Average Queue (ft)	21
95th Queue (ft)	36
Link Distance (ft)	2
Upstream Blk Time (%)	89
Queuing Penalty (veh)	173
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	B12	B12	NB	SB
Directions Served	UL	T	T	R	L	T	T	R	T	T	LTR	LTR
Maximum Queue (ft)	80	216	251	18	72	238	260	90	393	522	138	54
Average Queue (ft)	26	78	89	2	19	78	91	11	20	24	54	25
95th Queue (ft)	62	168	191	10	51	166	184	44	209	225	110	45
Link Distance (ft)		1703	1703			1527	1527		659	659	336	18
Upstream Blk Time (%)									0	0		47
Queuing Penalty (veh)									0	0		28
Storage Bay Dist (ft)	225			225	200			150				
Storage Blk Time (%)		0	0			0	2					
Queuing Penalty (veh)		0	0			0	2					

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	103	112	215	270	299	208	280	454	561	328	97	300
Average Queue (ft)	35	50	99	126	150	30	153	218	234	157	45	253
95th Queue (ft)	79	95	189	223	251	104	253	369	403	304	87	375
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)			0	1	3					0		3
Queuing Penalty (veh)			2	5	3					0		9

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	516	75	194	252	82	94
Average Queue (ft)	411	74	110	139	37	48
95th Queue (ft)	587	79	175	213	74	79
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	36					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	27	75				
Queuing Penalty (veh)	99	154				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	L	T	T
Maximum Queue (ft)	185	198	129	229	38	35
Average Queue (ft)	24	24	26	138	2	2
95th Queue (ft)	121	129	92	234	19	17
Link Distance (ft)	890	890	890	136	136	136
Upstream Blk Time (%)		0		15		
Queuing Penalty (veh)		0		90		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	344	387	301	294	310	368	402	327	461	180	252	196
Average Queue (ft)	201	196	81	73	96	218	254	186	245	97	129	77
95th Queue (ft)	358	362	203	197	216	330	364	282	394	164	209	172
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)			0	0	0							
Queuing Penalty (veh)			0	0	0							
Storage Bay Dist (ft)	500											
Storage Blk Time (%)	0	0										
Queuing Penalty (veh)	1	1										

Intersection: 6: Old Milburnie Road & Farmwell Road

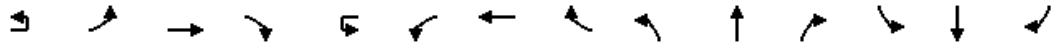
Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	74	67	517	200
Average Queue (ft)	22	34	483	196
95th Queue (ft)	96	78	498	208
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)		1	93	
Queuing Penalty (veh)		3	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			92	92
Queuing Penalty (veh)			267	279

Intersection: 7: Farmwell Road & Site Access

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	53	42	32	115
Average Queue (ft)	24	10	2	29
95th Queue (ft)	50	35	18	84
Link Distance (ft)	287	276	18	499
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 1578



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↗		↔	↕	↗	↖	↕	↖		↖	↗
Traffic Volume (vph)	27	506	1901	4	7	76	1453	197	61	5	63	162	9	215
Future Volume (vph)	27	506	1901	4	7	76	1453	197	61	5	63	162	9	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-1%			1%			4%	
Storage Length (ft)		375		375		500		100	0		0	0		0
Storage Lanes		1		1		1		1	1		0	0		2
Taper Length (ft)		100				100			25			25		
Satd. Flow (prot)	0	1743	3486	1560	0	1778	3557	1591	1761	1594	0	0	1743	2731
Flt Permitted		0.068				0.046			0.950				0.955	
Satd. Flow (perm)	0	125	3486	1560	0	86	3557	1591	1761	1594	0	0	1743	2731
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				125				122		67				229
Link Speed (mph)			45				45			25			45	
Link Distance (ft)			1108				1778			230			106	
Travel Time (s)			16.8				26.9			6.3			1.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	567	2022	4	0	88	1546	210	65	72	0	0	182	229
Turn Type	D.P+P	D.P+P	NA	Perm	D.P+P	D.P+P	NA	Perm	Split	NA		Split	NA	Prot
Protected Phases	5	5	2		1	1	6		3	3		4	4	4
Permitted Phases	6	6		2	2	2		6						
Detector Phase	5	5	2	2	1	1	6	6	3	3		4	4	4
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	20.0	20.0	14.0	14.0	20.0	20.0	15.0	15.0		15.0	15.0	15.0
Total Split (s)	42.0	42.0	92.0	92.0	14.0	14.0	64.0	64.0	15.0	15.0		19.0	19.0	19.0
Total Split (%)	30.0%	30.0%	65.7%	65.7%	10.0%	10.0%	45.7%	45.7%	10.7%	10.7%		13.6%	13.6%	13.6%
Yellow Time (s)	3.0	3.0	4.6	4.6	3.0	3.0	4.6	4.6	4.2	4.2		3.1	3.1	3.1
All-Red Time (s)	3.3	3.3	2.0	2.0	2.8	2.8	2.0	2.0	1.9	1.9		3.2	3.2	3.2
Lost Time Adjust (s)		-1.3	-1.6	0.0			-0.8	-1.6	-1.6	0.0	-1.1		-1.3	-1.3
Total Lost Time (s)		5.0	5.0	6.6			5.0	5.0	6.1	5.0			5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	None	C-Max	C-Max	None	None		None	None	None
Act Effect Green (s)		96.5	87.5	85.9			96.5	59.0	59.0	8.4	9.5		14.0	14.0
Actuated g/C Ratio		0.69	0.62	0.61			0.69	0.42	0.42	0.06	0.07		0.10	0.10
v/c Ratio		1.09	0.93	0.00			0.53	1.03	0.28	0.62	0.42		1.05	0.48
Control Delay		106.6	32.5	0.0			32.9	53.1	7.9	89.3	23.6		140.1	10.5
Queue Delay		0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		106.6	32.5	0.0			32.9	53.1	7.9	89.3	23.6		140.1	10.5
LOS		F	C	A			C	D	A	F	C		F	B
Approach Delay			48.6				47.0			54.8			67.9	
Approach LOS			D				D			D			E	
Queue Length 50th (ft)		-537	827	0		24	-772	21	59	4			-179	0
Queue Length 95th (ft)		#771	973	0		m50	m#914	m61	#119	56			#338	44
Internal Link Dist (ft)			1028				1698			150			26	
Turn Bay Length (ft)		375		375		500		100						
Base Capacity (vph)		520	2179	1005		167	1499	741	111	176			174	479
Starvation Cap Reductn		0	0	0		0	0	0	0	0			0	0
Spillback Cap Reductn		0	0	0		0	0	0	0	0			0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0			0	0
Reduced v/c Ratio		1.09	0.93	0.00		0.53	1.03	0.28	0.59	0.41			1.05	0.48

Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 23 (16%), Referenced to phase 2:EBWB and 6:EBWB, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 49.8 Intersection LOS: D
 Intersection Capacity Utilization 99.7% ICU Level of Service F
 Analysis Period (min) 15
 - Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Old Milburnie Road & US 64 Bus (Knightsdale Blvd)



Knightsdale Gateway
2: Westover Drive/Farmwell Road & US 64 Bus (Knightsdale Blvd)

Build-out PM (2034)
05/11/2022



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕	↗	↖	↕	↗		↕			↕	
Traffic Volume (vph)	7	41	2132	40	41	1636	85	11	4	8	151	8	67
Future Volume (vph)	7	41	2132	40	41	1636	85	11	4	8	151	8	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		225		225	200		150	0		0	0		0
Storage Lanes		1		1	1		1	0		0	0		0
Taper Length (ft)		100			100			25			25		
Satd. Flow (prot)	0	1698	3539	1583	1770	3539	1524	0	1736	0	0	1690	0
Flt Permitted		0.950			0.950				0.845			0.785	
Satd. Flow (perm)	0	1698	3539	1583	1770	3539	1524	0	1503	0	0	1371	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)				86			86		8			13	
Link Speed (mph)			45			45			25			30	
Link Distance (ft)			1778			1589			405			118	
Travel Time (s)			26.9			24.1			11.0			2.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	7%	2%	2%	2%	2%	6%	2%	2%	2%	3%	2%	8%
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	50	2244	42	43	1722	89	0	24	0	0	238	0
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	5	2		1	6			8			4	
Permitted Phases				2			6	8			4		
Detector Phase	5	5	2	2	1	6	6	8	8		4	4	
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	12.0	12.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	15.0	15.0	20.0	20.0	15.0	20.0	20.0	15.0	15.0		15.0	15.0	
Total Split (s)	15.0	15.0	96.0	96.0	15.0	96.0	96.0	29.0	29.0		29.0	29.0	
Total Split (%)	10.7%	10.7%	68.6%	68.6%	10.7%	68.6%	68.6%	20.7%	20.7%		20.7%	20.7%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effect Green (s)		9.8	94.1	94.1	9.7	94.0	94.0		24.0			24.0	
Actuated g/C Ratio		0.07	0.67	0.67	0.07	0.67	0.67		0.17			0.17	
v/c Ratio		0.42	0.94	0.04	0.35	0.72	0.08		0.09			0.97	
Control Delay		79.4	11.1	0.0	75.5	20.9	3.4		37.6			104.6	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay		79.4	11.1	0.0	75.5	20.9	3.4		37.6			104.6	
LOS		E	B	A	E	C	A		D			F	
Approach Delay			12.4			21.3			37.6			104.6	
Approach LOS			B			C			D			F	
Queue Length 50th (ft)		48	118	0	35	789	8		12			207	
Queue Length 95th (ft)		m54	m#1187	m0	m60	911	39		40			#383	
Internal Link Dist (ft)			1698			1509			325			38	
Turn Bay Length (ft)		225		225	200		150						
Base Capacity (vph)		121	2378	1092	126	2376	1051		264			245	
Starvation Cap Reductn		0	0	0	0	0	0		0			0	
Spillback Cap Reductn		0	0	0	0	0	0		0			0	
Storage Cap Reductn		0	0	0	0	0	0		0			0	
Reduced v/c Ratio		0.41	0.94	0.04	0.34	0.72	0.08		0.09			0.97	

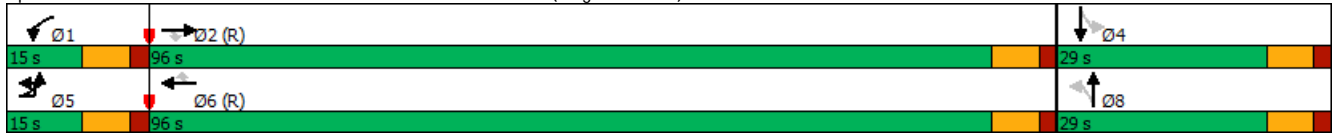
Intersection Summary

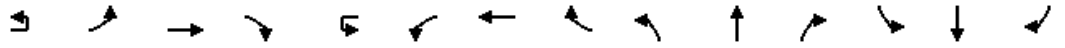
Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 21.1 Intersection LOS: C
 Intersection Capacity Utilization 86.1% ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↕↕↕	↗			↕↕↕	↗	↔↔	↔		↔↔	↕	↗
Traffic Volume (vph)	9	178	1893	294	35	402	1496	446	147	49	227	268	124	149
Future Volume (vph)	9	178	1893	294	35	402	1496	446	147	49	227	268	124	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			3%				-3%			-2%			1%	
Storage Length (ft)		200		200		575		375	200		50	0		0
Storage Lanes		3		1		1		1	1		1	2		1
Taper Length (ft)		300				100			100			25		
Satd. Flow (prot)	0	3365	5009	1560	0	1796	5111	1607	3467	1650	0	3416	1853	1575
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3363	5009	1560	0	1796	5111	1587	3467	1650	0	3416	1853	1575
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				83				365		138				182
Link Speed (mph)			45				45			35			25	
Link Distance (ft)			746				963			562			518	
Travel Time (s)			11.3				14.6			10.9			14.1	
Confl. Peds. (#/hr)		1						1						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	201	2035	316	0	470	1609	480	158	297	0	288	133	160
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7	3	8		7	4	5!
Permitted Phases				2				6						4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	15.0	15.0	19.0	15.0	15.0	15.0	20.0	15.0	15.0	16.0		15.0	15.0	15.0
Total Split (s)	20.0	20.0	65.0	25.0	35.0	35.0	80.0	15.0	25.0	25.0		15.0	15.0	20.0
Total Split (%)	14.3%	14.3%	46.4%	17.9%	25.0%	25.0%	57.1%	10.7%	17.9%	17.9%		10.7%	10.7%	14.3%
Yellow Time (s)	3.0	3.0	4.3	3.0	3.0	3.0	4.8	3.0	3.0	4.0		3.0	3.1	3.0
All-Red Time (s)	3.9	3.9	1.7	3.9	3.5	3.5	1.7	3.9	3.9	3.1		3.9	3.7	3.9
Lost Time Adjust (s)		-1.9	-1.0	-1.9		-1.5	-1.5	-1.9	-1.9	-2.1		-1.9	-1.8	-1.9
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effct Green (s)		13.7	60.7	74.9		30.0	77.0	87.0	14.2	19.3		10.0	15.1	33.8
Actuated g/C Ratio		0.10	0.43	0.54		0.21	0.55	0.62	0.10	0.14		0.07	0.11	0.24
v/c Ratio		0.61	0.94	0.36		1.22	0.57	0.43	0.45	0.86		1.18	0.67	0.31
Control Delay		66.4	27.6	5.3		154.9	11.7	1.2	62.6	54.3		169.2	76.9	5.5
Queue Delay		0.0	0.1	0.0		0.2	0.0	0.0	0.0	0.3		0.0	0.0	0.0
Total Delay		66.4	27.7	5.3		155.1	11.7	1.2	62.6	54.6		169.2	76.9	5.5
LOS		E	C	A		F	B	A	E	D		F	E	A
Approach Delay			28.0				36.1			57.4			103.0	
Approach LOS			C				D			E			F	
Queue Length 50th (ft)		87	559	67		-519	147	2	71	147		-161	117	0
Queue Length 95th (ft)		m94	m#663	m56		#741	219	5	104	#302		#258	#250	42
Internal Link Dist (ft)			666				883			482			438	
Turn Bay Length (ft)		200		200		575		375	200					
Base Capacity (vph)		360	2171	934		384	2812	1125	495	354		244	199	531
Starvation Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn		0	4	0		9	0	0	0	2		0	0	0
Storage Cap Reductn		0	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio		0.56	0.94	0.34		1.25	0.57	0.43	0.32	0.84		1.18	0.67	0.30

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 84 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 40.6

Intersection LOS: D

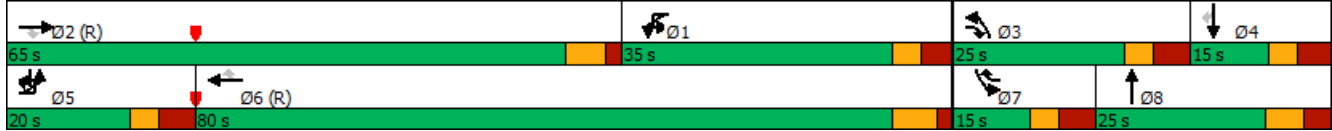
Intersection Capacity Utilization 101.7%

ICU Level of Service G

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- ! Phase conflict between lane groups.

Splits and Phases: 3: Hodge Road & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
4: I-540 Eastbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out PM (2034)
05/11/2022

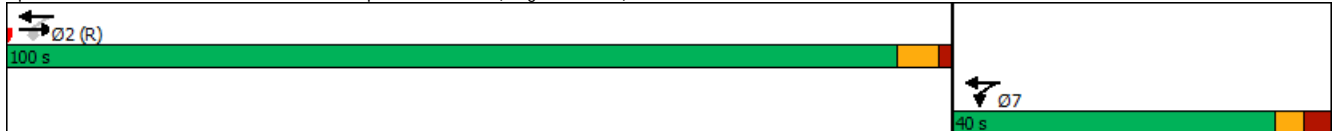


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↓	↑↑							↑
Traffic Volume (vph)	0	2227	126	255	1640	0	0	0	0	0	0	768
Future Volume (vph)	0	2227	126	255	1640	0	0	0	0	0	0	768
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			2%	
Satd. Flow (prot)	0	5060	1575	1778	3557	0	0	0	0	0	0	1580
Flt Permitted				0.040								
Satd. Flow (perm)	0	5060	1575	75	3557	0	0	0	0	0	0	1580
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			136									100
Link Speed (mph)		45			45			35				35
Link Distance (ft)		963			225			613				525
Travel Time (s)		14.6			3.4			11.9				10.2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2447	138	280	1802	0	0	0	0	0	0	844
Turn Type		NA	Perm	D.P+P	NA							Free
Protected Phases		2		7	2 7							
Permitted Phases			2	2								Free
Detector Phase		2	2	7	2 7							
Switch Phase												
Minimum Initial (s)		12.0	12.0	7.0								
Minimum Split (s)		19.0	19.0	15.0								
Total Split (s)		100.0	100.0	40.0								
Total Split (%)		71.4%	71.4%	28.6%								
Yellow Time (s)		4.4	4.4	3.0								
All-Red Time (s)		1.6	1.6	3.1								
Lost Time Adjust (s)		-1.0	-1.0	-1.1								
Total Lost Time (s)		5.0	5.0	5.0								
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max	C-Max	None								
Act Effct Green (s)		103.0	103.0	130.0	140.0							140.0
Actuated g/C Ratio		0.74	0.74	0.93	1.00							1.00
v/c Ratio		0.66	0.12	0.70	0.51							0.53
Control Delay		5.9	0.7	62.6	5.2							1.3
Queue Delay		0.9	0.0	0.0	0.0							0.0
Total Delay		6.8	0.7	62.6	5.2							1.3
LOS		A	A	E	A							A
Approach Delay		6.5			13.0						1.3	
Approach LOS		A			B						A	
Queue Length 50th (ft)		153	3	212	203							0
Queue Length 95th (ft)		m209	m3	303	178							0
Internal Link Dist (ft)		883			145			533			445	
Turn Bay Length (ft)												
Base Capacity (vph)		3722	1194	497	3544							1580
Starvation Cap Reductn		872	0	0	0							0
Spillback Cap Reductn		0	0	0	0							0
Storage Cap Reductn		0	0	0	0							0
Reduced v/c Ratio		0.86	0.12	0.56	0.51							0.53

Intersection Summary

Area Type: Other
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 72 (51%), Referenced to phase 2:EBWB, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 8.1 Intersection LOS: A
 Intersection Capacity Utilization 117.9% ICU Level of Service H
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)



Knightsdale Gateway
5: I-540 Westbound Ramps & US 64 Bus (Knightsdale Blvd)

Build-out PM (2034)
05/11/2022



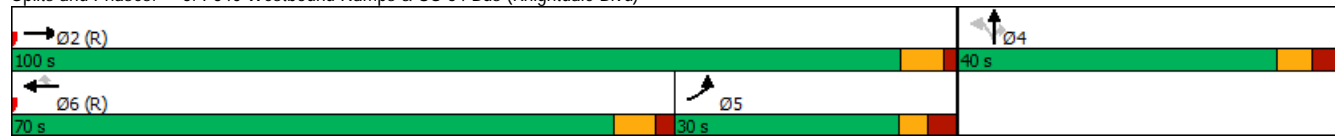
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↕↕↕			↕↕↕	↕↔		↕↔	↕↕↕			
Traffic Volume (vph)	426	2865	0	0	1758	647	138	4	634	0	0	0
Future Volume (vph)	426	2865	0	0	1758	647	138	4	634	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			1%			2%			0%	
Storage Length (ft)	500		0	0		0	0		0	0	0	0
Storage Lanes	1		0	0		1	0		2	0	0	0
Taper Length (ft)	200			25			25			25		
Satd. Flow (prot)	3417	5111	0	0	5060	1575	0	1743	2759	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	3417	5111	0	0	5060	1575	0	1743	2759	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						530			76			
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		848			814			733			573	
Travel Time (s)		12.8			12.3			14.3			11.2	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	435	2923	0	0	1794	660	0	145	647	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases						6	4		4			
Detector Phase	5	2			6	6	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	1.6			2.0	2.0	2.7	2.7	2.7			
Lost Time Adjust (s)	-1.3	-1.2			-1.4	-1.4	-1.4	-1.4	-1.4			
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	C-Max			C-Max	C-Max	None	None	None			
Act Effct Green (s)	25.0	97.2			67.2	67.2		32.8	32.8			
Actuated g/C Ratio	0.18	0.69			0.48	0.48		0.23	0.23			
v/c Ratio	0.71	0.82			0.74	0.64		0.36	0.92			
Control Delay	44.8	5.4			32.0	8.3		46.9	64.9			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	44.8	5.4			32.0	8.3		46.9	64.9			
LOS	D	A			C	A		D	E			
Approach Delay		10.5			25.7			61.6				
Approach LOS		B			C			E				
Queue Length 50th (ft)	202	132			487	70		109	289			
Queue Length 95th (ft)	239	145			548	202		174	#397			
Internal Link Dist (ft)		768			734			653			493	
Turn Bay Length (ft)	500											
Base Capacity (vph)	610	3548			2428	1031		435	746			
Starvation Cap Reductn	0	6			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.71	0.83			0.74	0.64		0.33	0.87			

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	68 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	22.3
Intersection Capacity Utilization:	85.9%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	E

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T	R		R
Traffic Volume (vph)	10	17	701	6	7	375
Future Volume (vph)	10	17	701	6	7	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		0%			4%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1674	0	1861	0	0	3465
Flt Permitted	0.981					0.999
Satd. Flow (perm)	1674	0	1861	0	0	3465
Link Speed (mph)	30		30			45
Link Distance (ft)	377		106			487
Travel Time (s)	8.6		2.4			7.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	0	752	0	0	406
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.3% ICU Level of Service A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	10	17	701	6	7	375
Future Vol, veh/h	10	17	701	6	7	375
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	4
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	18	746	6	7	399

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	963	749	0	0	752
Stage 1	749	-	-	-	-
Stage 2	214	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13
Critical Hdwy Stg 1	5.43	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219
Pot Cap-1 Maneuver	268	411	-	-	856
Stage 1	466	-	-	-	-
Stage 2	802	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	265	411	-	-	856
Mov Cap-2 Maneuver	265	-	-	-	-
Stage 1	466	-	-	-	-
Stage 2	793	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.5	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	341	856	-
HCM Lane V/C Ratio	-	-	0.084	0.009	-
HCM Control Delay (s)	-	-	16.5	9.2	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Knightsdale Gateway
7: Farmwell Road & Site Access

Build-out PM (2034)
05/11/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	8	4	10	13	7	4	9	107	13	4	203	18
Future Volume (vph)	8	4	10	13	7	4	9	107	13	4	203	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	1448	0	0	1574	0	0	1759	0	0	1824	0
Flt Permitted		0.983			0.973			0.997			0.999	
Satd. Flow (perm)	0	1448	0	0	1574	0	0	1759	0	0	1824	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		316			305			118			529	
Travel Time (s)		7.2			6.9			2.7			12.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	109%	2%	25%	2%	2%	2%	7%	2%	2%	3%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	23	0	0	25	0	0	136	0	0	237	0
Sign Control		Stop			Stop			Free			Yield	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	22.8%			ICU Level of Service A								
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	4	10	13	7	4	9	107	13	4	203	18
Future Vol, veh/h	8	4	10	13	7	4	9	107	13	4	203	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Yield	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1079869440	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	109	2	25	2	2	2	7	2	2	3	2
Mvmt Flow	8	4	11	14	7	4	9	113	14	4	214	19

Major/Minor	Minor2		Minor1			Major1		
Conflicting Flow All	144	145	0	146	138	120	0	0
Stage 1	0	0	-	138	138	-	-	-
Stage 2	144	145	-	8	0	-	-	-
Critical Hdwy	7.12	7.59	6.22	7.35	6.52	6.22	4.12	-
Critical Hdwy Stg 1	-	-	-	6.35	5.52	-	-	-
Critical Hdwy Stg 2	6.12	6.59	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.981	3.318	3.725	4.018	3.318	2.218	-
Pot Cap-1 Maneuver	825	588	-	773	753	931	-	-
Stage 1	-	-	-	813	782	-	-	-
Stage 2	859	612	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	815	588	-	-	753	931	-	-
Mov Cap-2 Maneuver	815	588	-	-	753	-	-	-
Stage 1	-	-	-	813	782	-	-	-
Stage 2	847	612	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s			
HCM LOS	-	-	-

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

7: Farmwell Road & Site Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	171.3	140.1	128.5
Total Del/Veh (s)	18.9	17.7	54.5	58.1	18.9	14.4	0.4	0.6	0.4	311.5	300.5	279.3

7: Farmwell Road & Site Access Performance by movement

Movement	All
Denied Del/Veh (s)	82.5
Total Del/Veh (s)	178.2

7: Farmwell Road & Site Access Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.0	139.6	82.5
Total Del/Veh (s)	36.5	39.2	0.5	300.4	178.2

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	UL	T	T	R	L	TR	LT	R
Maximum Queue (ft)	475	1112	1092	8	322	593	618	200	134	124	54	40
Average Queue (ft)	467	988	951	0	68	230	246	79	58	49	27	9
95th Queue (ft)	524	1342	1339	4	217	511	532	209	112	98	46	29
Link Distance (ft)		1060	1060			1703	1703		160	160	2	2
Upstream Blk Time (%)		38	9						0	0	87	33
Queuing Penalty (veh)		0	0						0	0	112	43
Storage Bay Dist (ft)	375			375	500			100				
Storage Blk Time (%)	63	4	5			3	34	1				
Queuing Penalty (veh)	598	19	0			3	67	4				

Intersection: 1: Old Milburnie Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	R
Maximum Queue (ft)	70
Average Queue (ft)	24
95th Queue (ft)	55
Link Distance (ft)	2
Upstream Blk Time (%)	87
Queuing Penalty (veh)	113
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	B12	B12	B12	NB
Directions Served	UL	T	T	R	L	T	T	R	T	T		LTR
Maximum Queue (ft)	204	544	462	178	96	218	232	83	533	686	70	61
Average Queue (ft)	48	190	200	10	32	110	119	10	32	48	5	17
95th Queue (ft)	135	422	397	80	74	203	214	54	263	331	100	48
Link Distance (ft)		1703	1703			1527	1527		659	659	659	336
Upstream Blk Time (%)									0	0	0	
Queuing Penalty (veh)									0	1	0	
Storage Bay Dist (ft)	225			225	200			150				
Storage Blk Time (%)		6	7			0	2					
Queuing Penalty (veh)		3	3			0	2					

Intersection: 2: Westover Drive/Farmwell Road & US 64 Bus (Knightdale Blvd)

Movement	SB
Directions Served	LTR
Maximum Queue (ft)	61
Average Queue (ft)	27
95th Queue (ft)	44
Link Distance (ft)	18
Upstream Blk Time (%)	79
Queuing Penalty (veh)	178
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB
Directions Served	UL	L	T	T	T	R	UL	T	T	T	R	L
Maximum Queue (ft)	147	257	419	507	512	300	675	943	958	1058	221	300
Average Queue (ft)	72	94	234	281	303	171	665	864	889	880	84	241
95th Queue (ft)	127	179	377	438	466	360	725	1157	1141	1383	172	386
Link Distance (ft)				659	659			890	890	890		
Upstream Blk Time (%)					0			50	55	60		
Queuing Penalty (veh)					0			407	440	486		
Storage Bay Dist (ft)	200	200	200			200	575				375	200
Storage Blk Time (%)	0	0	9	20	24	0	82	1		0		1
Queuing Penalty (veh)	0	0	58	160	71	1	408	6		1		3

Intersection: 3: Hodge Road & US 64 Bus (Knightdale Blvd)

Movement	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	L	T	R
Maximum Queue (ft)	504	75	453	461	423	240
Average Queue (ft)	404	74	324	350	207	56
95th Queue (ft)	588	77	535	535	443	169
Link Distance (ft)	469		443	443	443	443
Upstream Blk Time (%)	36		24	30	7	0
Queuing Penalty (veh)	0		0	0	0	0
Storage Bay Dist (ft)		50				
Storage Blk Time (%)	20	78				
Queuing Penalty (veh)	69	114				

Intersection: 4: I-540 Eastbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	WB	WB	WB	SB
Directions Served	T	T	T	L	T	T	R
Maximum Queue (ft)	178	282	196	240	264	261	538
Average Queue (ft)	13	23	28	157	203	207	419
95th Queue (ft)	107	162	129	259	330	325	728
Link Distance (ft)	890	890	890	136	136	136	481
Upstream Blk Time (%)		0		22	61	70	76
Queuing Penalty (veh)		0		142	387	442	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: I-540 Westbound Ramps & US 64 Bus (Knightdale Blvd)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	T	T	T	T	R	LT	R	R
Maximum Queue (ft)	254	242	728	847	714	801	803	814	803	257	398	378
Average Queue (ft)	151	157	206	280	257	612	638	615	546	109	261	221
95th Queue (ft)	225	229	476	664	555	987	977	1006	1049	205	362	324
Link Distance (ft)		802	802	802	802	774	774	774	774	660	660	660
Upstream Blk Time (%)			0	0	0	20	29	40	25			
Queuing Penalty (veh)			1	4	2	0	0	0	0			
Storage Bay Dist (ft)	500											
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 6: Old Milburnie Road & Farmwell Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	LT	T
Maximum Queue (ft)	238	71	504	200
Average Queue (ft)	126	47	482	188
95th Queue (ft)	297	80	497	242
Link Distance (ft)	352	2	465	
Upstream Blk Time (%)	7	0	92	
Queuing Penalty (veh)	0	2	0	
Storage Bay Dist (ft)				100
Storage Blk Time (%)			93	69
Queuing Penalty (veh)			173	135

Intersection: 7: Farmwell Road & Site Access

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	84	97	9	540
Average Queue (ft)	23	26	1	460
95th Queue (ft)	65	70	7	627
Link Distance (ft)	287	276	18	499
Upstream Blk Time (%)			0	58
Queuing Penalty (veh)			1	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 4658

Appendix L:
Queuing Summary

Intersection #1 - US 64 Bus (Knightdale Blvd) at Old Milburnie Rd

AM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage	s	375	-	s		150	-	75		s	-	s		s	-	-
	Synchro 95th	s	70	174	s	m2	138	1		s	26	s		s	#226	49	
	SimTraffic Max	s	166	118	s		28	231	94		s	47	s		s	66	62
Background (2025)	Storage	s	375	-	s		150	-	75		s	-	s		s	-	-
	Synchro 95th	s	#173	215	s	m2	380	1		s	26	s		s	#257	51	
	SimTraffic Max	s	225	128	s		28	317	161		s	46	s		s	64	70
Build-out (2025)	Storage	s	375	-	s		150	-	75		s	-	s		s	-	-
	Synchro 95th	s	#197	228	s	m2	405	1		s	26	s		s	#257	51	
	SimTraffic Max	s	255	149	s		73	328	162		s	58	s		s	69	52
Build-out (2025) - Improved	Storage	s	375	-	s		150	-	75		s	-	s		s	-	-
	Synchro 95th	s	#197	228	s	m0	120	m0		s	26	s		s	#257	51	
	SimTraffic Max	s	232	129	s		28	297	161		s	53	s		s	67	56
Background (2034)	Storage	s	375	-	375		500	-	100		-	-	s		s	-	-
	Synchro 95th	s	#242	257	0	m8	#693	m4		#225	58	s		s	#259	#235	
	SimTraffic Max	s	474	863	25		72	509	200		175	113	s		s	75	76
Build-out (2034)	Storage	s	375	-	375		500	-	100		-	-	s		s	-	-
	Synchro 95th	s	#260	270	0	m7	#854	m3		#225	58	s		s	#258	#236	
	SimTraffic Max	s	458	810	17		117	465	200		177	128	s		s	63	62

PM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage	s	375	-	s	s	150	-	75		s	-	s		s	-	-
	Synchro 95th	s	#323	536	s	s	m1	396	13		s	29	s		s	#256	19
	SimTraffic Max	s	369	269	s	s	40	235	167		s	69	s		s	54	52
Background (2025)	Storage	s	375	-	-	s	150	-	75		s	-	s		s	-	-
	Synchro 95th	s	#546	726	0	s	m1	505	21		s	29	s		s	#297	31
	SimTraffic Max	s	454	435	0	s	36	258	141		s	73	s		s	51	58
Build-out (2025)	Storage	s	375	-	s	s	150	-	75		s	-	s		s	-	-
	Synchro 95th	s	#575	747	s	s	m1	559	23		s	29	s		s	#297	36
	SimTraffic Max	s	430	433	s	s	41	236	84		s	72	s		s	41	60
Build-out (2025) - Improved	Storage	s	375	-	s	s	150	-	75		s	-	s		s	-	-
	Synchro 95th	s	#575	747	s	s	m1	56	0		s	29	s		s	#297	36
	SimTraffic Max	s	443	518	s	s	33	248	114		s	68	s		s	52	52
Background (2034)	Storage	s	375	-	375	s	500	-	100		-	-	s		s	-	-
	Synchro 95th	s	#750	970	0	s	76	#902	73		#153	56	s		s	#326	43
	SimTraffic Max	s	475	1110	101	s	368	705	200		197	138	s		s	67	69
Build-out (2034)	Storage	s	375	-	375	s	500	-	100		-	-	s		s	-	-
	Synchro 95th	s	#771	973	0	s	m50	m#914	m61		#119	56	s		s	#338	44
	SimTraffic Max	s	475	1112	8	s	322	618	200		134	124	s		s	54	70

*"s" indicates a movement that shares lanes

Intersection #2 - US 64 Bus (Knightdale Blvd) at Westover Dr / Farmwell Rd

AM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage		225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th		0	#N/A	#N/A		3	#N/A	#N/A		s	83	s		s	48	s
	SimTraffic Max		15	0	0		35	0	0		s	93	s		s	46	s
Background (2025)	Storage		225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th		0	#N/A	#N/A		3	#N/A	#N/A		s	163	s		s	78	s
	SimTraffic Max		19	0	0		41	0	0		s	154	s		s	45	s
Build-out (2025)	Storage		225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th		13	#N/A	#N/A		3	#N/A	#N/A		s	230	s		s	-	s
	SimTraffic Max		72	2	0		41	3	26		s	306	s		s	60	s
Build-out (2025) - Improved	Storage		225	-	225		200	-	150		s	-	s		-	-	s
	Synchro 95th		m63	m150	m0		m33	377	5		s	86	s		74	27	s
	SimTraffic Max		87	177	7		79	181	70		s	122	s		0	0	s
Background (2034)	Storage		225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th		m7	m159	m0		m31	793	m0		s	84	s		s	38	s
	SimTraffic Max		18	215	14		59	152	6		s	117	s		s	42	s
Build-out (2034)	Storage		225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th		m63	m177	m0		m29	832	9		s	92	s		s	89	s
	SimTraffic Max		80	251	18		72	260	90		s	138	s		s	54	s

PM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage	s	225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th	s	3	#N/A	#N/A		8	#N/A	#N/A		s	65	s		s	78	s
	SimTraffic Max	s	24	0	8		60	0	1		s	84	s		s	50	s
Background (2025)	Storage	s	225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th	s	5	#N/A	#N/A		13	#N/A	#N/A		s	98	s		s	118	s
	SimTraffic Max	s	34	0	4		72	0	2		s	161	s		s	64	s
Build-out (2025)	Storage	s	225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th	s	5	#N/A	#N/A		13	#N/A	#N/A		s	28	s		s	440	s
	SimTraffic Max	s	79	21	7		74	71	34		s	138	s		s	50	s
Build-out (2025) - Improved	Storage	s	225	-	225		200	-	150		s	-	s		-	-	s
	Synchro 95th	s	m64	m193	m0		71	673	19		s	34	s		#221	53	s
	SimTraffic Max	s	158	347	81		85	259	83		s	63	s		0	0	s
Background (2034)	Storage	s	225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th	s	m15	m123	m0		m61	905	m0		s	46	s		s	49	s
	SimTraffic Max	s	48	190	18		80	180	9		s	62	s		s	59	s
Build-out (2034)	Storage	s	225	-	225		200	-	150		s	-	s		s	-	s
	Synchro 95th	s	m54	m#1187	m0		m60	911	39		s	40	s		s	#383	s
	SimTraffic Max	s	204	544	178		96	232	83		s	61	s		s	61	s

*"s" indicates a movement that shares lanes

Intersection #3 - US 64 Bus (Knightdale Blvd) at Hodge Rd

AM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m31	m151	m32	s	170	93	5		99	98	s		72	39	0
	SimTraffic Max	s	70	217	78	s	228	243	58		436	75	s		123	82	67
Background (2025)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m57	m170	m29	s	#208	117	13		109	#171	s		155	57	39
	SimTraffic Max	s	108	207	90	s	248	336	93		493	75	s		225	102	86
Build-out (2025)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m58	m176	m27	s	#207	151	23		109	#171	s		155	57	39
	SimTraffic Max	s	95	223	92	s	246	362	92		501	76	s		208	88	84
Build-out (2025) - Improved	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	52	206	29	s	#207	151	23		109	#171	s		155	57	39
	SimTraffic Max	s	95	248	130	s	230	411	90		503	76	s		204	92	99
Background (2034)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	0	321	8	s	#237	194	39		121	#211	s		160	59	47
	SimTraffic Max	s	98	275	135	s	301	486	97		512	75	s		216	94	92
Build-out (2034)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	0	324	7	s	#236	226	39		121	#211	s		160	59	47
	SimTraffic Max	s	112	299	208	s	280	561	97		516	75	s		252	82	94

PM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m58	m336	m22	s	#569	104	1		84	124	s		95	150	0
	SimTraffic Max	s	100	344	298	s	675	937	100		462	75	s		152	187	65
Background (2025)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m112	m380	m43	s	#658	126	2		91	#252	s		#242	#199	24
	SimTraffic Max	s	196	434	300	s	675	1063	194		496	75	s		412	355	190
Build-out (2025)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m114	m462	m46	s	#657	141	3		91	#252	s		#242	#199	24
	SimTraffic Max	s	199	418	300	s	675	1057	210		502	75	s		396	255	125
Build-out (2025) - Improved	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m102	510	m69	s	#657	141	3		91	#252	s		#242	#199	24
	SimTraffic Max	s	232	430	300	s	675	1059	201		485	75	s		423	313	135
Background (2034)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m116	586	m71	s	#741	202	4		104	#302	s		#258	#250	42
	SimTraffic Max	s	194	422	288	s	675	1061	219		498	75	s		438	323	186
Build-out (2034)	Storage	s	200	-	200	s	575	-	375		200	-	s		-	-	-
	Synchro 95th	s	m94	m#663	m56	s	#741	219	5		104	#302	s		#258	#250	42
	SimTraffic Max	s	257	512	300	s	675	1058	221		504	75	s		461	423	240

*"s" indicates a movement that shares lanes

Intersection #4 - US 64 Bus (Knightdale Blvd) at I-540 EB Ramps

AM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage																
	Synchro 95th		0	34	m2		91	31	0		0	0	0		0	0	0
	SimTraffic Max		0	35	0		190	21	0		0	0	0		0	0	0
Background (2025)	Storage																
	Synchro 95th		0	95	m8		161	47	0		0	0	0		0	0	0
	SimTraffic Max		0	92	0		222	40	0		0	0	0		0	0	0
Build-out (2025)	Storage																
	Synchro 95th		0	96	m8		157	62	0		0	0	0		0	0	0
	SimTraffic Max		0	85	0		216	49	0		0	0	0		0	0	0
Build-out (2025) - Improved	Storage																
	Synchro 95th		0	96	m8		157	62	0		0	0	0		0	0	0
	SimTraffic Max		0	105	21		217	47	0		0	0	0		0	0	0
Background (2034)	Storage																
	Synchro 95th		0	108	m7		192	63	0		0	0	0		0	0	0
	SimTraffic Max		0	124	0		227	44	0		0	0	0		0	0	0
Build-out (2034)	Storage																
	Synchro 95th		0	107	m7		193	82	0		0	0	0		0	0	0
	SimTraffic Max		0	198	0		229	38	0		0	0	0		0	0	0

PM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage																
	Synchro 95th		0	m80	m1		187	67	0		0	0	0		0	0	0
	SimTraffic Max		0	198	0		233	218	0		0	0	0		0	0	388
Background (2025)	Storage																
	Synchro 95th		0	m158	m3		249	105	0		0	0	0		0	0	0
	SimTraffic Max		0	228	0		233	266	0		0	0	0		0	0	540
Build-out (2025)	Storage																
	Synchro 95th		0	m156	m4		255	116	0		0	0	0		0	0	0
	SimTraffic Max		0	179	0		229	266	0		0	0	0		0	0	537
Build-out (2025) - Improved	Storage																
	Synchro 95th		0	m156	m4		255	116	0		0	0	0		0	0	0
	SimTraffic Max		0	243	0		243	261	0		0	0	0		0	0	536
Background (2034)	Storage																
	Synchro 95th		0	m202	m3		296	164	0		0	0	0		0	0	0
	SimTraffic Max		0	321	0		235	265	0		0	0	0		0	0	539
Build-out (2034)	Storage																
	Synchro 95th		0	m209	m3		303	178	0		0	0	0		0	0	0
	SimTraffic Max		0	282	0		240	264	0		0	0	0		0	0	538

*"s" indicates a movement that shares lanes

Intersection #5 - US 64 Bus (Knightdale Blvd) at I-540 WB Ramps

AM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		164	60	0		0	256	52		s	93	97		0	0	0
	SimTraffic Max		209	126	0		0	295	324		s	113	192		0	0	0
Background (2025)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		#261	89	0		0	360	161		s	110	161		0	0	0
	SimTraffic Max		292	154	0		0	343	397		s	150	204		0	0	0
Build-out (2025)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		#261	92	0		0	386	163		s	140	164		0	0	0
	SimTraffic Max		290	150	0		0	361	447		s	192	216		0	0	0
Build-out (2025) - Improved	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		#259	87	0		0	386	163		s	140	164		0	0	0
	SimTraffic Max		271	207	0		0	348	520		s	170	218		0	0	0
Background (2034)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		#295	126	0		0	453	294		s	117	202		0	0	0
	SimTraffic Max		329	239	0		0	498	582		s	154	226		0	0	0
Build-out (2034)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		#297	134	0		0	481	290		s	146	205		0	0	0
	SimTraffic Max		387	310	0		0	402	461		s	180	252		0	0	0

PM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		185	112	0		0	353	62		s	105	288		0	0	0
	SimTraffic Max		189	582	0		0	458	240		s	159	319		0	0	0
Background (2025)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		230	124	0		0	439	100		s	141	335		0	0	0
	SimTraffic Max		258	765	0		0	727	639		s	174	368		0	0	0
Build-out (2025)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		242	124	0		0	452	111		s	155	335		0	0	0
	SimTraffic Max		247	706	0		0	774	752		s	199	352		0	0	0
Build-out (2025) - Improved	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		242	124	0		0	452	111		s	155	335		0	0	0
	SimTraffic Max		255	774	0		0	742	643		s	175	345		0	0	0
Background (2034)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		235	138	0		0	533	192		s	160	#397		0	0	0
	SimTraffic Max		283	726	0		0	812	807		s	206	369		0	0	0
Build-out (2034)	Storage		500	-	-		-	-	-		s	-	-		-	-	-
	Synchro 95th		239	145	0		0	548	202		s	174	#397		0	0	0
	SimTraffic Max		254	847	0		0	814	803		s	257	398		0	0	0

*"s" indicates a movement that shares lanes

Intersection #6 - Old Milburnie Rd at Farmwell Rd

AM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage						-		s			-	s		-	-	
	Synchro 95th						0		s			#N/A	s		0	#N/A	
	SimTraffic Max						136		s			54	s		0	515	
Background (2025)	Storage						-		s			-	s		-	-	
	Synchro 95th						3		s			#N/A	s		0	#N/A	
	SimTraffic Max						111		s			54	s		0	510	
Build-out (2025)	Storage						-		s			-	s		-	-	
	Synchro 95th						0		s			#N/A	s		0	#N/A	
	SimTraffic Max						87		s			54	s		0	514	
Build-out (2025) - Improved	Storage						-		s			-	s		-	-	
	Synchro 95th						0		s			#N/A	s		0	#N/A	
	SimTraffic Max						111		s			60	s		0	512	
Background (2034)	Storage						-		s			-	s		-	-	
	Synchro 95th						3		s			#N/A	s		0	#N/A	
	SimTraffic Max						98		s			60	s		0	510	
Build-out (2034)	Storage						-		s			-	s		-	-	
	Synchro 95th						3		s			#N/A	s		0	#N/A	
	SimTraffic Max						74		s			67	s		0	517	

PM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage						-		s			-	s		-	-	
	Synchro 95th						3		s			#N/A	s		0	#N/A	
	SimTraffic Max						54		s			62	s		0	431	
Background (2025)	Storage						-		s			-	s		-	-	
	Synchro 95th						3		s			#N/A	s		0	#N/A	
	SimTraffic Max						71		s			63	s		0	503	
Build-out (2025)	Storage						-		s			-	s		-	-	
	Synchro 95th						5		s			#N/A	s		0	#N/A	
	SimTraffic Max						148		s			58	s		0	504	
Build-out (2025) - Improved	Storage						-		s			-	s		-	-	
	Synchro 95th						5		s			#N/A	s		0	#N/A	
	SimTraffic Max						194		s			67	s		0	503	
Background (2034)	Storage						-		s			-	s		-	-	
	Synchro 95th						3		s			#N/A	s		0	#N/A	
	SimTraffic Max						102		s			69	s		0	518	
Build-out (2034)	Storage						-		s			-	s		-	-	
	Synchro 95th						8		s			#N/A	s		0	#N/A	
	SimTraffic Max						238		s			71	s		0	504	

*"s" indicates a movement that shares lanes

Intersection #7 - Farmwell Rd at Farmwell Rd / Site Driveway

AM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage				s		s						s				
	Synchro 95th			1	s		s	1			0		s				
	SimTraffic Max			40	s		s	49			0		s				
Background (2025)	Storage				s		s						s				
	Synchro 95th			1	s		s	1			0		s				
	SimTraffic Max			48	s		s	50			0		s				
Build-out (2025)	Storage		s		s		s		s		s		s		s		s
	Synchro 95th		s	#N/A	s		s	#N/A	s		s	#N/A	s		s	#N/A	s
	SimTraffic Max		s	150	s		s	92	s		s	15	s		s	369	s
Build-out (2025) - Improved	Storage		s		s		s		s		s		s		s		s
	Synchro 95th		s	#N/A	s		s	#N/A	s		s	#N/A	s		s	#N/A	s
	SimTraffic Max		s	58	s		s	58	s		s	17	s		s	96	s
Background (2034)	Storage				s		s						s				
	Synchro 95th			1	s		s	1			0		s				
	SimTraffic Max			42	s		s	62			0		s				
Build-out (2034)	Storage		s		s		s		s		s		s		s		s
	Synchro 95th		s	#N/A	s		s	#N/A	s		s	#N/A	s		s	#N/A	s
	SimTraffic Max		s	53	s		s	42	s		s	32	s		s	115	s

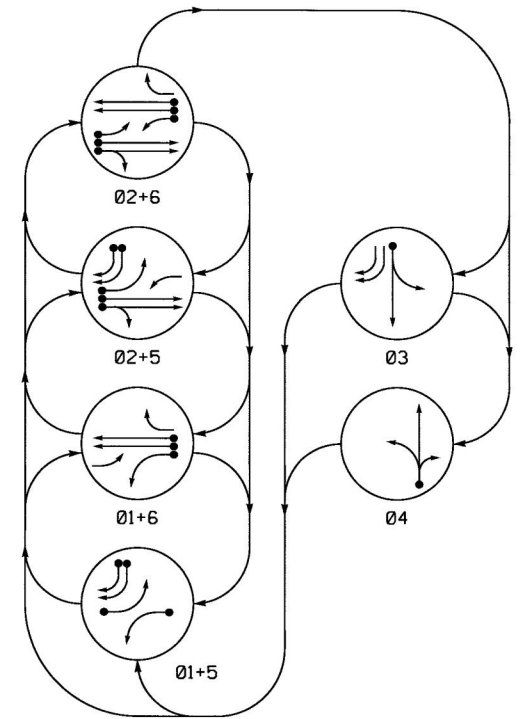
PM Peak Hour Queuing (feet)

Scenario		EB				WB				NB				SB			
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Existing (2021)	Storage				s		s						s				
	Synchro 95th			1	s		s	1			0		s				
	SimTraffic Max			82	s		s	75			0		s				
Background (2025)	Storage				s		s						s				
	Synchro 95th			1	s		s	2			0		s				
	SimTraffic Max			123	s		s	192			6		s				
Build-out (2025)	Storage		s		s		s		s		s		s		s		s
	Synchro 95th		s	#N/A	s		s	#N/A	s		s	#N/A	s		s	#N/A	s
	SimTraffic Max		s	244	s		s	261	s		s	4	s		s	524	s
Build-out (2025) - Improved	Storage		s		s		s		s		s		s		s		s
	Synchro 95th		s	#N/A	s		s	#N/A	s		s	#N/A	s		s	#N/A	s
	SimTraffic Max		s	82	s		s	96	s		s	20	s		s	480	s
Background (2034)	Storage				s		s						s				
	Synchro 95th			1	s		s	2			0		s				
	SimTraffic Max			60	s		s	75			0		s				
Build-out (2034)	Storage		s		s		s		s		s		s		s		s
	Synchro 95th		s	#N/A	s		s	#N/A	s		s	#N/A	s		s	#N/A	s
	SimTraffic Max		s	84	s		s	97	s		s	9	s		s	540	s

*"s" indicates a movement that shares lanes

Appendix M:
Signal Plans and Timings

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ← UN SIGNALIZED MOVEMENT
- ← PEDESTRIAN MOVEMENT

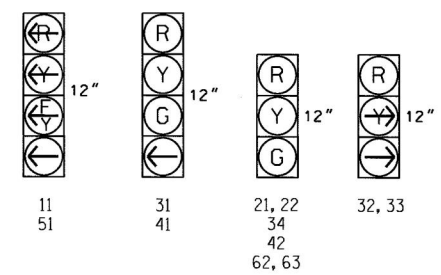
TABLE OF OPERATION

SIGNAL FACE	PHASE						FLASH
	01+5	01+6	02+5	02+6	03	04	
11	→	→	←	←	→	→	→
21, 22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32, 33	→	→	←	←	→	→	→
34	R	R	R	R	G	R	R
41	R	R	R	R	G	R	R
42	R	R	R	R	G	R	R
51	→	→	←	←	→	→	→
62, 63	R	G	R	G	R	R	Y

→ = Flashing Yellow Arrow

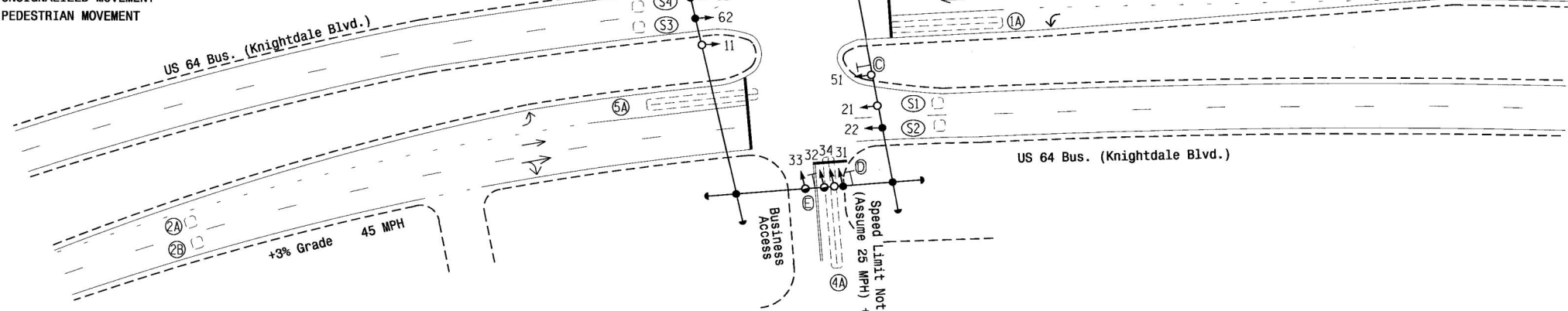
SIGNAL FACE I.D.

All Heads L.E.D.



2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					LOOP SYSTEM	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME			DELAY TIME
1A	6X60	0	2-4-2	-	1	Y	Y	-	-	15	-	Y
					6	Y	Y	Y	-	3	-	Y
2A, 2B	6X6	300	EXIST	-	2	Y	Y	-	-	-	-	Y
3A	6X60	0	2-4-2	-	3	Y	Y	-	-	3	-	Y
4A	6X60	+5	2-4-2	-	4	Y	Y	-	-	10	-	Y
5A	6X60	+5	2-4-2	-	5	Y	Y	-	-	15	-	Y
					2	Y	Y	Y	-	3	-	Y
5B	6X60	0	2-4-2	-	5	Y	Y	-	-	15	-	Y
5C	6X60	0	2-4-2	-	5	Y	Y	-	-	15	-	Y
6A, 6B	6X6	300	EXIST	-	6	Y	Y	-	-	-	-	Y
S1	6X6	+100	EXIST	-	-	-	-	-	-	-	-	Y
S2	6X6	+100	EXIST	-	-	-	-	-	-	-	-	Y
S3	6X6	+115	EXIST	-	-	-	-	-	-	-	-	Y
S4	6X6	+115	EXIST	-	-	-	-	-	-	-	-	Y



6 Phase Fully Actuated (US 64 Bus. Knightdale CLS)

NOTES

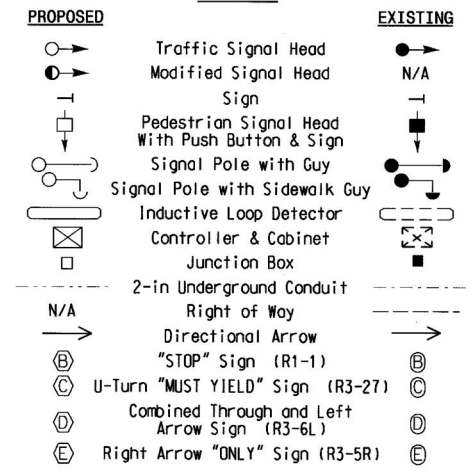
- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Disable Backup Protect for phase 2+6.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 22, 62 and 63.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
- Remove existing "Left Turn Yield on Green" ball signs (R10-12).
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data:
Master Asset #: 10528.
Controller Asset #: 1330.

OASIS 2070L TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	120	25	15	30	120
Yellow Clearance	3.0	4.6	4.2	3.1	3.0	4.6
Red Clearance	2.8	2.0	1.9	3.2	3.3	2.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	-	-	1.5
Max Variable Initial *	-	34	-	-	-	34
Time Before Reduction *	-	20	-	-	-	20
Time To Reduce *	-	45	-	-	-	45
Minimum Gap	-	3.2	-	-	-	3.2
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND



Signal Upgrade

750 N. Greenfield Pkwy, Garner, NC 27529

US 64 Bus. (Knightdale Blvd.) at SR 2217 (Old Milburnie Rd.)

Division 5 Wake County Knightdale

PLAN DATE: March 2013 REVIEWED BY:

PREPARED BY: L. Blount REVIEWED BY:

SEAL

SEAL 026486

ROBERT J. ZIEMBA

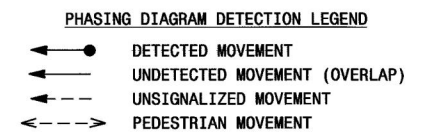
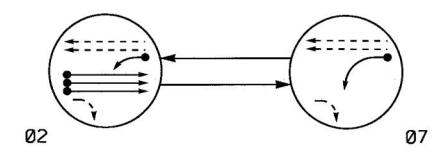
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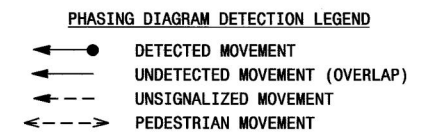
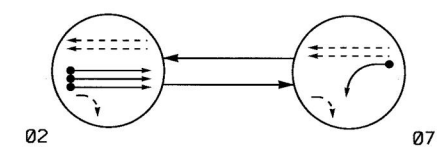
REVISIONS: _____

INIT. DATE

NORMAL PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



NORMAL PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE		
	N	S	F
21, 22, 23	G	R	Y
71	F	-	-

F = Flashing Yellow Arrow

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE		
	N	S	F
21, 22, 23	G	R	Y
71	F	-	-

F = Flashing Yellow Arrow

STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL

TO	CLEARANCE			
	1	2	1	2
F	→	→	→	→
R	→	→	→	→
L	→	→	→	→
P	→	→	→	→

F = Flashing Yellow Arrow

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD	
2A	6X6	300	EXISTING	-	2	Y	Y	-	-	-	-	-
2B	6X6	300	EXISTING	-	2	Y	Y	-	-	-	-	-
2C	6X6	300	EXISTING	-	2	Y	Y	-	-	-	-	-
7A	6X60	0	2-4-2	-	7	Y	Y	-	-	#15	-	-

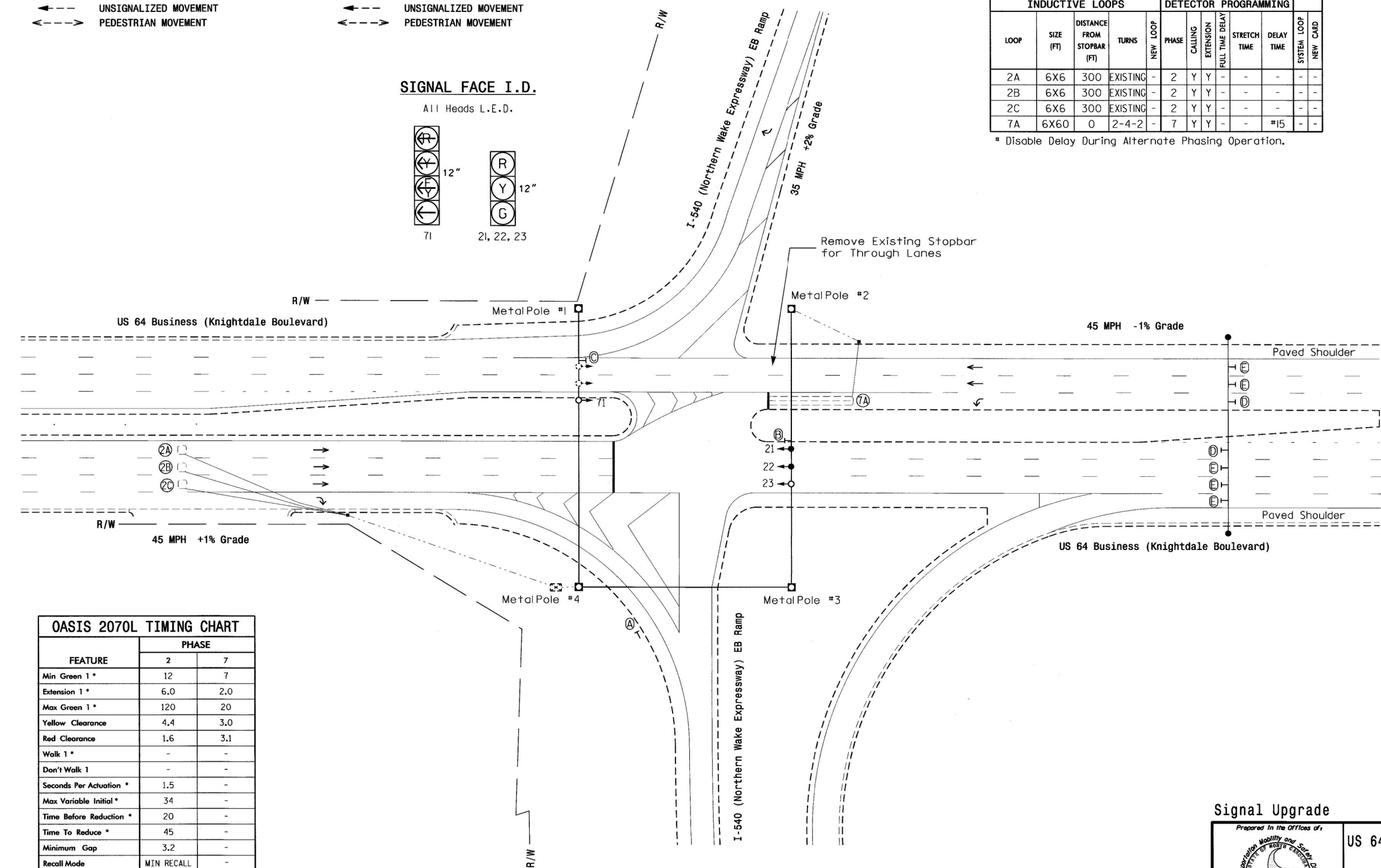
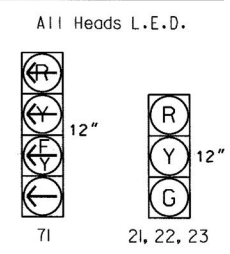
Disable Delay During Alternate Phasing Operation.

2 Phase Fully Actuated (US 64-Knightdale Closed Loop System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 21 and 22.
- Remove existing signal heads numbered 61 and 62.
- Set all detector units to presence mode.
- Pavement markings are existing unless otherwise shown.
- Program controller to operate in FYA COMPACT mode.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #: 2153.

SIGNAL FACE I.D.



OASIS 2070L TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	12	7
Extension 1 *	6.0	2.0
Max Green 1 *	120	20
Yellow Clearance	4.4	3.0
Red Clearance	1.6	3.1
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
Max Variable Initial *	34	-
Time Before Reduction *	20	-
Time To Reduce *	45	-
Minimum Gap	3.2	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

PROPOSED	EXISTING
○ Traffic Signal Head	● N/A
◐ Modified Signal Head	◐ N/A
○ with slash Remove Existing Signal Head	○ with slash N/A
⊕ Pedestrian Signal Head With Push Button & Sign	⊕ N/A
⊕ with slash Signal Pole with Guy	⊕ with slash N/A
⊕ with slash Signal Pole with Sidewalk Guy	⊕ with slash N/A
⊕ with slash Inductive Loop Detector	⊕ with slash N/A
⊕ with slash Controller & Cabinet	⊕ with slash N/A
⊕ with slash Junction Box	⊕ with slash N/A
⊕ with slash 2-in Underground Conduit	⊕ with slash N/A
→ Right of Way	→ N/A
→ Directional Arrow	→ N/A
⊕ Metal Strain Pole	⊕ N/A
⊕ "YIELD" Sign (R1-2)	⊕ N/A
⊕ No U-Turn Sign (R3-4)	⊕ N/A
⊕ No Right Turn Sign (R3-1)	⊕ N/A
⊕ Left Arrow "ONLY" Sign (R3-5L)	⊕ N/A
⊕ Through Arrow "ONLY" Sign (R3-5A)	⊕ N/A

Signal Upgrade

Prepared in the Office of:

US 64 Business (Knightdale Blvd.) at I-540 Eastbound Ramp
 Division 5 Wake County Knightdale
 PLAN DATE: January 2012 REVIEWED BY:
 PREPARED BY: C.E. Carter REVIEWED BY:
 REVISIONS: _____ INIT. DATE _____
 SCALE: 1" = 40'
 SIGNATURE: _____ DATE: 4/10/12
 SEAL: _____
 SIG. INVENTORY NO. 05-2153

10-FEB-2012 09:23 S:\15454175 Signal\Signal Design\Central Region\05-2153\052153.sig.dgn_2012010.dgn
 02:10:00

PHASING DIAGRAM

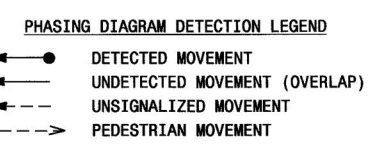
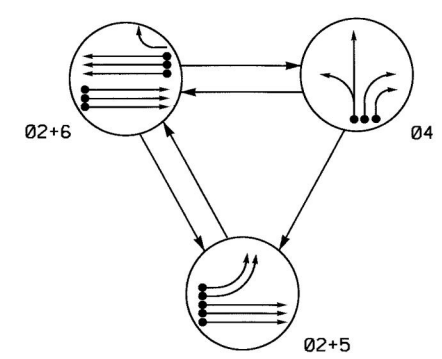
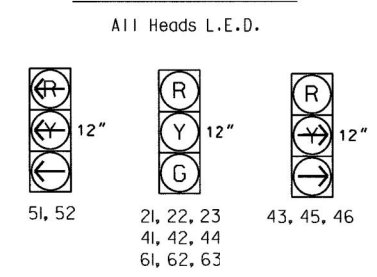


TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+6	04	04	04
21, 22, 23	G	G	R	Y
41, 42, 44	R	R	G	R
43, 45, 46	R	R	Y	R
51, 52	---	---	---	---
61, 62, 63	R	G	R	Y

SIGNAL FACE I.D.



OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

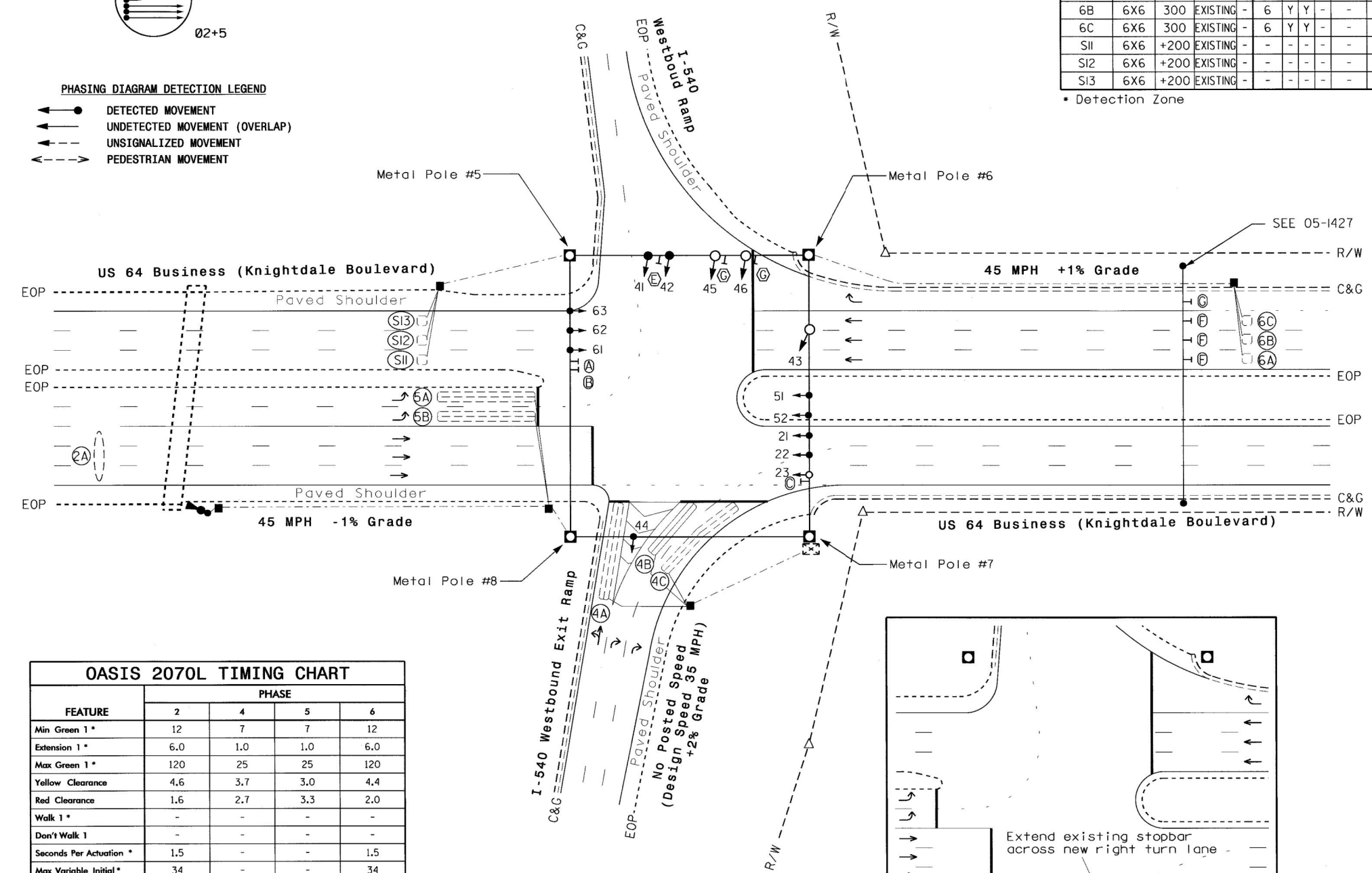
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
				PHASE	CALLING	EXTENSION	STRETCH TIME		
*2A	6X30	300	N/A	-	2	Y	Y	-	-
4A	6X60	0	2-4-2	-	4	Y	Y	-	-
4B	6X40	0	2-4-2	Y	4	Y	Y	-	15
4C	6X60	0	2-4-2	-	4	Y	Y	-	15
5A	6X60	0	2-4-2	-	5	Y	Y	-	-
5B	6X60	0	2-4-2	-	5	Y	Y	-	-
6A	6X6	300	EXISTING	-	6	Y	Y	-	-
6B	6X6	300	EXISTING	-	6	Y	Y	-	-
6C	6X6	300	EXISTING	-	6	Y	Y	-	-
SI1	6X6	+200	EXISTING	-	-	-	-	-	Y
SI2	6X6	+200	EXISTING	-	-	-	-	-	Y
SI3	6X6	+200	EXISTING	-	-	-	-	-	Y

* Detection Zone

3 Phase Fully Actuated (US 64-Knightdale Closed Loop System)

NOTES

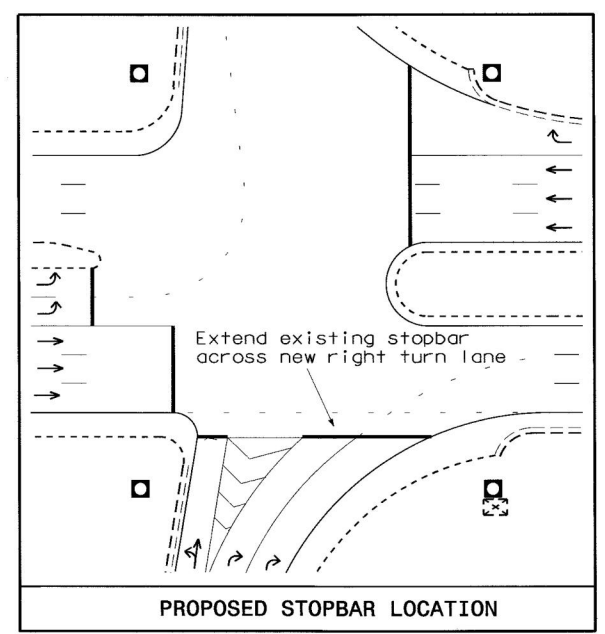
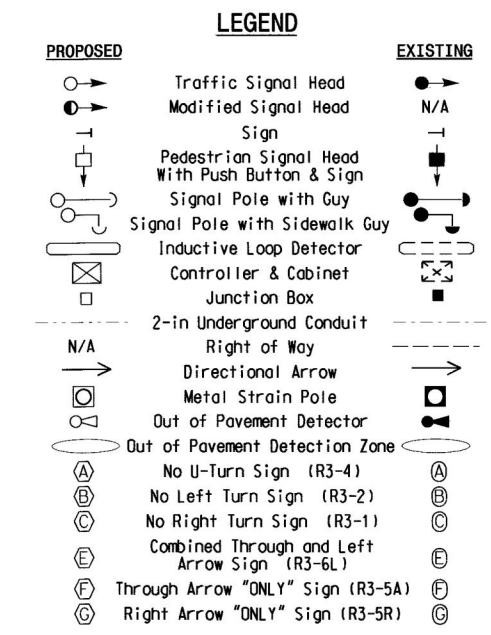
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 21 and 22.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- Pavement markings are existing unless otherwise shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #: 2152.



OASIS 2070L TIMING CHART

FEATURE	PHASE			
	2	4	5	6
Min Green 1*	12	7	7	12
Extension 1*	6.0	1.0	1.0	6.0
Max Green 1*	120	25	25	120
Yellow Clearance	4.6	3.7	3.0	4.4
Red Clearance	1.6	2.7	3.3	2.0
Walk 1*	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation*	1.5	-	-	1.5
Max Variable Initial*	34	-	-	34
Time Before Reduction*	15	-	-	15
Time To Reduce*	45	-	-	45
Minimum Gap	3.2	-	-	3.2
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.



Signal Upgrade

Prepared in the Offices of:

US 64 Business (Knightdale Blvd.) at I-540 Westbound Ramps
 Division 5 Wake County Knightdale
 PLAN DATE: January 2012 REVIEWED BY:
 PREPARED BY: C.E. Carter REVIEWED BY:
 SCALE: 1" = 40'
 REVISIONS: _____ INIT. DATE: _____
 SIGNATURE: _____ DATE: _____
 SIG. INVENTORY NO. 05-2152

08-FEB-2012 16:37 S:\TSS\AS\1751\SIGNAL\AS\SIGNAL - Design Section\Central - Reg\on\014_5405-2152\02152_1a-dsn_20120208.dgn P2.rvt

US 64 - Old Milburnie

(Plan 5, Offset 1)

(Phase Sequence 3)

AM

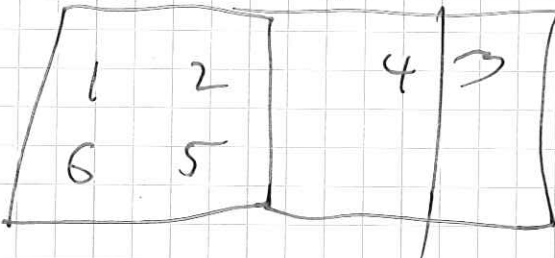
CL: 120

Offset: 110

Splits

1 = 15 2 = 70 3 = 20 4 = 15 5 = 15 6 = 70

2 + 6 = Coordination



Other stuff same as Signal Plan

PM

(Plan 7, Offset 1)

(Phase Sequence 2)

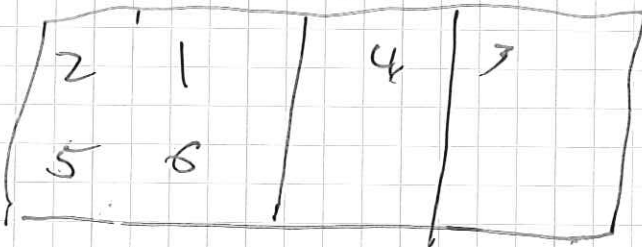
CL: 140

Offset: 23

Splits

1 = 15 2 = 85 3 = 25 4 = 15 5 = 20 6 = 80

2 + 6 = Coordination



US 64 - Hodge

(Schedule 3, Offset 1)

AM

Plan 5

CL: 120

Offset: 60

Splits

1:22 2:62 3:21 4:15 5:15 6:69 7:20

8:16

2+6 Coordination

Sequence Page 3

1 2 3 4

6 5 7 8

PM

(Schedule 5, Offset 1)

CL: 140

Plan 7

Offset: 84

Splits

1:35 2:65 3:25 4:15 5:20 6:80 7:15 8:25

2 1 3 4

Sequence Page 2

5 6 7 8

US 84 - I-540 EB Ramps

AM

Plan 5, Offset 1

CL: 120

Offset: 57

Splits

2: 90 7: 30

2 7

PM

Plan 7, Offset 1

CL: 140

Offset: 72

Splits

2: 100 7: 40

US 64 - I-540 WB Ramps

AM

Plan 5, Offset 7

CL: 120

Offset: 32

Splits

2: 85 4: 35 5: 25 6: 60

Sequence 3, Timing 2



PM

Plan 7, Offset 1

CL: 140

Offset: 68

Splits

2: 100 4: 40 5: 30 6: 70

Sequence 3, Timing 2

