



*Revised Traffic Impact Analysis*

# ParkStone Knightdale, NC

Prepared for:

The Widewaters Group, Inc.

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## Executive Summary

Kimley-Horn and Associates, Inc. has revised the original Traffic Impact Analysis dated May 13, 2016 for the proposed ParkStone multi-use development to address comments provided by both the North Carolina Department of Transportation (NCDOT) and the Town of Knightdale. This development is proposed to be located south of US 64 Business across from the Wake Stone quarry in Knightdale, NC. The site is currently vacant and adjacent land uses are generally a mix of commercial and residential. As currently envisioned, the development will consist of approximately 350 apartments, a 130-room hotel, a 12-screen movie theater, approximately 212,500 square feet of general retail space, and three outparcels, which were assumed to include an 8,000 SF automobile parts sales store, a 2,500 SF fast-food restaurant, and a gas station with 12 fueling positions. The development is proposed to be accessed by one full-movement driveway on US 64 Business across from the Wake Stone Driveway and one right-in/right-out site driveway on US 64 Business, as well as the extension of Village Park Drive through the site. Build-out of the development is anticipated in 2019, so the horizon years 2020 and 2029 were studied as part of this analysis per Town of Knightdale requirements.

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 (2016) traffic condition, the projected (2020) background and build-out traffic conditions, and the projected (2029) background and build-out traffic conditions. The weekday AM and PM peak hours were studied.

As shown in table ES-1, the proposed development has the potential to generate 6,356 new trips in and 6,356 new trips out during a typical weekday with 264 new trips entering and 285 new trips exiting during the AM peak hour and 475 new trips entering and 464 new trips exiting during the PM peak hour.



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
220	Apartment	350	d.u.	1,123	1,123	35	140	137	73
310	Hotel	130	rooms	531	531	41	28	40	38
445	Multiplex Movie Theater	12	screens	820	820	-	-	74	90
820	Shopping Center	212,550	s.f.	5,543	5,543	153	94	477	516
843	Automobile Parts Sales	8,000	s.f.	249	249	9	9	24	24
934	Fast-Food Restaurant w/ Drive-Through Window	3,500	s.f.	868	868	81	78	59	55
945	Gas Station w/ Convenience Market	12	f.p.	977	977	61	61	81	81
<b>Subtotal</b>				<b>10,111</b>	<b>10,111</b>	<b>380</b>	<b>410</b>	<b>892</b>	<b>877</b>
<i>Internal Capture</i>				<i>1,835</i>	<i>1,835</i>	<i>61</i>	<i>61</i>	<i>223</i>	<i>223</i>
<i>Pass-by Capture</i>				<i>1,920</i>	<i>1,920</i>	<i>55</i>	<i>64</i>	<i>194</i>	<i>190</i>
<b>Net New External Trips</b>				<b>6,356</b>	<b>6,356</b>	<b>264</b>	<b>285</b>	<b>475</b>	<b>464</b>

Capacity analyses were performed using Synchro Version 9.1 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		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
<b>US 64 Business at I-540 EB Ramps (Signalized)</b>		
Existing (2016) Traffic	OVERALL – A (2.0) EB – A (1.5) WBL – A (4.7)	OVERALL – A (3.3) EB – A (2.2) WBL – B (16.3)
Background (2020) Traffic	OVERALL – A (2.9) EB – A (2.0) WBL – A (8.1)	OVERALL – A (4.7) EB – A (3.1) WBL – C (23.6)
Build-out (2020) Traffic	OVERALL – A (4.2) EB – A (2.6) WBL – B (12.8)	OVERALL – A (7.0) EB – A (4.6) WBL – C (30.6)
Background (2029) Traffic	OVERALL – A (7.6) EB – A (5.0) WBL – C (22.7)	OVERALL – A (9.1) EB – A (6.8) WBL – D (36.1)
Build-out (2029) Traffic	OVERALL – A (9.3) EB – A (6.3) WBL – C (25.9)	OVERALL – B (12.0) EB – A (9.2) WBL – D (41.0)

<b>Table ES-2 (cont.)                      Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour                      LOS (Delay)</b>	<b>PM Peak Hour                      LOS (Delay)</b>
<b>US 64 Business at I-540 WB Ramps (Signalized)</b>		
Existing (2016) Traffic	OVERALL – B (11.3) EB – C (20.2) WB – A (3.6) NB – C (22.1)	OVERALL - B (19.9) EB – B (19.9) WB – A (7.2) NB – E (57.6)
Background (2020) Traffic	OVERALL - B (13.3) EB – C (23.0) WB – A (4.4) NB – C (30.1)	OVERALL - C (22.3) EB – C (22.9) WB – A (8.6) NB – E (59.6)
Build-out (2020) Traffic	OVERALL - B (15.2) EB – C (24.6) WB – A (5.3) NB – D (39.8)	OVERALL - C (23.7) EB – C (24.7) WB – A (9.9) NB – E (61.6)
Background (2029) Traffic	OVERALL - C (29.2) EB – D (42.5) WB – B (16.8) NB – D (53.9)	OVERALL - D (50.8) EB – E (70.4) WB – B (11.7) NB – E (77.6)
Build-out (2029) Traffic	OVERALL - C (31.2) EB – D (42.8) WB – B (19.7) NB – D (56.7)	OVERALL - E (56.4) EB – E (76.4) WB – B (14.6) NB – F (93.7)
Build-out (2029) Traffic – <i>w/ UDO Improvements</i>	OVERALL - C (29.5) EB – D (41.1) WB – B (18.3) NB – D (52.7)	OVERALL - D (51.0) EB – E (75.4) WB – B (12.3) SB – E (59.6)

<b>Table ES-2 (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>US 64 Business at Hinton Oaks Boulevard/Lynnwood Road (Signalized)</b>		
Existing (2016) Traffic	OVERALL - B (12.5) EB - B (10.8) WB - A (5.7) NB - D (52.4) SB - D (36.3)	OVERALL - B (18.0) EB - B (16.2) WB - B (10.8) NB - D (53.6) SB - D (44.6)
Background (2020) Traffic	OVERALL - B (13.1) EB - B (10.8) WB - A (6.8) NB - D (52.3) SB - D (35.1)	OVERALL - B (19.7) EB - B (18.6) WB - B (11.8) NB - D (53.6) SB - D (44.8)
Build-out (2020) Traffic	OVERALL - B (12.5) EB - A (9.9) WB - A (6.8) NB - D (52.3) SB - D (35.1)	OVERALL - C (20.1) EB - B (18.5) WB - B (14.2) NB - D (53.6) SB - D (44.8)
Background (2029) Traffic	OVERALL - C (22.3) EB - B (10.5) WB - C (24.5) NB - D (50.3) SB - C (32.0)	OVERALL - D (35.8) EB - D (43.9) WB - B (16.2) NB - E (55.3) SB - D (43.9)
Build-out (2029) Traffic	OVERALL - C (31.3) EB - B (12.0) WB - D (40.3) NB - D (50.3) SB - C (32.0)	OVERALL - D (40.5) EB - D (50.9) WB - B (19.2) NB - E (55.3) SB - D (43.9)

Table ES-2 (cont.) Level-of-Service Summary		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
<b>US 64 Business at Widewaters Parkway (Signalized)</b>		
Existing (2016) Traffic	OVERALL - C (20.3) EB - B (12.0) WB - C (21.1) NB - D (46.2) SB - C (33.3)	OVERALL - C (29.7) EB - B (18.3) WB - C (23.6) NB - E (68.7) SB - D (54.5)
Background (2020) Traffic	OVERALL - C (21.3) EB - B (12.2) WB - C (22.9) NB - D (46.1) SB - C (33.3)	OVERALL - C (33.1) EB - C (22.2) WB - C (25.5) NB - E (73.7) SB - E (57.9)
Build-out (2020) Traffic	OVERALL - C (21.2) EB - B (12.3) WB - C (23.3) NB - D (46.1) SB - C (33.3)	OVERALL - D (37.7) EB - C (26.9) WB - D (35.3) NB - E (73.7) SB - E (57.9)
Background (2029) Traffic	OVERALL - C (24.2) EB - B (12.3) WB - C (28.2) NB - D (47.5) SB - C (33.5)	OVERALL - E (60.0) EB - E (62.5) WB - C (28.9) NB - F (106.2) SB - F (84.7)
Background (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (25.4) EB - B (11.8) WB - C (30.7) NB - D (47.5) SB - C (33.5)	OVERALL - D (42.3) EB - C (25.5) WB - C (28.5) NB - F (106.2) SB - F (84.7)
Build-out (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (30.5) EB - B (11.7) WB - D (40.7) NB - D (47.5) SB - C (33.5)	OVERALL - D (48.2) EB - C (29.1) WB - D (44.9) NB - F (106.2) SB - F (84.7)

<b>Table ES-2 (cont.)                      Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour                      LOS (Delay)</b>	<b>PM Peak Hour                      LOS (Delay)</b>
<b>US 64 Business at Wake Stone Driveway/Site Drive</b>		
Existing (2016) Traffic – <i>Unsignalized</i>	SB – F (97.9) EBL – C (20.6) WBU – A (0.0)	SB – F (187.5) EBL – C (19.9) WBU – C (22.5)
Background (2020) Traffic - <i>Unsignalized</i>	SB – F (194.2) EBL – D (26.6) WBU – A (0.0)	SB – F (395.0) EBL – C (24.6) WBU – D (28.2)
Build-out (2020) Traffic – <i>Signalized w/                      Developer Improvements</i>	OVERALL - B (16.3) EB – A (8.3) WB – B (14.6) NB – E (66.8) SB – B (18.4)	OVERALL – C (28.4) EB – B (17.8) WB – D (33.8) NB – E (65.7) SB – D (45.3)
Background (2029) Traffic - <i>Unsignalized</i>	SB – F (974.7) EBL – F (73.6) WBU – A (0.0)	SB – F (1883.8) EBL – F (53.3) WBU – F (59.3)
Background (2029) Traffic – <i>Unsignalized                      w/ UDO Improvements</i>	SB – F (417.3) EBL – F (129.5) WBU – A (0.0)	SB – F (1184.3) EBL – E (37.6) WBU – F (59.3)
Build-out (2029) Traffic – <i>Signalized w/                      Developer and UDO Improvements</i>	OVERALL – B (13.4) EB – B (11.0) WB – A (9.4) NB – E (66.8) SB – B (18.4)	OVERALL – D (47.1) EB – D (49.9) WB – D (37.3) NB – E (76.4) SB – D (46.0)

<b>Table ES-2 (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>US 64 Business at Bozeman Drive/Crossover (Signalized)</b>		
Existing (2016) Traffic	OVERALL - B (17.6) WB - B (18.1) NB - A (7.7) SB - C (31.6)	OVERALL - B (18.7) WB - B (18.3) NB - B (16.7) SB - D (37.5)
Background (2020) Traffic	OVERALL - C (23.3) WB - C (24.2) NB - A (7.1) SB - C (28.1)	OVERALL - C (21.6) WB - C (21.7) NB - B (16.6) SB - D (37.4)
Build-out (2020) Traffic	OVERALL - C (25.0) WB - C (26.0) NB - A (7.1) SB - C (28.1)	OVERALL - C (23.7) WB - C (24.0) NB - B (16.6) SB - D (37.4)
Background (2029) Traffic	OVERALL - F (109.3) WB - F (115.5) NB - A (6.7) SB - C (25.3)	OVERALL - D (43.2) WB - D (46.2) NB - B (16.3) SB - D (38.9)
Background (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (23.1) WB - C (24.1) NB - A (6.5) SB - C (25.3)	OVERALL - C (21.9) WB - C (22.0) NB - B (16.2) SB - D (38.9)
Build-out (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (24.2) WB - C (25.1) NB - A (6.6) SB - C (25.3)	OVERALL - C (23.4) WB - C (23.6) NB - B (16.3) SB - D (38.9)

<b>Table ES-2 (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>US 64 Business at Parkside Commons Drive/Crossover (Signalized)</b>		
Existing (2016) Traffic	OVERALL - B (15.1) EB - B (10.6) NB - E (57.2) SB - B (12.0)	OVERALL - B (14.7) EB - B (12.7) NB - D (47.7) SB - A (7.9)
Background (2020) Traffic	OVERALL - B (16.2) EB - B (11.8) NB - E (57.7) SB - B (13.5)	OVERALL - B (19.0) EB - B (17.3) NB - D (48.1) SB - A (8.4)
Build-out (2020) Traffic – w/ <i>Developer Improvements</i>	OVERALL - B (18.8) EB - B (15.1) NB - E (57.7) SB - B (12.3)	OVERALL B (16.8) EB - B (15.1) NB - D (48.0) SB - A (8.1)
Background (2029) Traffic	OVERALL - B (19.8) EB - B (15.9) NB - E (57.9) SB - B (11.8)	OVERALL - F (122.0) EB - F (131.4) NB - D (48.3) SB - A (8.6)
Build-out (2029) Traffic – w/ <i>Developer Improvements</i>	OVERALL - C (23.5) EB - C (20.4) NB - E (57.9) SB - B (11.3)	OVERALL - D (44.0) EB - D (45.3) NB - D (48.2) SB - A (8.1)
<b>Parkside Commons Drive at Village Park Drive (Unsignalized)<sup>1</sup></b>		
Existing (2016) Traffic	EB - A (9.9) WB - B (10.1) NBL - A (7.3) SBL - A (7.5)	EB - B (14.0) WB - B (10.8) NBL - A (0.5) SBL - A (4.2)
Background (2020) Traffic	EB - B (10.1) WB - B (10.4) NBL - A (7.3) SBL - A (7.5)	EB - C (15.6) WB - B (11.3) NBL - A (0.5) SBL - A (4.2)
Build-out (2020) Traffic	EB - B (10.3) WB - B (11.0) NBL - B (7.4) SBL - A (7.5)	EB - C (18.6) WB - B (13.4) NBL - A (2.5) SBL - A (3.9)
Background (2029) Traffic	EB - B (10.8) WB - B (11.0) NBL - A (7.4) SBL - A (7.6)	EB - C (23.2) WB - B (13.3) NBL - A (0.5) SBL - A (4.4)
Build-out (2029) Traffic	EB - B (10.9) WB - B (11.8) NBL - A (7.4) SBL - A (7.6)	EB - D (32.8) WB - C (16.7) NBL - A (2.2) SBL - A (4.1)

<sup>1</sup>Since HCM 2010 does not report delay for major-street U-turns from a shared through-lane, reported PM peak hour delays at this intersection are from HCM 2000.

<b>Table ES-2 (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>Widewaters Parkway at Village Park Drive (Roundabout)<sup>2</sup></b>		
Existing (2016) Traffic	OVERALL - A (4.7) EB - A (3.9) WB - A (5.1) NB - A (4.3) SB - A (4.9)	OVERALL - A (6.2) EB - A (7.0) WB - A (4.9) NB - A (5.6) SB - A (6.1)
Background (2020) Traffic	OVERALL - A (5.4) EB - A (4.0) WB - A (6.1) NB - A (5.3) SB - A (5.1)	OVERALL - A (6.7) EB - A (7.7) WB - A (5.2) NB - A (6.0) SB - A (6.5)
Build-out (2020) Traffic	OVERALL - A (5.7) EB - A (4.2) WB - A (6.5) NB - A (5.6) SB - A (5.3)	OVERALL - A (7.2) EB - A (8.4) WB - A (5.8) NB - A (6.6) SB - A (7.0)
Background (2029) Traffic	OVERALL - A (6.3) EB - A (4.2) WB - A (7.4) NB - A (6.2) SB - A (5.9)	OVERALL - A (8.5) EB - B (10.2) WB - A (6.0) NB - A (7.3) SB - A (8.0)
Build-out (2029) Traffic	OVERALL - A (6.6) EB - A (4.5) WB - A (7.9) NB - A (6.5) SB - A (6.2)	OVERALL - A (9.2) EB - B (11.3) WB - A (6.8) NB - A (8.0) SB - A (8.7)
<b>US 64 Business at Right-in/Right-out Site Drive (Unsignalized)<sup>3</sup></b>		
Build-out (2020) Traffic	NB - A (5.4)	NB - C (24.4)
Build-out (2029) Traffic	NB - A (9.1)	NB - D (30.8)

<sup>2</sup>Overall intersection LOS and delay reported from HCS 2010.

<sup>3</sup>Minor street approach LOS and delay reported from SimTraffic version 9.1.

The following roadway improvements are recommended to be performed to accommodate existing traffic and the projected ParkStone site traffic for the study year 2020 based on the capacity analysis presented herein as well as discussions with NCDOT and the Town of Knightdale:

US 64 Business:

- Extend the third eastbound through lane on US 64 Business along the property frontage and restripe the outside lane on US 64 Business east of the site to provide a continuous through lane from the site to Smithfield Road



- Modify the traffic signals at Parkside Commons Drive and at McKnight Drive to accommodate the change in laneage on US 64 Business

US 64 Business at Wake Stone Driveway/Site Drive:

- Construct an exclusive eastbound right-turn lane on US 64 Business with 100 feet of storage and appropriate tapers
- Extend the storage of the westbound left-turn lane on US 64 Business by approximately 175 feet to provide 300 feet of storage on that approach
- Construct an exclusive northbound left-turn lane with 250 feet of storage, a shared through/left turn-lane, and an exclusive right-turn lane with 100 feet of storage on the Site Drive
- Construct an exclusive southbound right-turn lane on the Wake Stone Corporation Driveway with approximately 75 feet of storage
- Install a traffic signal

US 64 Business at Right-in/Right-out Site Drive:

- Construct an eastbound right-turn lane on US 64 Business with 100 feet of storage and appropriate tapers

Analysis indicates that with the recommended improvements in place, all of the signalized study intersections are expected to operate at an acceptable LOS in the projected (2020) build-out traffic condition, though some long queues observed in the existing and background conditions at Hinton Oaks Boulevard and Widewaters Parkway are expected to continue. Additionally, it should be noted that while Synchro indicates that the minor street approach of the intersection of US 64 Business at the Right-in/Right-out Site Drive is expected to operate with long delays in the PM peak hour, SimTraffic indicates that delays will be short and that no queuing issues are expected at this intersection. The recommended laneage is shown on Figure ES-1.

As part of the Town's UDO requirements, the 2029 horizon year was analyzed to determine what improvements would be required to achieve acceptable levels of service. These improvements are to assist the Town in determining future roadway priorities and are not considered to be improvements recommended or required for the proposed ParkStone development. The following improvements were identified as being necessary to accommodate projected (2029) traffic volumes at the study intersections:

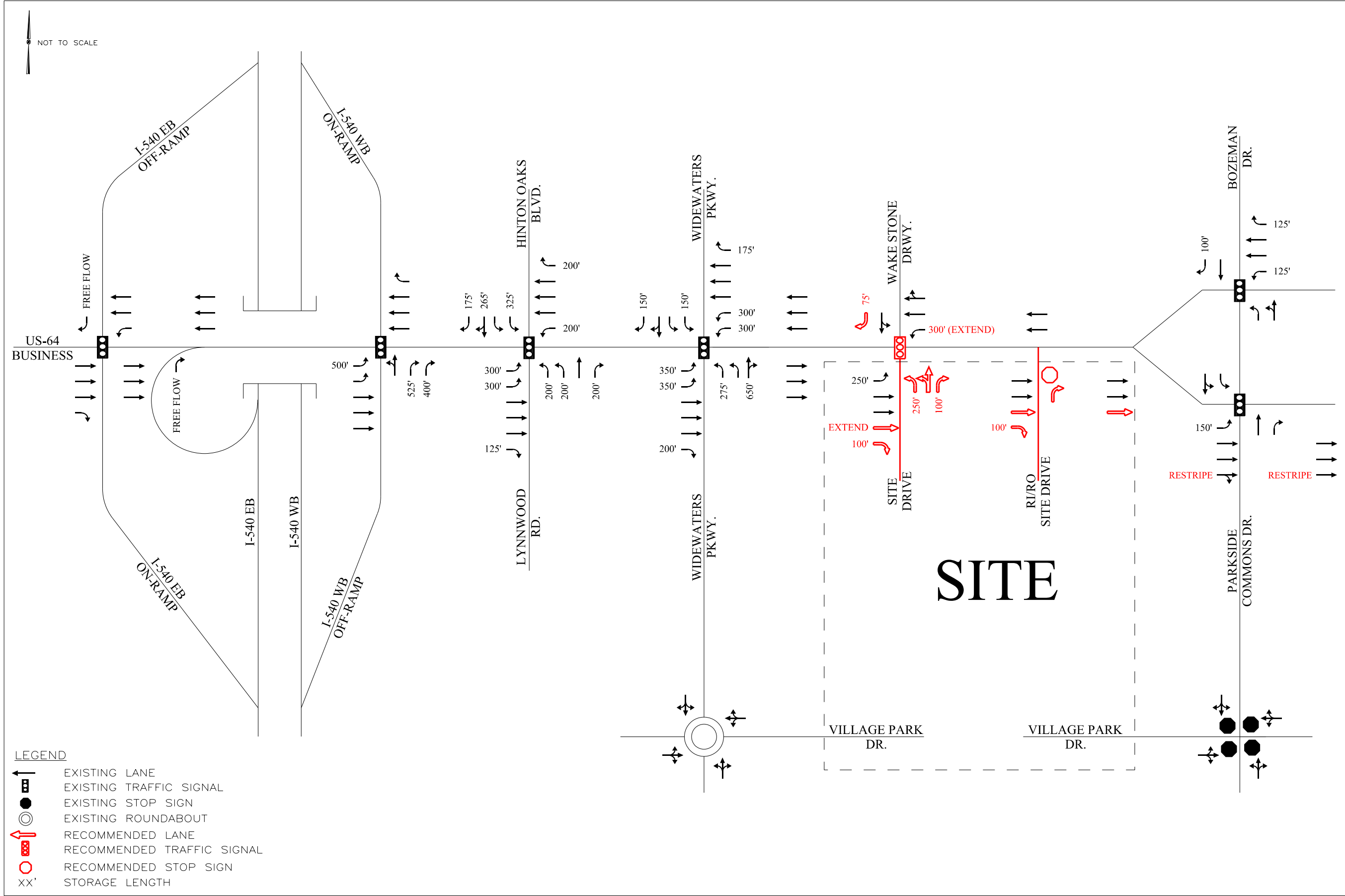
US 64 Business:

- Construct an additional eastbound through lane from west of Widewaters Parkway to the Wake Stone Driveway/Site Drive, terminating as the eastbound right-turn lane at the proposed Site Drive
- Construct an additional westbound through lane from east of Bozeman Drive to the Wake Stone Driveway/Site Drive

US 64 Business at I-540 WB Off-Ramp:

- Construct an additional northbound right-turn lane on the I-540 WB Off-Ramp to provide triple right-turn lanes on that approach

Analysis indicates that with these improvements in place, all of the study intersections are expected to operate at an acceptable LOS in the projected (2029) build-out traffic condition. It should be noted that the intersections of US 64 Business at Widewaters Parkway, the Wake Stone Driveway, Bozeman Drive, and Parkside Commons Drive are all expected to operate at an unacceptable LOS in the year 2029 without the proposed ParkStone development in place. Additionally, queuing issues are expected to continue at several study intersections with particularly long queues anticipated for the eastbound left-turn movement on US 64 Business at Hinton Oaks Boulevard as well as the eastbound left-turn and southbound left-turn movements at the intersection of US 64 Business at Widewaters Parkway. However, these queueing issues would be present with or without the proposed ParkStone development in place, and no site traffic is added to movements on which long queues are expected. Site traffic is expected to generally account for only 2-6% of the total traffic at each of the off-site intersections along US 64 in both the AM and PM peak hours in the year 2029. The recommended 2029 roadway laneage is shown on Figure ES-2.

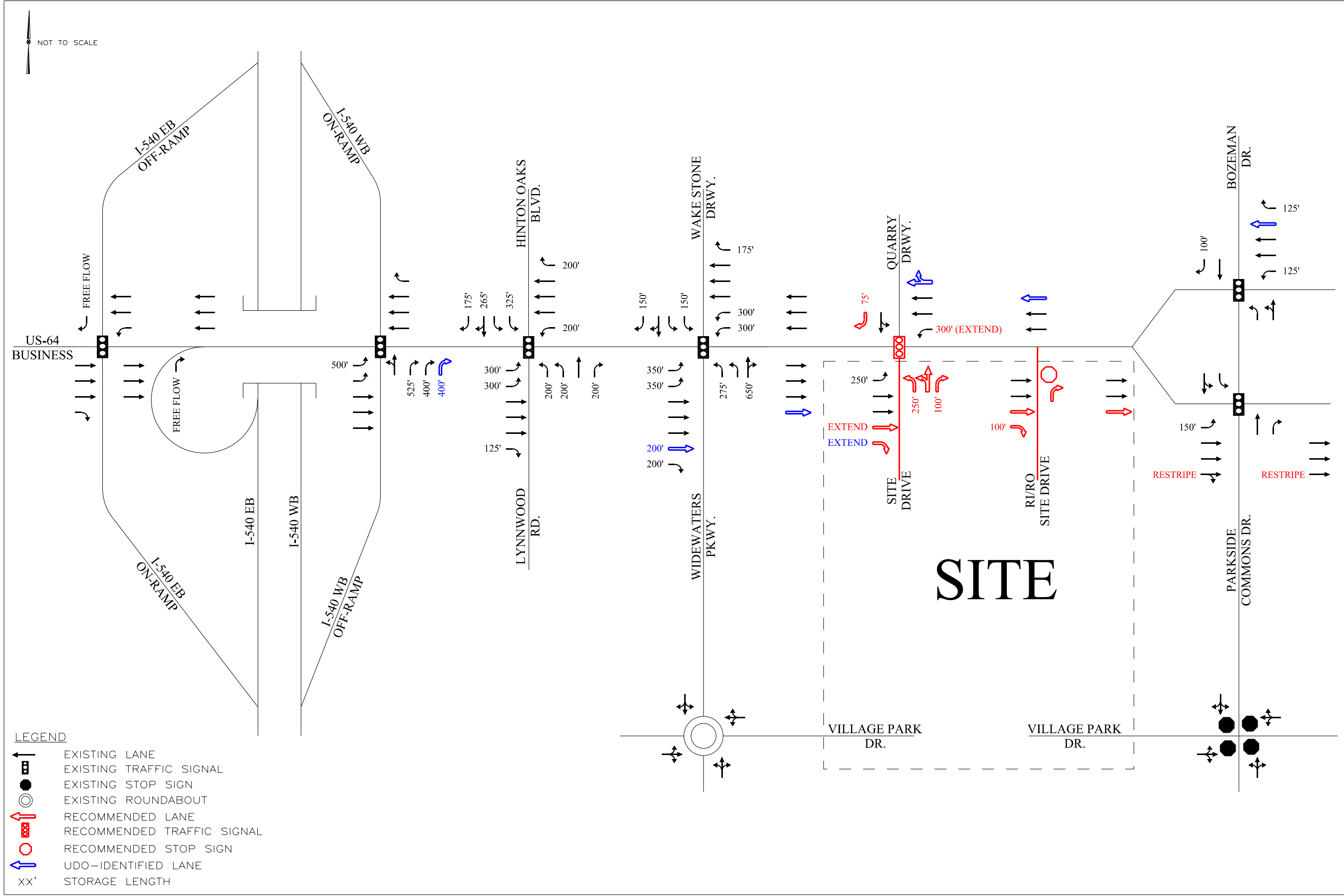


PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

RECOMMENDED ROADWAY LANEAGE  
- 2020

FIGURE  
ES-1

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC 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.



PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

UDO-IDENTIFIED ROADWAY LANEAGE  
- 2029

FIGURE  
ES-2

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC 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.

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## 1.0 Introduction

Kimley-Horn and Associates, Inc. has revised the original Traffic Impact Analysis dated May 13, 2016 for the proposed ParkStone multi-use development to address comments provided by both the North Carolina Department of Transportation (NCDOT) and the Town of Knightdale. This development is proposed to be located south of US 64 Business across from the Wake Stone quarry in Knightdale, NC. The site is currently vacant and adjacent land uses are generally a mix of commercial and residential. As currently envisioned, the development will consist of approximately 350 apartments, a 130-room hotel, a 12-screen movie theater, approximately 212,500 square feet of general retail space, and three outparcels, which were assumed to include an 8,000 SF automobile parts sales store, a 2,500 SF fast-food restaurant, and a gas station with 12 fueling positions. The development is proposed to be accessed by one full-movement driveway on US 64 Business across from the Wake Stone Driveway and one right-in/right-out site driveway on US 64 Business, as well as the extension of Village Park Drive through the site. Build-out of the development is anticipated in 2019, so the horizon years 2020 and 2029 were studied as part of this analysis per Town of Knightdale requirements.

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 (2016) traffic condition, the projected (2020) background and build-out traffic conditions, and the projected (2029) background and build-out traffic conditions. The weekday AM and PM peak hours were studied.

NCDOT and Town of Knightdale transportation staff provided background data and were consulted regarding the elements to be covered in this analysis. The approved Memorandum of Understanding is included in the Appendix of this report.



## 2.0 Inventory

### 2.1 Study Area

The study area for this development includes the following intersections:

- US 64 Business at I-540 EB Ramps
- US 64 Business at I-540 WB Ramps
- US 64 Business at Hinton Oaks Boulevard/Lynnwood Road
- US 64 Business at Widewaters Parkway
- US 64 Business at Wake Stone Driveway/Site Driveway
- US 64 Business at Bozeman Drive/Parkside Commons Drive
- Widewaters Parkway at Village Park Drive
- Parkside Commons Drive at Village Park Drive
- US 64 Business at Right-in/Right-out Site Drive

Figure 1 shows the site location. The preliminary site plan is shown on Figure 2.

### 2.2 Existing Conditions

The proposed ParkStone development is located south of US 64 Business across from the Wake Stone Corporation Quarry in Knightdale, North Carolina. Roadways in the study area include I-540, US 64 Business, Widewaters Parkway, Hinton Oaks Boulevard/Lynnwood Road, Bozeman Drive/Parkside Commons Drive, and Village Park Drive. The existing roadway laneage is shown in Figure 3.

I-540 is a multi-lane divided interstate with a posted speed limit of 70 mph. The reported 2013 ADT volume is approximately 44,000 vehicles per day (vpd) in the vicinity of the site.

US 64 Business (Knightdale Boulevard) is a multi-lane divided principal arterial with a posted speed limit of 45 mph. The estimated 2016 ADT volume is approximately 31,600 vpd in the vicinity of the site.

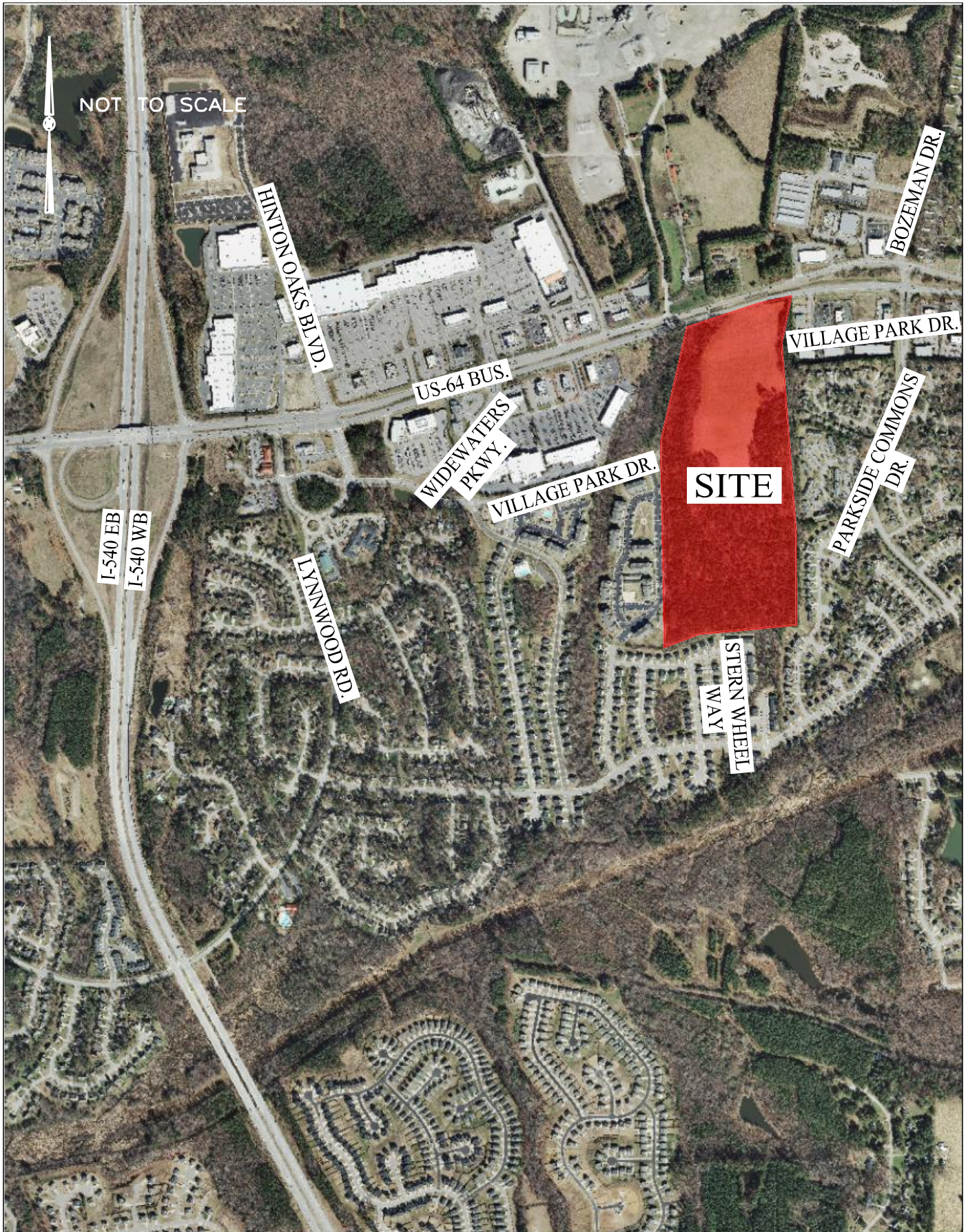
Widewaters Parkway is a multi-lane undivided roadway with an assumed speed limit of 25 mph that serves The Shoppes at Midway Plantation commercial development to the north of US 64 Business and a mixture of commercial and residential uses to the south of US 64 Business. The estimated 2016 ADT volume is approximately 8,200 vpd south of US 64 Business and approximately 6,600 vpd north of US 64 Business.

North of US 64 Business, Hinton Oaks Boulevard is generally a three-lane undivided roadway with a posted speed limit of 25 mph and an estimated 2016 ADT of approximately 42,000 vpd. South of US 64 Business, Hinton Oaks Boulevard becomes Lynnwood Drive, which has a posted speed limit of 25 mph and an estimated 2016 ADT of approximately 4,400 vpd.

North of US 64 Business, Bozeman Drive is a two-lane undivided roadway with a posted speed limit of 25 mph and an estimated 2016 ADT of less than 1,000 vpd. South of US 64 Business, Bozeman Drive becomes Parkside Commons Drive, which has a posted speed limit of 25 mph and an estimated 2016 ADT of approximately 2,600 vpd.

Village Park Drive is a two-lane undivided east-west roadway with a posted speed limit of 25 mph. The road currently terminates on both the eastern and western boundaries of the ParkStone property but will be extended through the site. The estimated 2016 ADT volume is approximately 1,000 vpd to the east at Parkside Commons Drive and approximately 1,900 vpd to the west at Widewaters Parkway.





PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

SITE LOCATION

FIGURE  
1

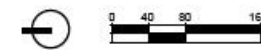
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# ParkStone

Knightdale, North Carolina

April 6, 2016



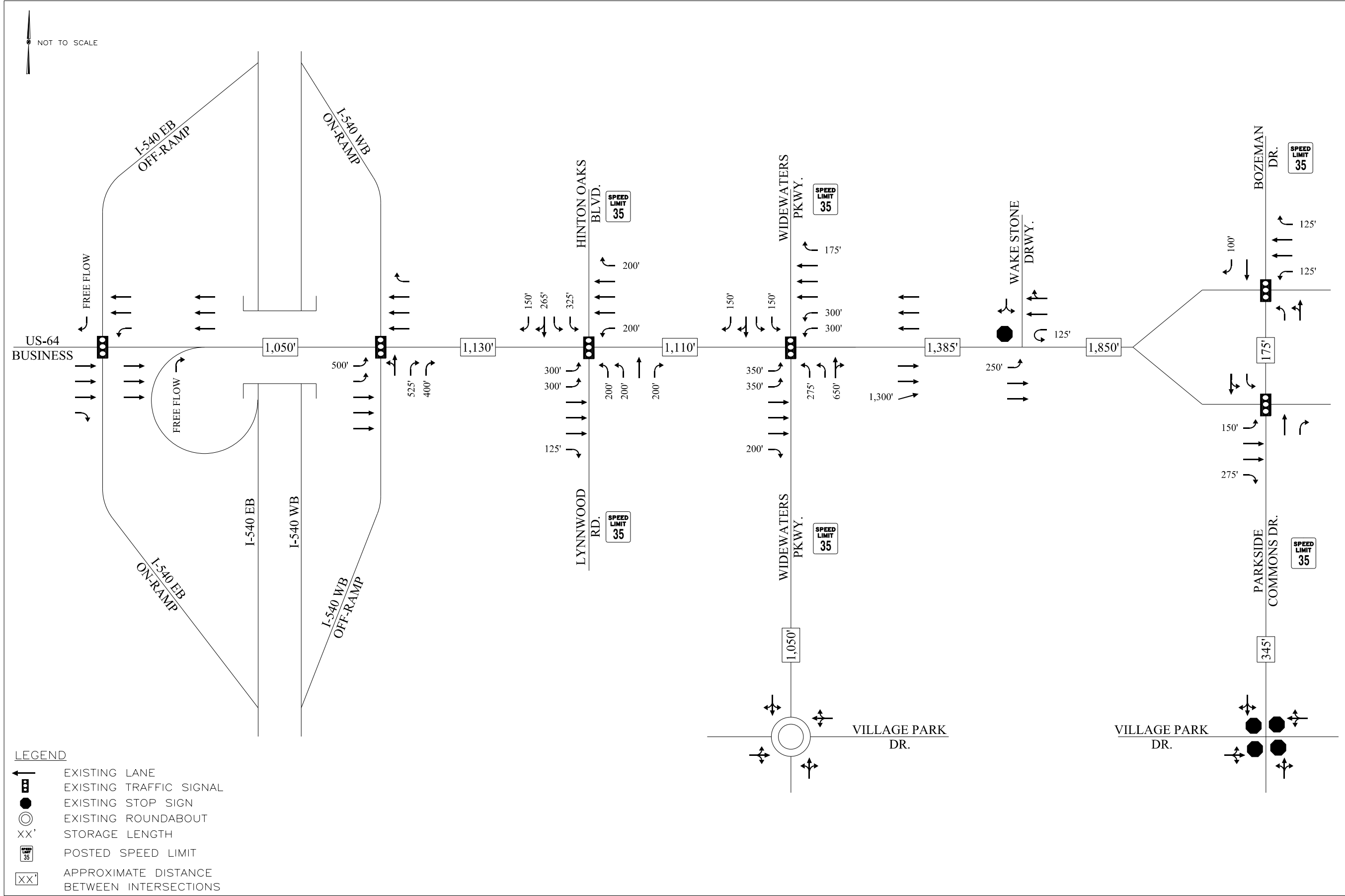
PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

PRELIMINARY SITE PLAN

FIGURE  
2

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### 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, Ninth Edition, 2012). As currently envisioned, the development will consist of approximately 350 apartments, a 130-room hotel, a 12-screen movie theater, approximately 212,500 square feet of general retail space, and three outparcels, which for the purposes of this analysis were assumed to include an 8,000 SF automobile parts sales store, a 2,500 SF fast-food restaurant, and a gas station with 12 fueling positions.

Land Use Code	Land Use	Intensity		Daily		AM Peak Hour		PM Peak Hour	
				In	Out	In	Out	In	Out
220	Apartment	350	d.u.	1,123	1,123	35	140	137	73
310	Hotel	130	rooms	531	531	41	28	40	38
445	Multiplex Movie Theater	12	screens	820	820	-	-	74	90
820	Shopping Center	212,550	s.f.	5,543	5,543	153	94	477	516
843	Automobile Parts Sales	8,000	s.f.	249	249	9	9	24	24
934	Fast-Food Restaurant w/ Drive-Through Window	3,500	s.f.	868	868	81	78	59	55
945	Gas Station w/ Convenience Market	12	f.p.	977	977	61	61	81	81
<b>Subtotal</b>				<b>10,111</b>	<b>10,111</b>	<b>380</b>	<b>410</b>	<b>892</b>	<b>877</b>
<i>Internal Capture</i>				<i>1,835</i>	<i>1,835</i>	<i>61</i>	<i>61</i>	<i>223</i>	<i>223</i>
<i>Pass-by Capture</i>				<i>1,920</i>	<i>1,920</i>	<i>55</i>	<i>64</i>	<i>194</i>	<i>190</i>
<b>Net New External Trips</b>				<b>6,356</b>	<b>6,356</b>	<b>264</b>	<b>285</b>	<b>475</b>	<b>464</b>

Table 3.0 shows that the proposed development has the potential to generate 6,356 new trips in and 6,356 new trips out during a typical weekday with 264 new trips entering and 285 new trips exiting during the AM peak hour and 475 new trips entering and 464 new trips exiting during the PM peak hour.

Internally captured trips are trips that begin and end on the project site and do not access the external roadway network. Institute of Transportation Engineers (ITE) internal capture rates published in the *Trip Generation Manual User’s Guide and Handbook* (Ninth Edition, 2012) indicate that the internal capture between uses will be approximately 15% in the AM peak hour and approximately 25% in the PM peak hour.

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. The *ITE Trip Generation Manual User's Guide and Handbook* indicates that approximately 15% of the AM peak hour traffic and 22% of the PM peak hour traffic will be pass-by traffic. Pass-by trips were assigned based on existing traffic patterns.

Detailed trip generation calculations are included in the Appendix of this report.

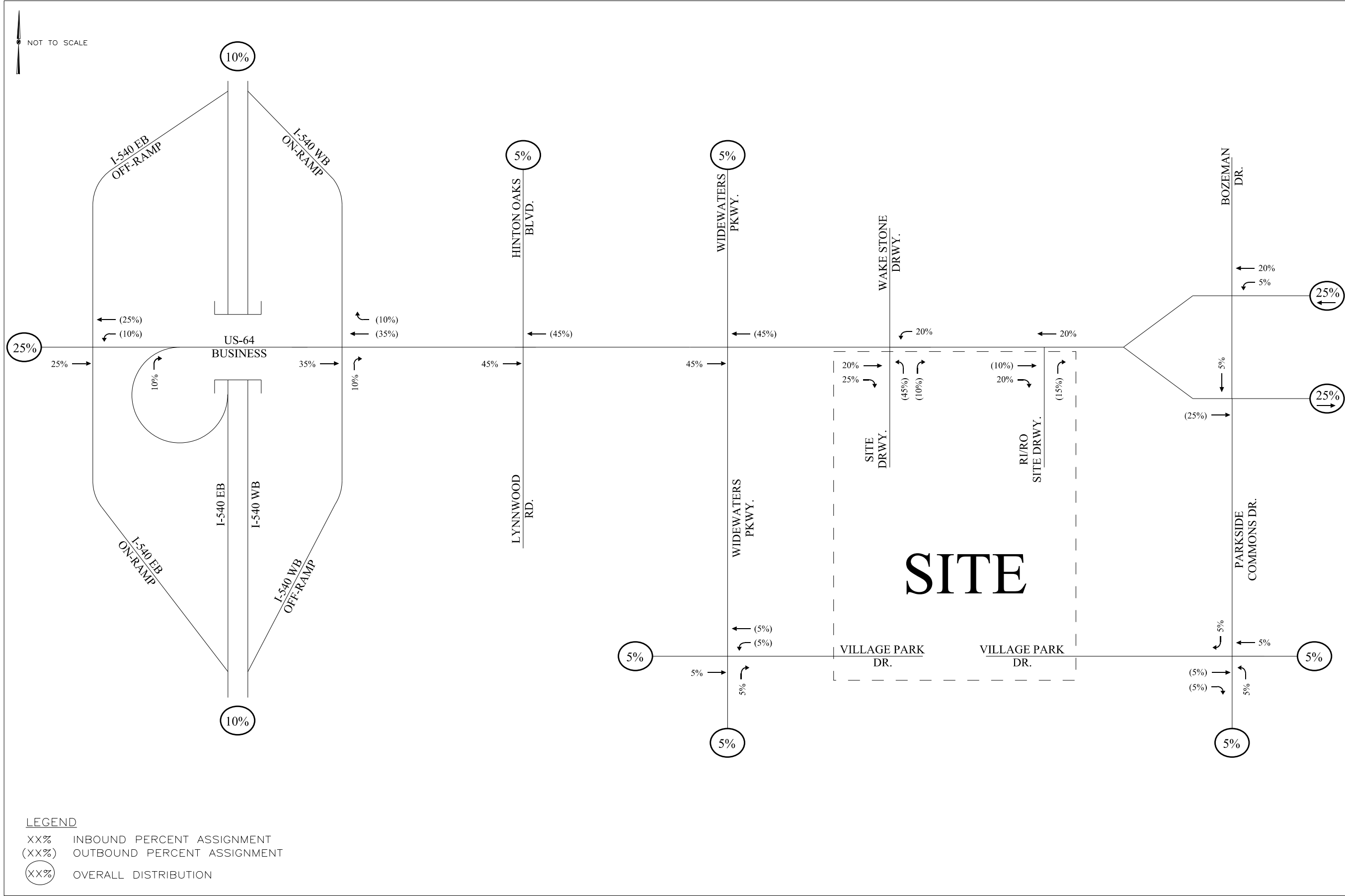
#### 4.0 Site Traffic Distribution

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

- 25% to/from the west on US 64 Business
- 25% to/from the east on US 64 Business
- 10% to/from the north on I-540
- 10% to/from the south on I-540
- 5% to/from the north on Hinton Oaks Boulevard
- 5% to/from the north on Widewaters Parkway
- 5% to/from the south on Widewaters Parkway
- 5% to/from the east on Village Park Drive
- 5% to/from the west on Village Park Drive
- 5% to/from the south on Parkside Commons Drive

The 5% to/from the north on Hinton Oaks Boulevard and the 5% to/from the north on Widewaters Parkway represent capture with the adjacent shopping centers. As these trips are already on the network, they represent diverted link trips and will be assigned to the network as such rather than as net new trips. The site traffic distribution and percent assignment for the net new site trips are shown on Figure 4.





PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

SITE TRAFFIC DISTRIBUTION  
AND PERCENT ASSIGNMENT

FIGURE  
4

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## 5.0 Projected Traffic Volumes

### 5.1 Existing Traffic

AM peak hour (7:00 to 9:00 AM) and PM peak hour (2:00 to 4:00 PM) turning movement counts were performed or obtained from an NCDOT signal timing study at the following intersections:

- US 64 Business at I-540 EB Ramps March 17, 2016
- US 64 Business at I-540 WB Ramps March 17, 2016
- US 64 Business at Hinton Oaks Blvd./Lynnwood Rd. March 17, 2016
- US 64 Business at Widewaters Parkway March 17, 2016
- US 64 Business at Bozeman Drive/Crossover March 17, 2016
- US 64 Business at Parkside Commons Drive/Crossover March 17, 2016
- US 64 Business at Wake Stone Driveway March 22, 2016
- Parkside Commons Drive at Village Park Drive March 22, 2016
- Widewaters Parkway at Village Park Drive March 22, 2016

Per discussions with the operators of the Wake Stone Corporation Quarry north of US 64 Business, the Quarry processed approximately 330 truckloads of material on the day that traffic counts were performed. This volume of trucks represents an “average” day at the site, though high volume days require nearly 500 truck trips. Therefore, in order to better analyze traffic conditions on those busy days, existing volumes into/out of the Quarry were increased by 50%.

The existing AM and PM peak hour traffic volumes are shown on Figures 5 and 6, and the traffic count data are included in the Appendix.

### 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 studied horizon years of 2020 and 2029. 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. No approved developments were identified for inclusion in this analysis as background traffic.

Background traffic volumes consisting of existing and historic growth traffic for the analysis year 2020 are shown on Figures 5A and 5B for the AM and PM peak hours, respectively. Background

traffic volumes for the analysis year 2029 are shown on Figures 6A and 6B for the AM and PM peak hours, respectively.

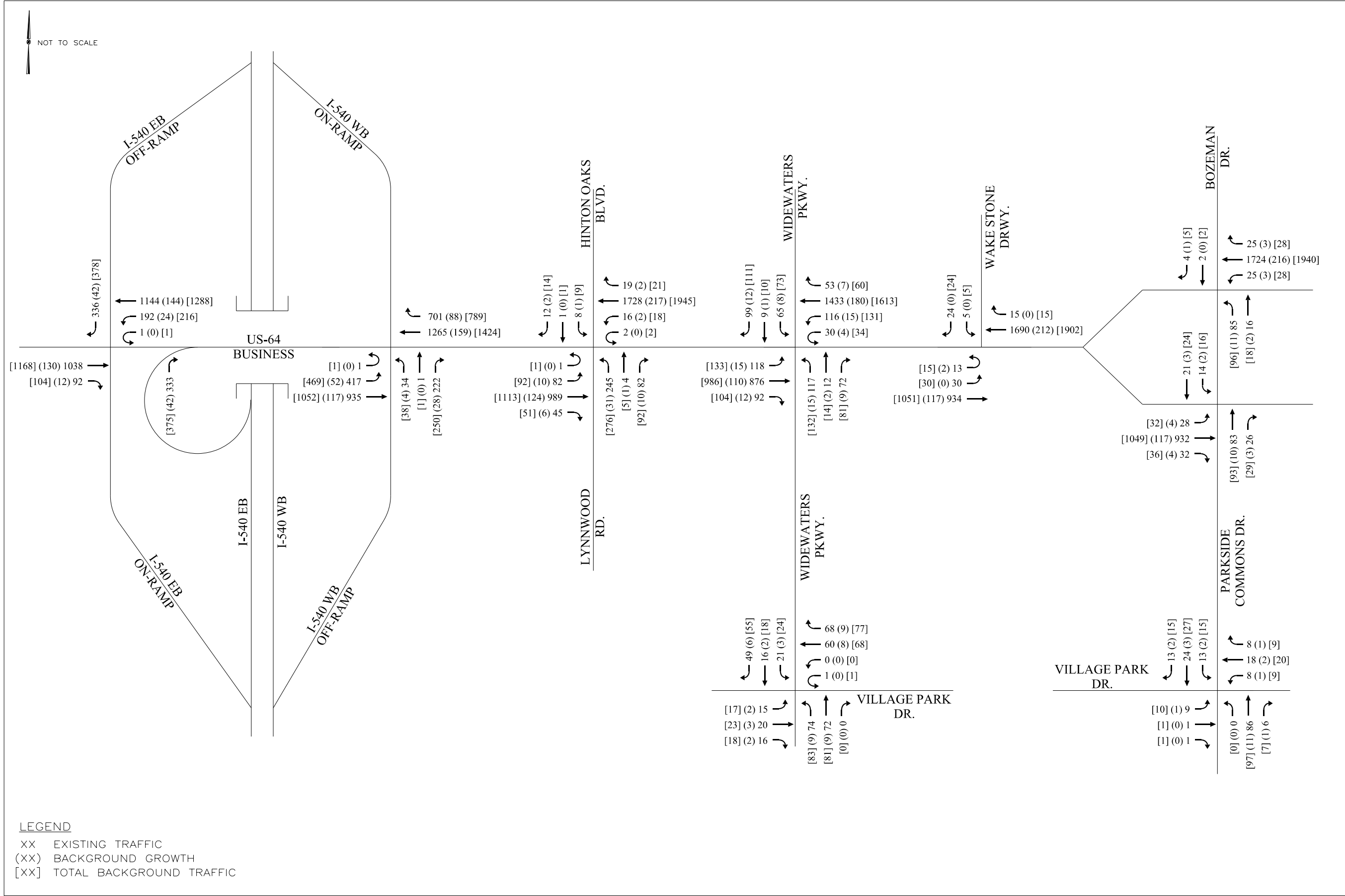
#### 5.4 *Site Traffic*

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 peak hour are shown on Figures 7A and 8A for the years 2020 and 2029, respectively. The site traffic volumes for the PM peak hour are shown on Figures 7B and 8B for the years 2020 and 2029, respectively.

It should be noted that the extension of Village Park Drive will improve connectivity in the area and may result in a diversion of trips from US 64 Business to Village Park Drive. However, to present a conservative analysis, the traffic volumes on US 64 Business were not reduced.

#### 5.5 *Build-Out Traffic*

To obtain the projected (2020) build-out traffic volumes, the projected site traffic volumes were added to the projected (2020) background traffic. Traffic volume calculations are detailed in intersection spreadsheets in the Appendix of this report. Figures 7A and 7B show the projected (2020) AM and PM peak hour build-out traffic volumes, respectively. Figures 8A and 8B show the projected (2029) AM and PM peak hour build-out traffic volumes, respectively.

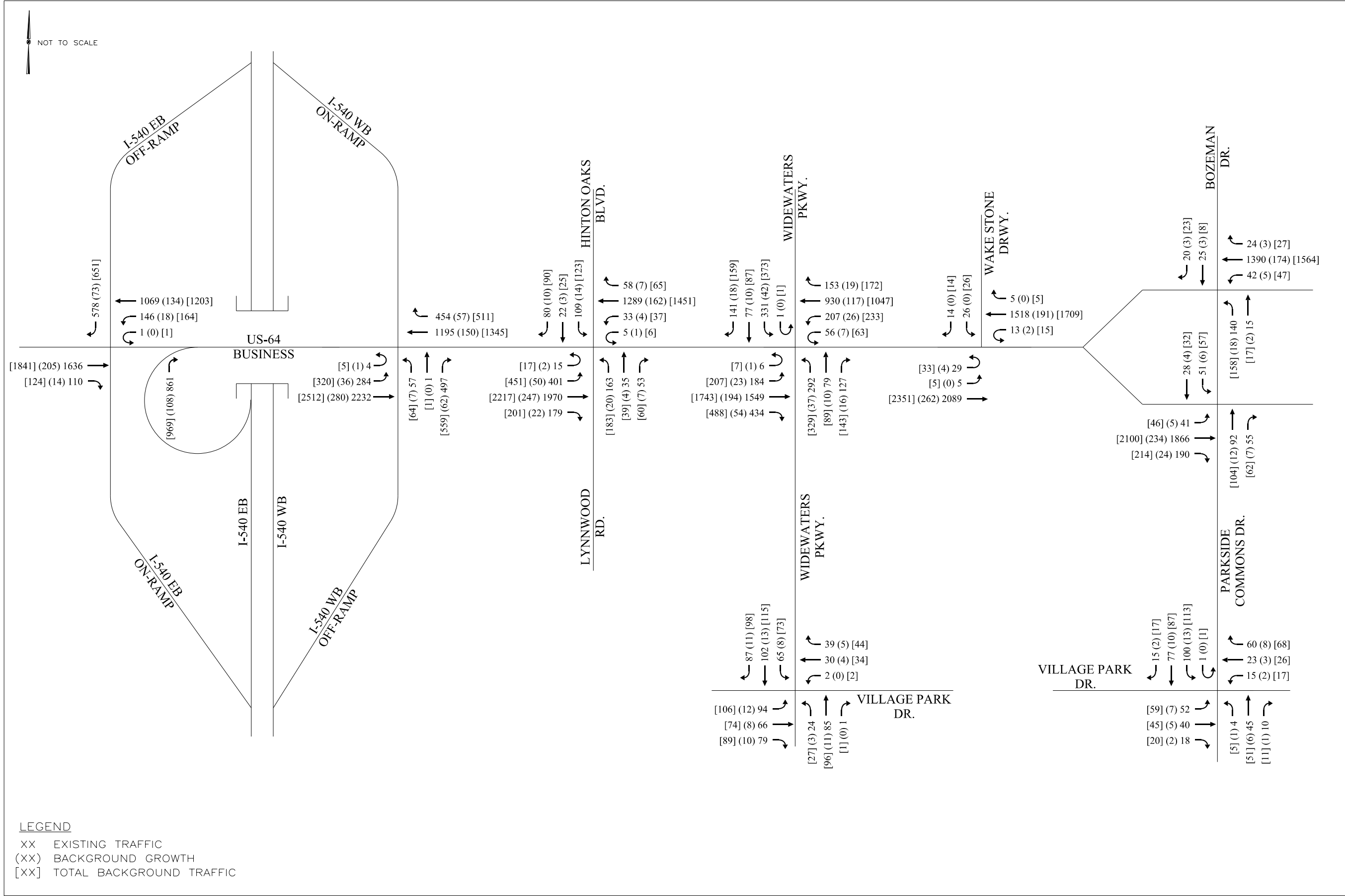


**PARKSTONE KNIGHTDALE, NC TRAFFIC IMPACT ANALYSIS**

**EXISTING AND PROJECTED (2020) BACKGROUND AM PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 5A**

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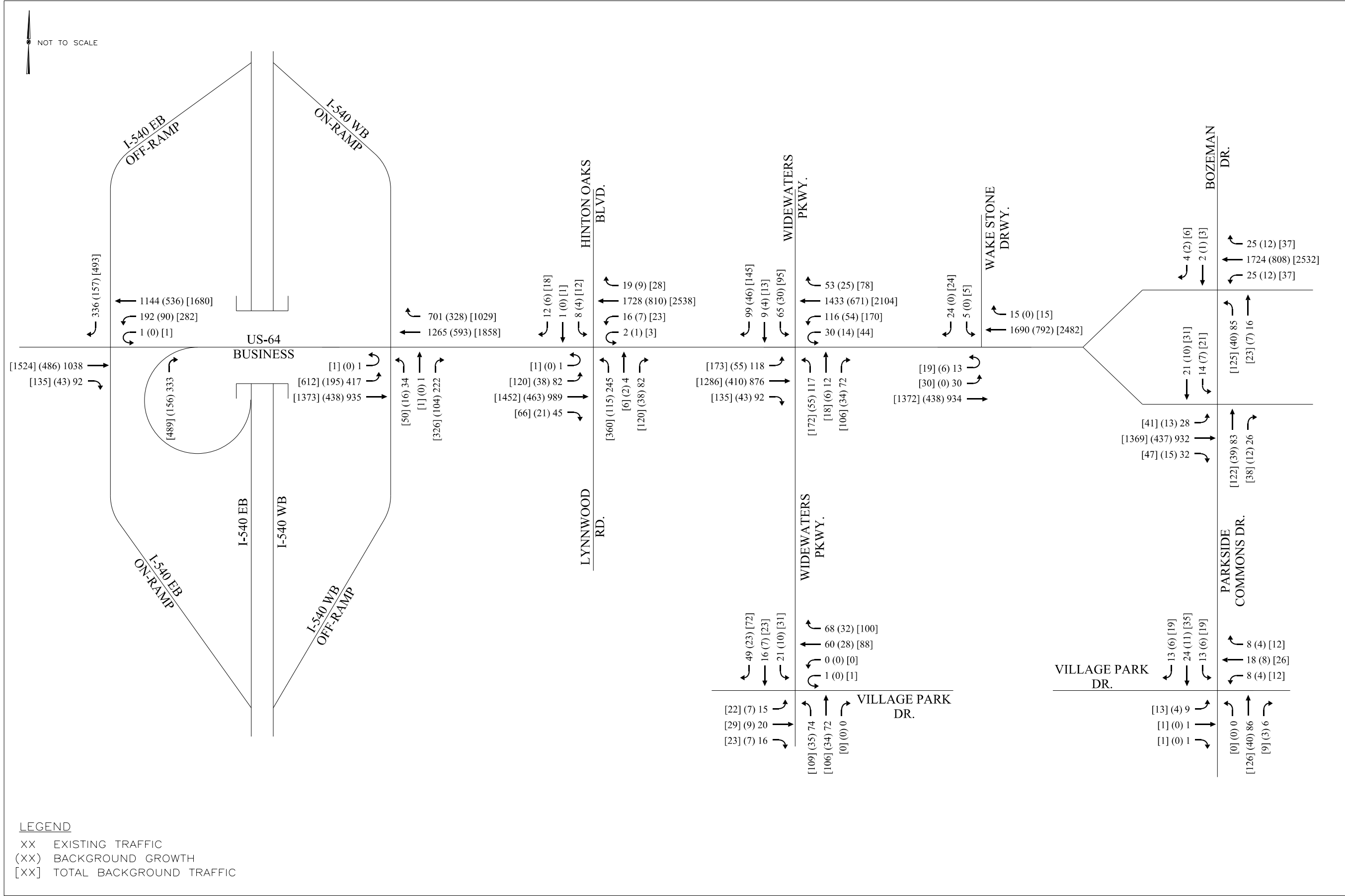


**PARKSTONE KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS**

**EXISTING AND PROJECTED (2020) BACKGROUND PM PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 5B**

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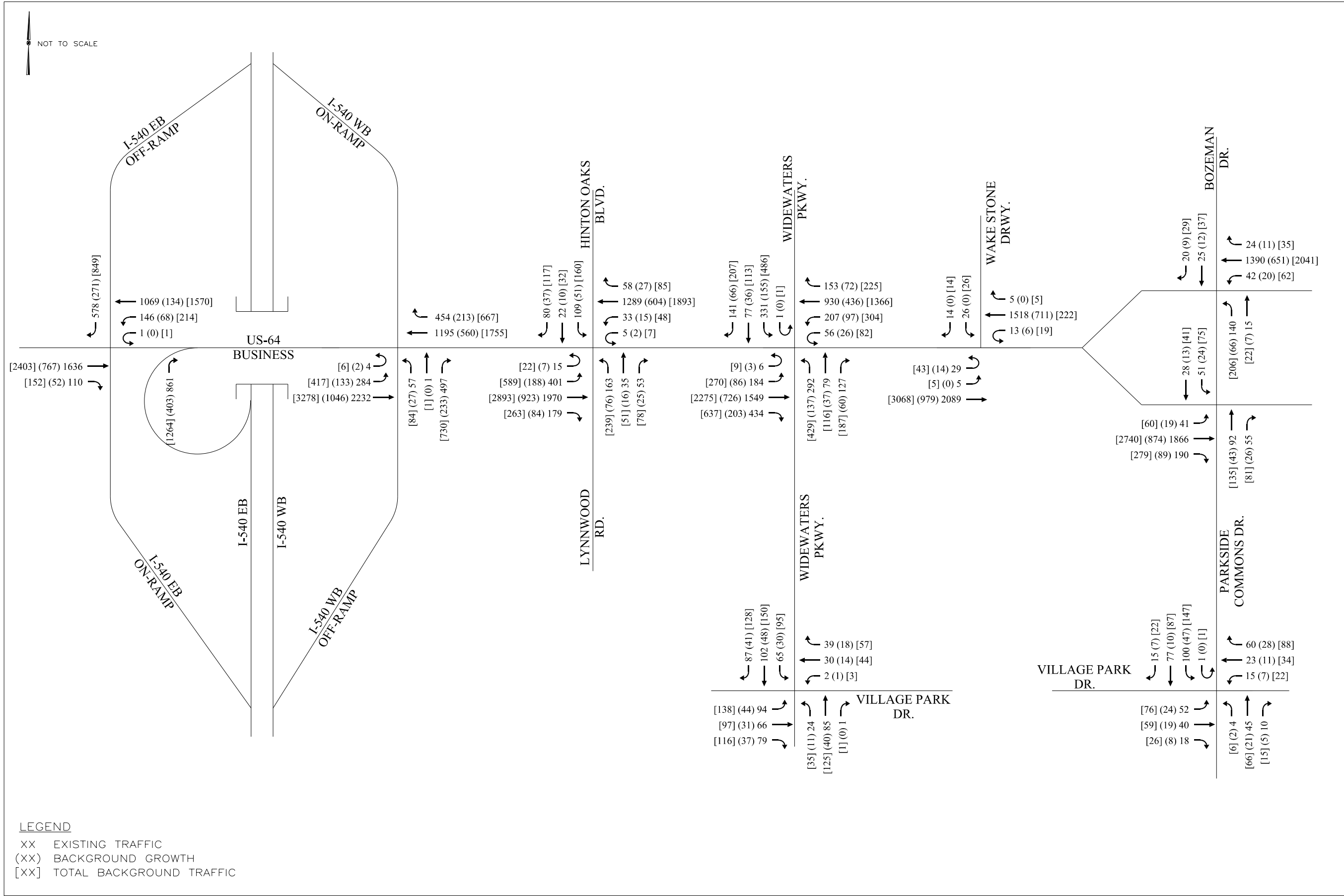


PARKSTONE KNIGHTDALE, NC  
 TRAFFIC IMPACT ANALYSIS

EXISTING AND PROJECTED (2029) BACKGROUND AM PEAK HOUR TRAFFIC VOLUMES

FIGURE 6A

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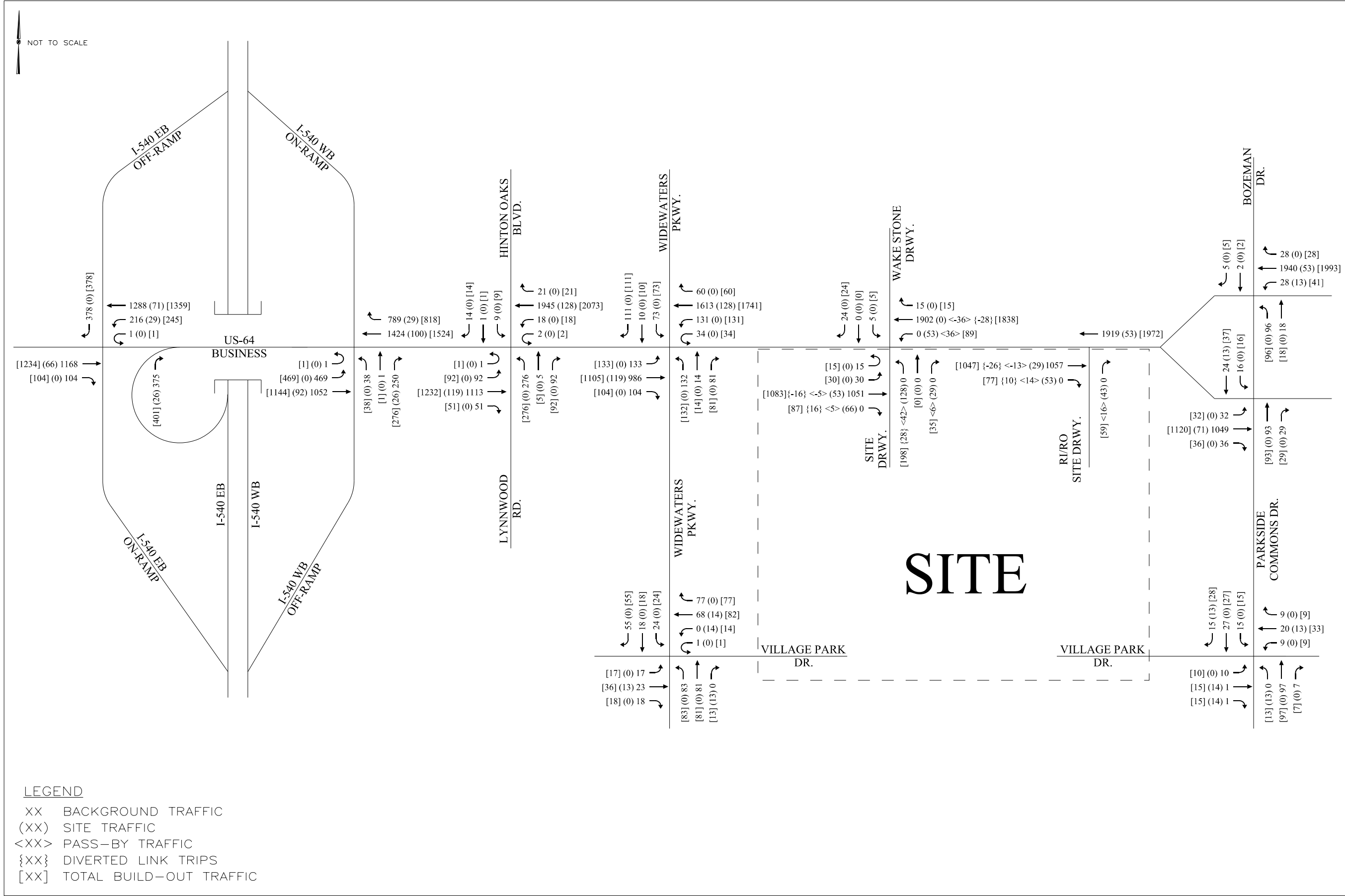


PARKSTONE KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

EXISTING AND PROJECTED  
(2029) BACKGROUND PM  
PEAK HOUR TRAFFIC VOLUMES

FIGURE 6B

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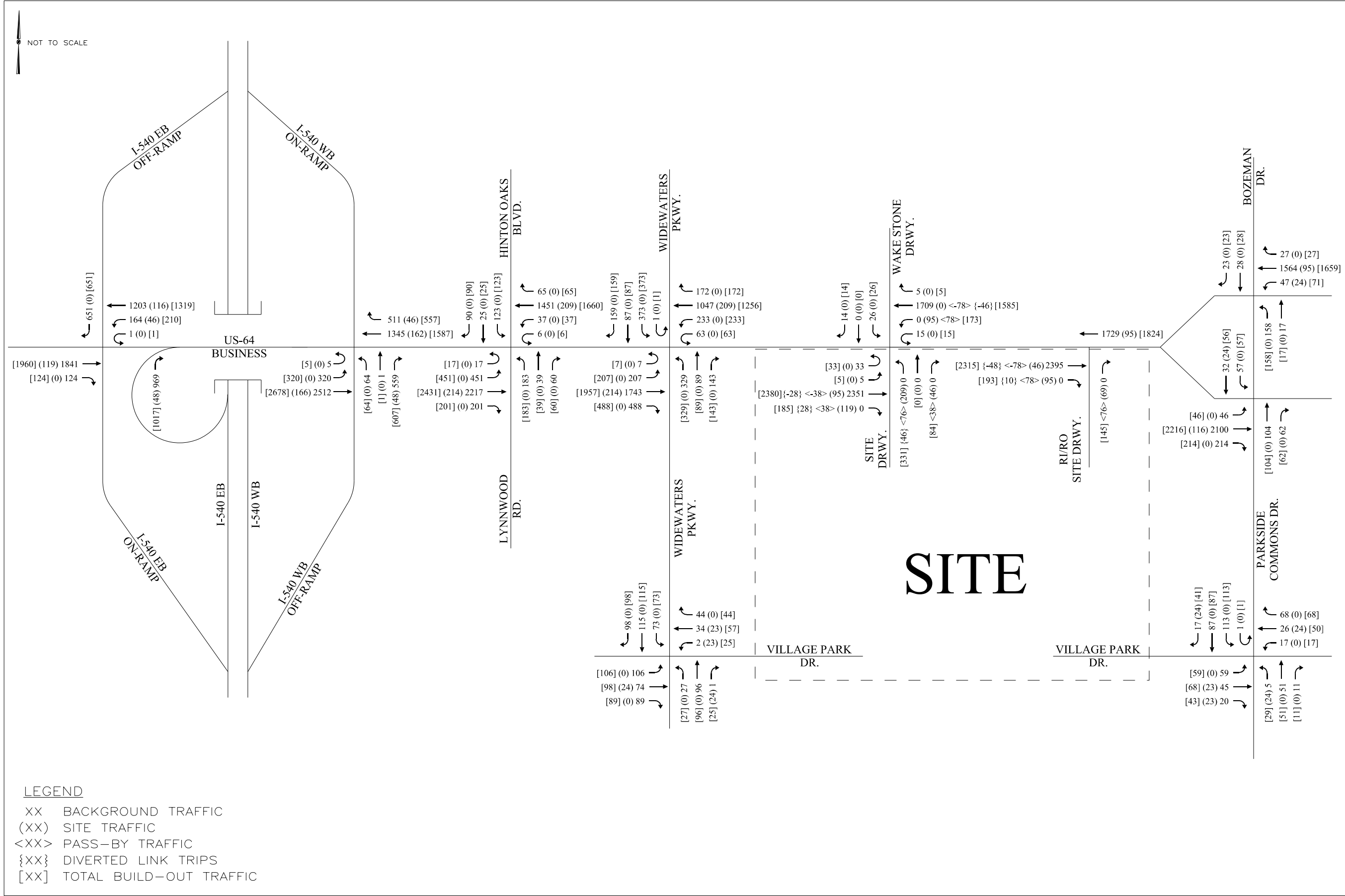
PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

PROJECTED (2020) BUILD-OUT  
AM PEAK HOUR  
TRAFFIC VOLUMES

FIGURE  
7A

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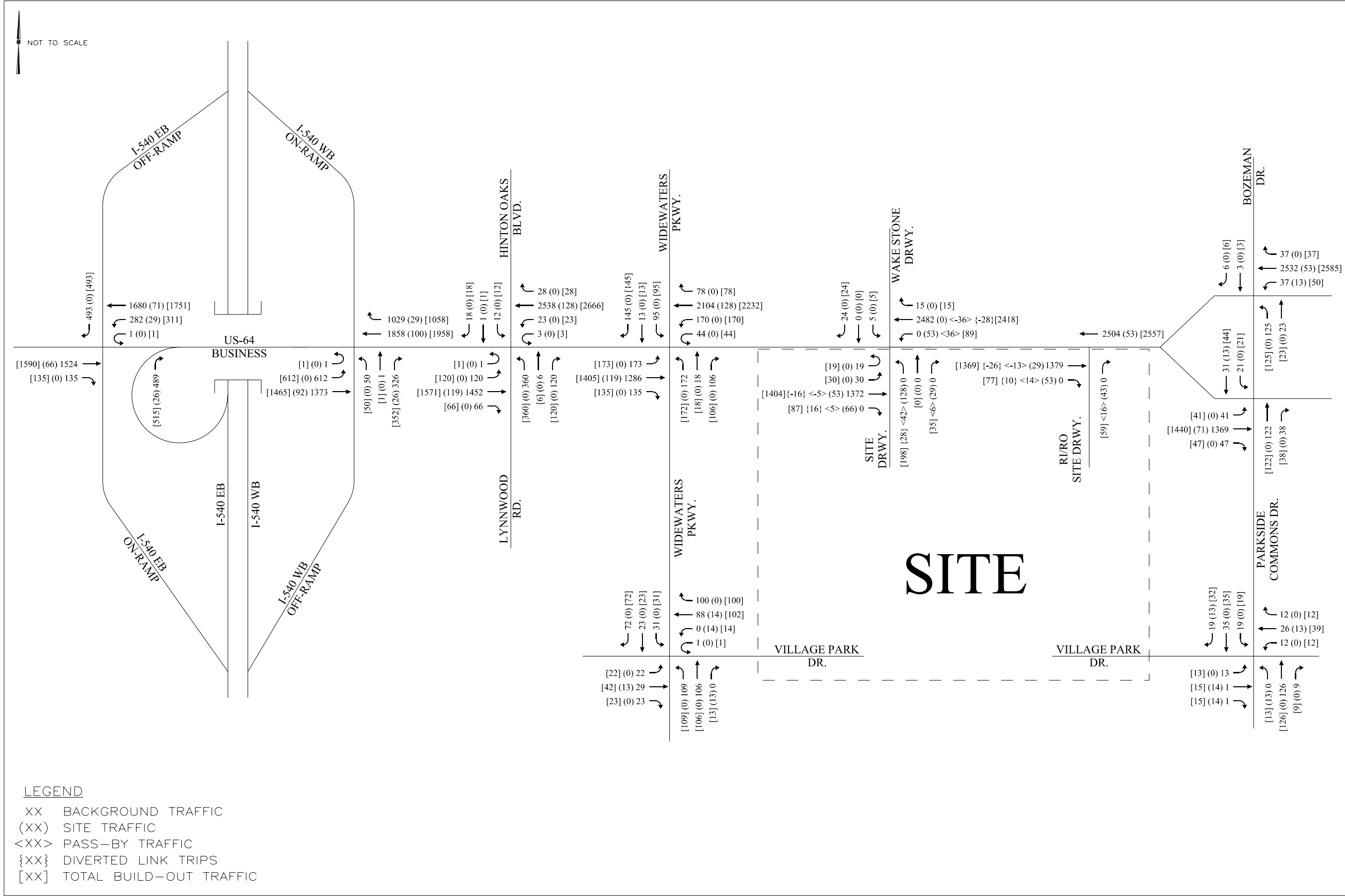


PARKSTONE KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

PROJECTED (2020) BUILD-OUT  
PM PEAK HOUR  
TRAFFIC VOLUMES

FIGURE 7B

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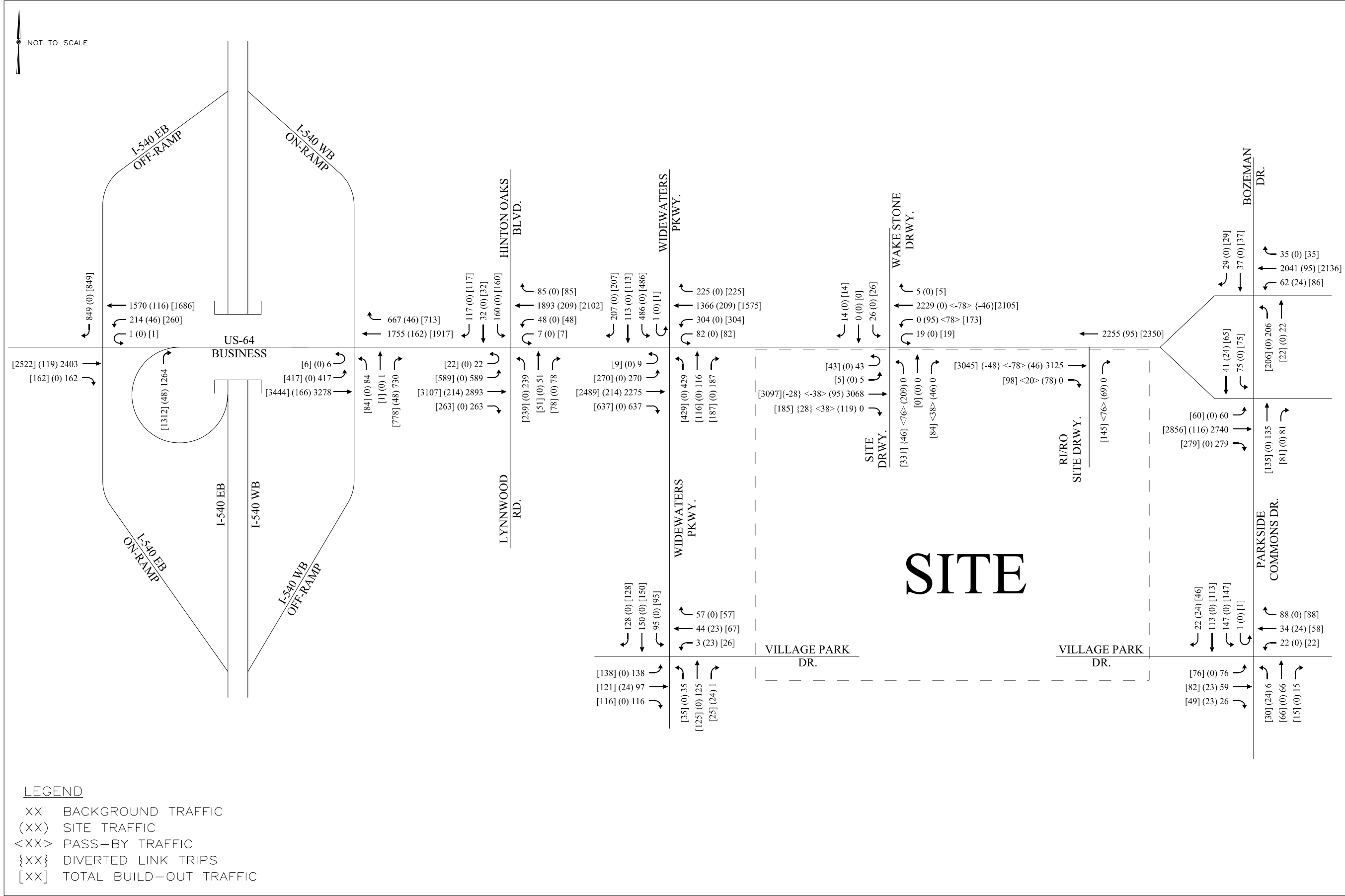


FIGURE 8B

PROJECTED (2029) BUILD-OUT PM PEAK HOUR TRAFFIC VOLUMES

PARKSTONE KNIGHTDALE, NC TRAFFIC IMPACT ANALYSIS



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## 6.0 Capacity Analysis

Capacity analyses (see Appendix) were performed for the AM and PM peak hours for the existing traffic condition, the projected (2020) background and build-out traffic conditions, and the projected (2029) background and build-out traffic conditions using Synchro/SimTraffic Version 9.1 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 9.1 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 6.0-A lists the LOS control delay thresholds published in the *Highway Capacity Manual* for signalized and unsignalized intersections.

<b>Table 6.0-A</b>		
<b>Level-of-Service Control Delay Thresholds</b>		
<b>Level-of-Service</b>	<b>Signalized Intersections – Control Delay Per Vehicle [sec/veh]</b>	<b>Unsignalized Intersections – Average Control Delay [sec/veh]</b>
A	≤ 10	≤ 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Existing signal timings were obtained in the field as part of an NCDOT signal timing project and were not modified for this study. Existing peak hour factors (PHF's) were used for all conditions except at new intersections, where a PHF of 0.90 was used. Right-turns on red were included for all intersections where currently allowed but prohibited in the analysis for new intersections.

Capacity analyses were performed for the existing (2016) traffic condition, projected (2020) background and build-out traffic conditions, and the projected (2029) background and build-out traffic conditions for the following intersections:

- US 64 Business at I-540 EB Ramps
- US 64 Business at I-540 WB Ramps
- US 64 Business at Hinton Oaks Boulevard/Lynnwood Road
- US 64 Business at Widewaters Parkway
- US 64 Business at Wake Stone Driveway/Site Driveway
- US 64 Business at Bozeman Drive/Parkside Commons Drive
- Widewaters Parkway at Village Park Drive
- Parkside Commons Drive at Village Park Drive
- US 64 Business at Right-in/Right-out Site Drive

Table 6.0-B summarizes the LOS and delay (seconds per vehicle) for all of the study intersections for the studied traffic conditions. All capacity analyses are included in the Appendix and are briefly summarized in the following sub-sections.

<b>Table 6.0-B Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>US 64 Business at I-540 EB Ramps (Signalized)</b>		
Existing (2016) Traffic	OVERALL – A (2.0) EB – A (1.5) WBL – A (4.7)	OVERALL – A (3.3) EB - A (2.2) WBL – B (16.3)
Background (2020) Traffic	OVERALL – A (2.9) EB – A (2.0) WBL – A (8.1)	OVERALL - A (4.7) EB – A (3.1) WBL – C (23.6)
Build-out (2020) Traffic	OVERALL - A (4.2) EB – A (2.6) WBL – B (12.8)	OVERALL – A (7.0) EB – A (4.6) WBL – C (30.6)
Background (2029) Traffic	OVERALL – A (7.6) EB – A (5.0) WBL – C (22.7)	OVERALL – A (9.1) EB – A (6.8) WBL – D (36.1)
Build-out (2029) Traffic	OVERALL – A (9.3) EB – A (6.3) WBL – C (25.9)	OVERALL – B (12.0) EB – A (9.2) WBL – D (41.0)

<b>Table 6.0-B (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>US 64 Business at I-540 WB Ramps (Signalized)</b>		
Existing (2016) Traffic	OVERALL – B (11.3) EB – C (20.2) WB – A (3.6) NB – C (22.1)	OVERALL - B (19.9) EB – B (19.9) WB – A (7.2) NB – E (57.6)
Background (2020) Traffic	OVERALL - B (13.3) EB – C (23.0) WB – A (4.4) NB – C (30.1)	OVERALL - C (22.3) EB – C (22.9) WB – A (8.6) NB – E (59.6)
Build-out (2020) Traffic	OVERALL - B (15.2) EB – C (24.6) WB – A (5.3) NB – D (39.8)	OVERALL - C (23.7) EB – C (24.7) WB – A (9.9) NB – E (61.6)
Background (2029) Traffic	OVERALL - C (29.2) EB – D (42.5) WB – B (16.8) NB – D (53.9)	OVERALL - D (50.8) EB – E (70.4) WB – B (11.7) NB – E (77.6)
Build-out (2029) Traffic	OVERALL - C (31.2) EB – D (42.8) WB – B (19.7) NB – D (56.7)	OVERALL - E (56.4) EB – E (76.4) WB – B (14.6) NB – F (93.7)
Build-out (2029) Traffic – <i>w/ UDO Improvements</i>	OVERALL - C (29.5) EB – D (41.1) WB – B (18.3) NB – D (52.7)	OVERALL - D (51.0) EB – E (75.4) WB – B (12.3) SB – E (59.6)



<b>Table 6.0-B (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>US 64 Business at Hinton Oaks Boulevard/Lynnwood Road (Signalized)</b>		
Existing (2016) Traffic	OVERALL - B (12.5) EB - B (10.8) WB - A (5.7) NB - D (52.4) SB - D (36.3)	OVERALL - B (18.0) EB - B (16.2) WB - B (10.8) NB - D (53.6) SB - D (44.6)
Background (2020) Traffic	OVERALL - B (13.1) EB - B (10.8) WB - A (6.8) NB - D (52.3) SB - D (35.1)	OVERALL - B (19.7) EB - B (18.6) WB - B (11.8) NB - D (53.6) SB - D (44.8)
Build-out (2020) Traffic	OVERALL - B (12.5) EB - A (9.9) WB - A (6.8) NB - D (52.3) SB - D (35.1)	OVERALL - C (20.1) EB - B (18.5) WB - B (14.2) NB - D (53.6) SB - D (44.8)
Background (2029) Traffic	OVERALL - C (22.3) EB - B (10.5) WB - C (24.5) NB - D (50.3) SB - C (32.0)	OVERALL - D (35.8) EB - D (43.9) WB - B (16.2) NB - E (55.3) SB - D (43.9)
Build-out (2029) Traffic	OVERALL - C (31.3) EB - B (12.0) WB - D (40.3) NB - D (50.3) SB - C (32.0)	OVERALL - D (40.5) EB - D (50.9) WB - B (19.2) NB - E (55.3) SB - D (43.9)

Table 6.0-B (cont.) Level-of-Service Summary		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
<b>US 64 Business at Widewaters Parkway (Signalized)</b>		
Existing (2016) Traffic	OVERALL - C (20.3) EB - B (12.0) WB - C (21.1) NB - D (46.2) SB - C (33.3)	OVERALL - C (29.7) EB - B (18.3) WB - C (23.6) NB - E (68.7) SB - D (54.5)
Background (2020) Traffic	OVERALL - C (21.3) EB - B (12.2) WB - C (22.9) NB - D (46.1) SB - C (33.3)	OVERALL - C (33.1) EB - C (22.2) WB - C (25.5) NB - E (73.7) SB - E (57.9)
Build-out (2020) Traffic	OVERALL - C (21.2) EB - B (12.3) WB - C (23.3) NB - D (46.1) SB - C (33.3)	OVERALL - D (37.7) EB - C (26.9) WB - D (35.3) NB - E (73.7) SB - E (57.9)
Background (2029) Traffic	OVERALL - C (24.2) EB - B (12.3) WB - C (28.2) NB - D (47.5) SB - C (33.5)	OVERALL - E (60.0) EB - E (62.5) WB - C (28.9) NB - F (106.2) SB - F (84.7)
Background (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (25.4) EB - B (11.8) WB - C (30.7) NB - D (47.5) SB - C (33.5)	OVERALL - D (42.3) EB - C (25.5) WB - C (28.5) NB - F (106.2) SB - F (84.7)
Build-out (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (30.5) EB - B (11.7) WB - D (40.7) NB - D (47.5) SB - C (33.5)	OVERALL - D (48.2) EB - C (29.1) WB - D (44.9) NB - F (106.2) SB - F (84.7)

Table 6.0-B (cont.) Level-of-Service Summary		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
<b>US 64 Business at Wake Stone Driveway/Site Drive</b>		
Existing (2016) Traffic – <i>Unsignalized</i>	SB – F (97.9) EBL – C (20.6) WBU – A (0.0)	SB – F (187.5) EBL – C (19.9) WBU – C (22.5)
Background (2020) Traffic - <i>Unsignalized</i>	SB – F (194.2) EBL – D (26.6) WBU – A (0.0)	SB – F (395.0) EBL – C (24.6) WBU – D (28.2)
Build-out (2020) Traffic – <i>Signalized w/ Developer Improvements</i>	OVERALL - B (16.3) EB – A (8.3) WB – B (14.6) NB – E (66.8) SB – B (18.4)	OVERALL – C (28.4) EB – B (17.8) WB – D (33.8) NB – E (65.7) SB – D (45.3)
Background (2029) Traffic - <i>Unsignalized</i>	SB – F (974.7) EBL – F (73.6) WBU – A (0.0)	SB – F (1883.8) EBL – F (53.3) WBU – F (59.3)
Background (2029) Traffic – <i>Unsignalized w/ UDO Improvements</i>	SB – F (417.3) EBL – F (129.5) WBU – A (0.0)	SB – F (1184.3) EBL – E (37.6) WBU – F (59.3)
Build-out (2029) Traffic – <i>Signalized w/ Developer and UDO Improvements</i>	OVERALL – B (13.4) EB – B (11.0) WB – A (9.4) NB – E (66.8) SB – B (18.4)	OVERALL – D (47.1) EB – D (49.9) WB – D (37.3) NB – E (76.4) SB – D (46.0)

<b>Table 6.0-B (cont.)                      Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour                      LOS (Delay)</b>	<b>PM Peak Hour                      LOS (Delay)</b>
<b>US 64 Business at Bozeman Drive/Crossover (Signalized)</b>		
Existing (2016) Traffic	OVERALL - B (17.6) WB - B (18.1) NB - A (7.7) SB - C (31.6)	OVERALL - B (18.7) WB - B (18.3) NB - B (16.7) SB - D (37.5)
Background (2020) Traffic	OVERALL - C (23.3) WB - C (24.2) NB - A (7.1) SB - C (28.1)	OVERALL - C (21.6) WB - C (21.7) NB - B (16.6) SB - D (37.4)
Build-out (2020) Traffic	OVERALL - C (25.0) WB - C (26.0) NB - A (7.1) SB - C (28.1)	OVERALL - C (23.7) WB - C (24.0) NB - B (16.6) SB - D (37.4)
Background (2029) Traffic	OVERALL - F (109.3) WB - F (115.5) NB - A (6.7) SB - C (25.3)	OVERALL - D (43.2) WB - D (46.2) NB - B (16.3) SB - D (38.9)
Background (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (23.1) WB - C (24.1) NB - A (6.5) SB - C (25.3)	OVERALL - C (21.9) WB - C (22.0) NB - B (16.2) SB - D (38.9)
Build-out (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (24.2) WB - C (25.1) NB - A (6.6) SB - C (25.3)	OVERALL - C (23.4) WB - C (23.6) NB - B (16.3) SB - D (38.9)

<b>Table 6.0-B (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>US 64 Business at Parkside Commons Drive/Crossover (Signalized)</b>		
Existing (2016) Traffic	OVERALL - B (15.1) EB - B (10.6) NB - E (57.2) SB - B (12.0)	OVERALL - B (14.7) EB - B (12.7) NB - D (47.7) SB - A (7.9)
Background (2020) Traffic	OVERALL - B (16.2) EB - B (11.8) NB - E (57.7) SB - B (13.5)	OVERALL - B (19.0) EB - B (17.3) NB - D (48.1) SB - A (8.4)
Build-out (2020) Traffic – w/ <i>Developer Improvements</i>	OVERALL - B (18.8) EB - B (15.1) NB - E (57.7) SB - B (12.3)	OVERALL B (16.8) EB - B (15.1) NB - D (48.0) SB - A (8.1)
Background (2029) Traffic	OVERALL - B (19.8) EB - B (15.9) NB - E (57.9) SB - B (11.8)	OVERALL - F (122.0) EB - F (131.4) NB - D (48.3) SB - A (8.6)
Build-out (2029) Traffic – w/ <i>Developer Improvements</i>	OVERALL - C (23.5) EB - C (20.4) NB - E (57.9) SB - B (11.3)	OVERALL - D (44.0) EB - D (45.3) NB - D (48.2) SB - A (8.1)
<b>Parkside Commons Drive at Village Park Drive (Unsignalized)<sup>1</sup></b>		
Existing (2016) Traffic	EB - A (9.9) WB - B (10.1) NBL - A (7.3) SBL - A (7.5)	EB - B (14.0) WB - B (10.8) NBL - A (0.5) SBL - A (4.2)
Background (2020) Traffic	EB - B (10.1) WB - B (10.4) NBL - A (7.3) SBL - A (7.5)	EB - C (15.6) WB - B (11.3) NBL - A (0.5) SBL - A (4.2)
Build-out (2020) Traffic	EB - B (10.3) WB - B (11.0) NBL - B (7.4) SBL - A (7.5)	EB - C (18.6) WB - B (13.4) NBL - A (2.5) SBL - A (3.9)
Background (2029) Traffic	EB - B (10.8) WB - B (11.0) NBL - A (7.4) SBL - A (7.6)	EB - C (23.2) WB - B (13.3) NBL - A (0.5) SBL - A (4.4)
Build-out (2029) Traffic	EB - B (10.9) WB - B (11.8) NBL - A (7.4) SBL - A (7.6)	EB - D (32.8) WB - C (16.7) NBL - A (2.2) SBL - A (4.1)

<sup>1</sup>Since HCM 2010 does not report delay for major-street U-turns from a shared through-lane, reported PM peak hour delays at this intersection are from HCM 2000.

<b>Table 6.0-B (cont.) Level-of-Service Summary</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
<b>Widewaters Parkway at Village Park Drive (Roundabout)<sup>2</sup></b>		
Existing (2016) Traffic	OVERALL - A (4.7) EB - A (3.9) WB - A (5.1) NB - A (4.3) SB - A (4.9)	OVERALL - A (6.2) EB - A (7.0) WB - A (4.9) NB - A (5.6) SB - A (6.1)
Background (2020) Traffic	OVERALL - A (5.4) EB - A (4.0) WB - A (6.1) NB - A (5.3) SB - A (5.1)	OVERALL - A (6.7) EB - A (7.7) WB - A (5.2) NB - A (6.0) SB - A (6.5)
Build-out (2020) Traffic	OVERALL - A (5.7) EB - A (4.2) WB - A (6.5) NB - A (5.6) SB - A (5.3)	OVERALL - A (7.2) EB - A (8.4) WB - A (5.8) NB - A (6.6) SB - A (7.0)
Background (2029) Traffic	OVERALL - A (6.3) EB - A (4.2) WB - A (7.4) NB - A (6.2) SB - A (5.9)	OVERALL - A (8.5) EB - B (10.2) WB - A (6.0) NB - A (7.3) SB - A (8.0)
Build-out (2029) Traffic	OVERALL - A (6.6) EB - A (4.5) WB - A (7.9) NB - A (6.5) SB - A (6.2)	OVERALL - A (9.2) EB - B (11.3) WB - A (6.8) NB - A (8.0) SB - A (8.7)
<b>US 64 Business at Right-in/Right-out Site Drive (Unsignalized)<sup>3</sup></b>		
Build-out (2020) Traffic	NB - A (5.4)	NB - C (24.4)
Build-out (2029) Traffic	NB - A (9.1)	NB - D (30.8)

<sup>2</sup>Overall intersection LOS and delay reported from HCS 2010.

<sup>3</sup>Minor street approach LOS and delay reported from SimTraffic version 9.1.



6.1 US 64 Business at I-540 EB Ramps

Analyses indicate that the intersection of US 64 Business at the I-540 EB Ramps currently operates at LOS A in both the AM and PM peak hours. In the year 2020, the intersection is expected to operate at LOS A in both peak hours with or without the proposed ParkStone project in place. No roadway improvements are recommended to be performed to accommodate projected traffic volumes at this intersection as part of the ParkStone development.

The study year 2029 was also studied as part of this analysis. Analysis indicates that the intersection will continue to operate at LOS A in both peak hours in the projected (2029) background traffic condition, and at LOS A in the AM peak hour and LOS B in the PM peak hour in the projected (2029) build-out traffic condition. As such, no improvements were necessary to achieve an acceptable LOS per the Town’s UDO requirements.

Table 6.1 summarizes the operation of the intersection of US 64 Business at the I-540 EB Ramps for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.1 Level-of-Service US 64 Business at I-540 EB Ramps (Signalized)</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic	OVERALL – A (2.0) EB – A (1.5) WBL – A (4.7)	OVERALL – A (3.3) EB – A (2.2) WBL – B (16.3)
Background (2020) Traffic	OVERALL – A (2.9) EB – A (2.0) WBL – A (8.1)	OVERALL – A (4.7) EB – A (3.1) WBL – C (23.6)
Build-out (2020) Traffic	OVERALL – A (4.2) EB – A (2.6) WBL – B (12.8)	OVERALL – A (7.0) EB – A (4.6) WBL – C (30.6)
Background (2029) Traffic	OVERALL – A (7.6) EB – A (5.0) WBL – C (22.7)	OVERALL – A (9.1) EB – A (6.8) WBL – D (36.1)
Build-out (2029) Traffic	OVERALL – A (9.3) EB – A (6.3) WBL – C (25.9)	OVERALL – B (12.0) EB – A (9.2) WBL – D (41.0)

## 6.2 US 64 Business at I-540 WB Ramps

Analyses indicate that the intersection of US 64 Business at the I-540 WB Ramps currently operates at LOS B in both the AM and PM peak hours. In the year 2020, 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 ParkStone project in place. No roadway improvements are recommended to be performed to accommodate projected traffic volumes at this intersection as part of the ParkStone development.

The year 2029 was also studied as part of this analysis. Analysis indicates that the intersection will operate at LOS C in the AM peak hour and LOS D in the PM peak hour in the projected (2029) background traffic condition and at LOS C and E in the AM and PM peak hours in the build-out traffic condition with no additional roadway improvements in place. Per the Town's UDO, the following improvement was also identified to achieve acceptable LOS in the projected (2029) build-out traffic condition:

- Construct an additional northbound right-turn lane on the I-540 WB Off-Ramp to provide triple right-turn lanes on that approach

Analysis indicates that with this improvement in place, this intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour in the projected (2029) build-out traffic condition. These improvements are to assist the Town in determining future roadway priorities and are not considered to be improvements recommended or required for the proposed ParkStone development.

Table 6.2 summarizes the operation of the intersection of US 64 Business at I-540 WB Ramps for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.2</b> <b>Level-of-Service</b> <b>US 64 Business at I-540 WB Ramps (Signalized)</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic	OVERALL - B (11.3) EB - C (20.2) WB - A (3.6) NB - C (22.1)	OVERALL - B (19.9) EB - B (19.9) WB - A (7.2) NB - E (57.6)
Background (2020) Traffic	OVERALL - B (13.3) EB - C (23.0) WB - A (4.4) NB - C (30.1)	OVERALL - C (22.3) EB - C (22.9) WB - A (8.6) NB - E (59.6)
Build-out (2020) Traffic	OVERALL - B (15.2) EB - C (24.6) WB - A (5.3) NB - D (39.8)	OVERALL - C (23.7) EB - C (24.7) WB - A (9.9) NB - E (61.6)
Background (2029) Traffic	OVERALL - C (29.2) EB - D (42.5) WB - B (16.8) NB - D (53.9)	OVERALL - D (50.8) EB - E (70.4) WB - B (11.7) NB - E (77.6)
Build-out (2029) Traffic	OVERALL - C (31.2) EB - D (42.8) WB - B (19.7) NB - D (56.7)	OVERALL - E (56.4) EB - E (76.4) WB - B (14.6) NB - F (93.7)
Build-out (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (29.5) EB - D (41.1) WB - B (18.3) NB - D (52.7)	OVERALL - D (51.0) EB - E (75.4) WB - B (12.3) SB - E (59.6)

6.3 US 64 Business at Hinton Oaks Boulevard/Lynnwood Road

Analyses indicate that the intersection of US 64 Business at Hinton Oaks Boulevard/Lynnwood Road currently operates at LOS B in both the AM and PM peak hours. In the year 2020 background traffic condition, the intersection is expected to operate at LOS B in both peak hours, while in the build-out traffic condition the intersection is expected to operate at LOS B in the AM peak hour and LOS C in the PM peak hour. No roadway improvements are recommended to be performed to accommodate projected traffic volumes at this intersection.

The study year 2029 was also studied as part of this analysis. Analysis indicates that the intersection will operate at LOS C in the AM peak hour and LOS D in the PM peak hour in both the projected (2029) background and build-out traffic conditions. As such, no improvements are necessary to achieve an acceptable LOS per the Town’s UDO requirements.

Table 6.3 summarizes the operation of the intersection of Hinton Oaks Boulevard/Lynnwood Road for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.3 Level-of-Service US 64 Business at Hinton Oaks Blvd./Lynnwood Rd. (Signalized)</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic	OVERALL - B (12.5) EB – B (10.8) WB – A (5.7) NB – D (52.4) SB – D (36.3)	OVERALL - B (18.0) EB – B (16.2) WB – B (10.8) NB – D (53.6) SB – D (44.6)
Background (2020) Traffic	OVERALL - B (13.1) EB – B (10.8) WB – A (6.8) NB – D (52.3) SB – D (35.1)	OVERALL - B (19.7) EB – B (18.6) WB – B (11.8) NB – D (53.6) SB – D (44.8)
Build-out (2020) Traffic	OVERALL - B (12.5) EB – A (9.9) WB – A (6.8) NB – D (52.3) SB – D (35.1)	OVERALL - C (20.1) EB – B (18.5) WB – B (14.2) NB – D (53.6) SB – D (44.8)
Background (2029) Traffic	OVERALL - C (22.3) EB – B (10.5) WB – C (24.5) NB – D (50.3) SB – C (32.0)	OVERALL - D (35.8) EB – D (43.9) WB – B (16.2) NB – E (55.3) SB – D (43.9)
Build-out (2029) Traffic	OVERALL - C (31.3) EB – B (12.0) WB – D (40.3) NB – D (50.3) SB – C (32.0)	OVERALL - D (40.5) EB – D (50.9) WB – B (19.2) NB – E (55.3) SB – D (43.9)

#### 6.4 US 64 Business at Widewaters Parkway

Analyses indicate that the intersection of US 64 Business at Widewaters Parkway currently operates at LOS C in both the AM and PM peak hours. In the year 2020 background traffic condition, the intersection is expected to operate at LOS C in both peak hours, while in the build-out traffic condition the intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour. No roadway improvements are recommended to be performed to accommodate projected traffic volumes at this intersection as part of the ParkStone development.

The study year 2029 was also studied as part of this analysis. Analysis indicates that the intersection will operate at LOS C in the AM peak hour and LOS E in the PM peak hour in the projected (2029) background traffic condition. Per the Town's UDO, the following improvement was identified to achieve an acceptable LOS in the projected (2029) background and build-out traffic conditions:

- Construct an additional eastbound through lane from west of Widewaters Parkway to the Wake Stone Driveway/Site Drive

Analysis indicates that with this improvement in place, the intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour in the projected (2029) background and build-out traffic conditions. However, queuing issues observed in the existing condition at this intersection are expected at this intersection, particularly for the eastbound left-turn and southbound left-turn movements. These improvements are to assist the Town in determining future roadway priorities and are not considered to be improvements recommended or required for the proposed ParkStone development.

Table 6.4 summarizes the operation of the intersection of US 64 Business at Widewaters Parkway for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.4</b> <b>Level-of-Service</b> <b>US 64 Business at Widewaters Parkway (Signalized)</b>		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
Existing (2016) Traffic	OVERALL - C (20.3) EB - B (12.0) WB - C (21.1) NB - D (46.2) SB - C (33.3)	OVERALL - C (29.7) EB - B (18.3) WB - C (23.6) NB - E (68.7) SB - D (54.5)
Background (2020) Traffic	OVERALL - C (21.3) EB - B (12.2) WB - C (22.9) NB - D (46.1) SB - C (33.3)	OVERALL - C (33.1) EB - C (22.2) WB - C (25.5) NB - E (73.7) SB - E (57.9)
Build-out (2020) Traffic	OVERALL - C (21.2) EB - B (12.3) WB - C (23.3) NB - D (46.1) SB - C (33.3)	OVERALL - D (37.7) EB - C (26.9) WB - D (35.3) NB - E (73.7) SB - E (57.9)
Background (2029) Traffic	OVERALL - C (24.2) EB - B (12.3) WB - C (28.2) NB - D (47.5) SB - C (33.5)	OVERALL - E (60.0) EB - E (62.5) WB - C (28.9) NB - F (106.2) SB - F (84.7)
Background (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (25.4) EB - B (11.8) WB - C (30.7) NB - D (47.5) SB - C (33.5)	OVERALL - D (42.3) EB - C (25.5) WB - C (28.5) NB - F (106.2) SB - F (84.7)
Build-out (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (30.5) EB - B (11.7) WB - D (40.7) NB - D (47.5) SB - C (33.5)	OVERALL - D (48.2) EB - C (29.1) WB - D (44.9) NB - F (106.2) SB - F (84.7)

## 6.5 US 64 Business at Wake Stone Driveway/Site Drive

Analyses indicate that the unsignalized intersection of US 64 Business at the Wake Stone Driveway/Site Drive currently operates with long delays on the minor street approach (Wake Stone Driveway) in both the AM and PM peak hours. Similarly, the minor street approach and major-street left-turn movements are expected to operate with moderate to long delays in the background traffic condition. The following roadway improvements are recommended to be performed to accommodate existing traffic and the projected ParkStone site traffic for the study year 2020 based on the capacity analysis presented herein as well as discussions with NCDOT and the Town of Knightdale:

- Extend the third eastbound through lane on US 64 Business along the property frontage
- Construct an exclusive eastbound right-turn lane on US 64 Business with 100 feet of storage and appropriate tapers
- Extend the storage of the westbound left-turn lane on US 64 Business by approximately 175 feet to provide 300 feet of storage on that approach
- Construct an exclusive northbound left-turn lane with 250 feet of storage, a shared through/left turn-lane, and an exclusive right-turn lane with 100 feet of storage on the Site Drive
- Construct an exclusive southbound right-turn lane on the Wake Stone Corporation Driveway with approximately 75 feet of storage
- Install a traffic signal

The analysis indicates that with the recommended roadway improvements and traffic signal in place, the intersection is expected to operate at LOS B in the AM peak hour and LOS C in the PM peak hour at project build-out.

The year 2029 was also studied as part of this analysis. Analysis indicates that, without a traffic signal in place, the intersection will operate with very long delays on the minor street approach and major-street left-turn movements in both the AM and PM peak hours in the projected (2029) background traffic condition. Per the Town's UDO, the following improvements were also identified to accommodate projected (2029) background and build-out traffic volumes:

- Construct an additional eastbound through lane from west of Widewaters Parkway to the Wake Stone Driveway/Site Drive, terminating as the eastbound right-turn lane at the proposed Site Drive
- Construct an additional westbound through lane from east of Bozeman Drive to the Wake Stone Driveway/Site Drive

Analysis indicates that with these improvements in place, this intersection is expected to continue to operate with long delays on the minor street approach in both the AM and PM peak hours,



though delays are expected to be shorter than without the UDO-improvements in place. However, in the projected (2029) build-out traffic condition with the traffic signal and UDO improvements in place, the intersections is expected to operate at LOS B in the AM peak hour and LOS D in the PM peak hour. These improvements are to assist the Town in determining future roadway priorities and are not considered to be improvements recommended or required for the proposed ParkStone development.

Table 6.5 summarizes the operation of the intersection of US 64 Business at Wake Stone Driveway/Site Drive for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.5</b> <b>Level-of-Service</b> <b>US 64 Business at Wake Stone Driveway/Site Drive</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic – <i>Unsignalized</i>	SB – F (97.9) EBL – C (20.6) WBU – A (0.0)	SB – F (187.5) EBL – C (19.9) WBU – C (22.5)
Background (2020) Traffic - <i>Unsignalized</i>	SB – F (194.2) EBL – D (26.6) WBU – A (0.0)	SB – F (395.0) EBL – C (24.6) WBU – D (28.2)
Build-out (2020) Traffic – <i>Signalized w/ Developer Improvements</i>	OVERALL - B (16.3) EB – A (8.3) WB – B (14.6) NB – E (66.8) SB – B (18.4)	OVERALL – C (28.4) EB – B (17.8) WB – D (33.8) NB – E (65.7) SB – D (45.3)
Background (2029) Traffic - <i>Unsignalized</i>	SB – F (974.7) EBL – F (73.6) WBU – A (0.0)	SB – F (1883.8) EBL – F (53.3) WBU – F (59.3)
Background (2029) Traffic – <i>Unsignalized w/ UDO Improvements</i>	SB – F (417.3) EBL – F (129.5) WBU – A (0.0)	SB – F (1184.3) EBL – E (37.6) WBU – F (59.3)
Build-out (2029) Traffic – <i>Signalized w/ Developer and UDO Improvements</i>	OVERALL – B (13.4) EB – B (11.0) WB – A (9.4) NB – E (66.8) SB – B (18.4)	OVERALL – D (47.1) EB – D (49.9) WB – D (37.3) NB – E (76.4) SB – D (46.0)

## 6.6 US 64 Business at Bozeman Drive/Crossover

Analyses indicate that the intersection of US 64 Business at Bozeman Drive/Crossover currently operates at LOS B in both the AM and PM peak hours. In the year 2020, the intersection is expected to operate at LOS C in both peak hours with or without the proposed ParkStone project in place. No roadway improvements are recommended to be performed to accommodate projected traffic volumes at this intersection as part of the ParkStone development.

The year 2029 was also studied as part of this analysis. Analysis indicates that the intersection is expected to operate at LOS F in the AM peak hour and LOS D in the PM peak hour in the projected (2029) background traffic condition. Per the Town's UDO, the following improvements were identified to achieve an acceptable LOS in the projected (2029) background and build-out traffic conditions:

- Construct an additional westbound through lane from east of Bozeman Drive to the Wake Stone Driveway/Site Drive

Analysis indicates that with this improvement in place, this intersection is expected to operate at LOS C in both the AM and PM peak hours in the projected (2029) background and build-out traffic conditions. These improvements are to assist the Town in determining future roadway priorities and are not considered to be improvements recommended or required for the proposed ParkStone development.

Table 6.6 summarizes the operation of the intersection of US 64 Business at Bozeman Drive/Crossover for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.6</b> <b>Level-of-Service</b> <b>US 64 Business at Bozeman Drive/Crossover (Signalized)</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic	OVERALL - B (17.6) WB - B (18.1) NB - A (7.7) SB - C (31.6)	OVERALL - B (18.7) WB - B (18.3) NB - B (16.7) SB - D (37.5)
Background (2020) Traffic	OVERALL - C (23.3) WB - C (24.2) NB - A (7.1) SB - C (28.1)	OVERALL - C (21.6) WB - C (21.7) NB - B (16.6) SB - D (37.4)
Build-out (2020) Traffic	OVERALL - C (25.0) WB - C (26.0) NB - A (7.1) SB - C (28.1)	OVERALL - C (23.7) WB - C (24.0) NB - B (16.6) SB - D (37.4)
Background (2029) Traffic	OVERALL - F (109.3) WB - F (115.5) NB - A (6.7) SB - C (25.3)	OVERALL - D (43.2) WB - D (46.2) NB - B (16.3) SB - D (38.9)
Background (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (23.1) WB - C (24.1) NB - A (6.5) SB - C (25.3)	OVERALL - C (21.9) WB - C (22.0) NB - B (16.2) SB - D (38.9)
Build-out (2029) Traffic – w/ <i>UDO Improvements</i>	OVERALL - C (24.2) WB - C (25.1) NB - A (6.6) SB - C (25.3)	OVERALL - C (23.4) WB - C (23.6) NB - B (16.3) SB - D (38.9)

### 6.7 US 64 Business at Parkside Commons Drive/Crossover

Analyses indicate that the intersection of US 64 Business at Bozeman Drive/Crossover currently operates at LOS B in both the AM and PM peak hours. In the year 2020, the intersection is expected to operate at LOS B in both peak hours in the background traffic condition. The following roadway improvement is recommended to be performed to accommodate existing traffic and the projected ParkStone site traffic for the study year 2020 based on the capacity analysis presented herein as well as discussions with NCDOT and the Town of Knightdale:

- Restripe the existing right-turn lane on US 64 Business to a continuous through lane
- Modify the traffic signal to accommodate the change in laneage on US 64 Business

Analysis indicates that, with the recommended improvement in place, the intersection is expected to operate at LOS B in both peak hours in the build-out traffic condition.

The year 2029 was also studied as part of this analysis. Analysis indicates that the intersection is expected to operate at LOS B in the AM peak hour and LOS F in the PM peak hour in the projected (2029) background traffic condition. However, with the proposed widening/restriping of eastbound US 64 Business and from the site to Smithfield Road in place, the intersection is expected to operate at LOS C in the AM peak hour and LOS D in the PM peak hour in the projected (2029) build-out traffic condition.

Table 6.7 summarizes the operation of the intersection of US 64 Business at Parkside Commons Drive/Crossover for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.7</b> <b>Level-of-Service</b> <b>US 64 Business at Parkside Commons Drive/Crossover (Signalized)</b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic	OVERALL - B (15.1) EB - B (10.6) NB - E (57.2) SB - B (12.0)	OVERALL - B (14.7) EB - B (12.7) NB - D (47.7) SB - A (7.9)
Background (2020) Traffic	OVERALL - B (16.2) EB - B (11.8) NB - E (57.7) SB - B (13.5)	OVERALL - B (19.0) EB - B (17.3) NB - D (48.1) SB - A (8.4)
Build-out (2020) Traffic – w/ <i>Developer Improvements</i>	OVERALL - B (18.8) EB - B (15.1) NB - E (57.7) SB - B (12.3)	OVERALL B (16.8) EB - B (15.1) NB - D (48.0) SB - A (8.1)
Background (2029) Traffic	OVERALL - B (19.8) EB - B (15.9) NB - E (57.9) SB - B (11.8)	OVERALL - F (122.0) EB - F (131.4) NB - D (48.3) SB - A (8.6)
Build-out (2029) Traffic – w/ <i>Developer Improvements</i>	OVERALL - C (23.5) EB - C (20.4) NB - E (57.9) SB - B (11.3)	OVERALL - D (44.0) EB - D (45.3) NB - D (48.2) SB - A (8.1)

6.8 Parkside Commons Drive at Village Park Drive

Analyses indicate that the intersection of Parkside Commons Drive at Village Park Drive currently operates with short delays on both minor street approaches (Village Park Drive) and the major-street left-turn movements in both the AM and PM peak hours. These same delay conditions are expected to continue in both the background and build-out traffic conditions. No roadway improvements are recommended to be performed to accommodate projected traffic volumes at this intersection as part of the ParkStone development.

The year 2029 was also studied as part of this analysis. Analysis indicates that the intersection will operate with short or moderate delays on the minor street approaches in both peak hours with or without the proposed development in place. As such, no improvements are necessary to achieve an acceptable LOS per the Town’s UDO requirements.

Table 6.8 summarizes the operation of the intersection of Parkside Commons Drive at Village Park Drive for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.8 Level-of-Service Parkside Commons Drive at Village Park Drive (Unsignalized)<sup>1</sup></b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic	EB – A (9.9) WB – B (10.1) NBL – A (7.3) SBL – A (7.5)	EB – B (14.0) WB – B (10.8) NBL – A (0.5) SBL – A (4.2)
Background (2020) Traffic	EB – B (10.1) WB – B (10.4) NBL – A (7.3) SBL – A (7.5)	EB – C (15.6) WB – B (11.3) NBL – A (0.5) SBL – A (4.2)
Build-out (2020) Traffic	EB – B (10.3) WB – B (11.0) NBL – B (7.4) SBL – A (7.5)	EB – C (18.6) WB – B (13.4) NBL – A (2.5) SBL – A (3.9)
Background (2029) Traffic	EB – B (10.8) WB – B (11.0) NBL – A (7.4) SBL – A (7.6)	EB – C (23.2) WB – B (13.3) NBL – A (0.5) SBL – A (4.4)
Build-out (2029) Traffic	EB – B (10.9) WB – B (11.8) NBL – A (7.4) SBL – A (7.6)	EB – D (32.8) WB – C (16.7) NBL – A (2.2) SBL – A (4.1)

<sup>1</sup>Since HCM 2010 does not report delay for major-street U-turns from a shared through-lane, reported PM peak hour delays at this intersection are from HCM 2000.

6.9 Widewaters Parkway at Village Park Drive

Analyses indicate that the roundabout-intersection of Widewaters Parkway at Village Park Drive currently operates at an overall LOS A in both the AM and PM peak hours. The intersection is expected to continue to operate at an overall LOS A in both the background and build-out traffic conditions. No roadway improvements are recommended to be performed to accommodate projected traffic volumes at this intersection as part of the ParkStone development.

The year 2029 was also studied as part of this analysis. Analysis indicates that the intersection will continue to operate at an overall LOS in both peak hours with or without the proposed development in place. As such, no improvements are necessary to achieve an acceptable LOS per the Town’s UDO requirements.

Table 6.9 summarizes the operation of the intersection of Widewaters Parkway at Village Park Drive for the existing (2016), projected (2020) background and build-out traffic conditions, and projected (2029) background and build-out traffic conditions.

<b>Table 6.9 Level-of-Service Widewaters Parkway at Village Park Drive (Roundabout)<sup>1</sup></b>		
<b>Condition</b>	<b>AM Peak Hour LOS (Delay)</b>	<b>PM Peak Hour LOS (Delay)</b>
Existing (2016) Traffic	OVERALL - A (4.7) EB - A (3.9) WB - A (5.1) NB - A (4.3) SB - A (4.9)	OVERALL - A (6.2) EB - A (7.0) WB - A (4.9) NB - A (5.6) SB - A (6.1)
Background (2020) Traffic	OVERALL - A (5.4) EB - A (4.0) WB - A (6.1) NB - A (5.3) SB - A (5.1)	OVERALL - A (6.7) EB - A (7.7) WB - A (5.2) NB - A (6.0) SB - A (6.5)
Build-out (2020) Traffic	OVERALL - A (5.7) EB - A (4.2) WB - A (6.5) NB - A (5.6) SB - A (5.3)	OVERALL - A (7.2) EB - A (8.4) WB - A (5.8) NB - A (6.6) SB - A (7.0)
Background (2029) Traffic	OVERALL - A (6.3) EB - A (4.2) WB - A (7.4) NB - A (6.2) SB - A (5.9)	OVERALL - A (8.5) EB - B (10.2) WB - A (6.0) NB - A (7.3) SB - A (8.0)
Build-out (2029) Traffic	OVERALL - A (6.6) EB - A (4.5) WB - A (7.9) NB - A (6.5) SB - A (6.2)	OVERALL - A (9.2) EB - B (11.3) WB - A (6.8) NB - A (8.0) SB - A (8.7)

<sup>1</sup>Overall intersection LOS and delay reported from HCS 2010.



6.10 US 64 Business at Right-in/Right-out Site Drive

A right-in/right-out site drive is proposed on US 64 Business approximately 600 feet east of the Wake Stone Driveway/Site Drive intersection. The following roadway improvements are recommended to be performed to accommodate the projected ParkStone site traffic for the study year 2020 based on the capacity analysis presented herein as well as discussions with NCDOT and the Town of Knightdale:

- Extend the third eastbound through lane on US 64 Business along the property frontage and restripe the outside lane on US 64 Business east of the site to provide a continuous through lane from the site to Smithfield Road
- Construct an eastbound right-turn lane on US 64 Business with 100 feet of storage and appropriate tapers

SimTraffic simulations indicates that minor street (Site Drive) delays will be short and that no queuing issues are expected at this intersection.

The year 2029 was also studied as part of this analysis. As with the projected (2020) build-out condition, SimTraffic indicates that the minor street approach (Site Drive) at this intersection is expected to operate with short delays in the AM peak hour and with moderate delays in the PM peak hour with the recommended improvements in place. No queuing issues are expected at this intersection.

Table 6.10 summarizes the operation of the intersection of US 64 Business at Right-in/Right-out Site Drive for the projected (2020) and projected (2029) build-out traffic conditions.

<b>Table 6.10</b> <b>Level-of-Service</b> <b>US 64 Business at Right-in/Right-out Site Drive (Unsignalized)<sup>1</sup></b>		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
Build-out (2020) Traffic	NB – A (5.4)	NB – C (24.4)
Build-out (2029) Traffic	NB – A (9.1)	NB – D (30.8)

<sup>1</sup>Minor street approach LOS and delay reported from SimTraffic version 9.1.

## 7.0 Recommendations

The following roadway improvements are recommended to be performed to accommodate existing traffic and the projected ParkStone site traffic for the study year 2020 based on the capacity analysis presented herein as well as discussions with NCDOT and the Town of Knightdale:

### US 64 Business:

- Extend the third eastbound through lane on US 64 Business along the property frontage and restripe the outside lane on US 64 Business east of the site to provide a continuous through lane from the site to Smithfield Road
- Modify the traffic signals at Parkside Commons Drive and at McKnight Drive to accommodate the change in laneage on US 64 Business

### US 64 Business at Wake Stone Driveway/Site Drive:

- Construct an exclusive eastbound right-turn lane on US 64 Business with 100 feet of storage and appropriate tapers
- Extend the storage of the westbound left-turn lane on US 64 Business by approximately 175 feet to provide 300 feet of storage on that approach
- Construct an exclusive northbound left-turn lane with approximately 250 feet of storage, a shared through/left turn-lane, and an exclusive right-turn lane with approximately 100 feet of storage on the Site Drive
- Construct an exclusive southbound right-turn lane on the Wake Stone Corporation Driveway with 75 feet of storage
- Install a traffic signal

### US 64 Business at Right-in/Right-out Site Drive:

- Construct an eastbound right-turn lane on US 64 Business with 100 feet of storage and appropriate tapers

Analysis indicates that with the recommended improvements and signal installation in place, all of the signalized study intersections are expected to operate at an acceptable LOS in the projected (2020) build-out traffic condition, though some long queues observed in the existing and background conditions at Hinton Oaks Boulevard and Widewaters Parkway are expected to continue. Additionally, it should be noted that while Synchro indicates that the minor street approach of the intersection of US 64 Business at the Right-in/Right-out Site Drive is expected to operate with long delays in the PM peak hour, SimTraffic indicates that delays will be short and that no queuing issues are expected at this intersection. The recommended laneage is shown on Figure 9A.

As part of the Town's UDO requirements, the 2029 horizon year was analyzed to determine what improvements would be required to achieve acceptable levels of service. These improvements are

to assist the Town in determining future roadway priorities and are not considered to be improvements recommended or required for the proposed ParkStone development. The following improvements were identified as being necessary to accommodate projected (2029) traffic volumes at the study intersections:

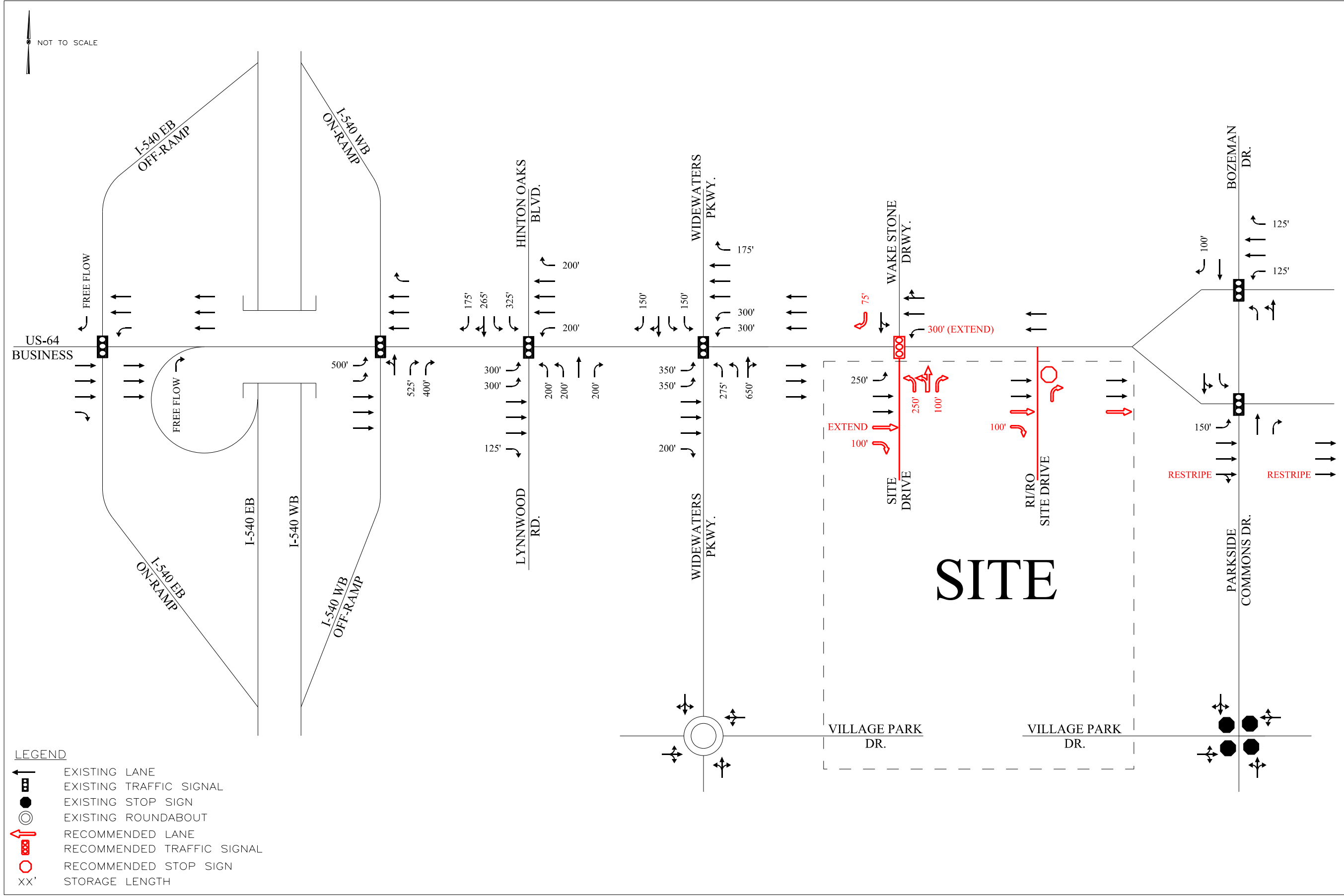
US 64 Business:

- Construct an additional eastbound through lane from west of Widewaters Parkway to the Wake Stone Driveway/Site Drive, terminating as the eastbound right-turn lane at the proposed Site Drive
- Construct an additional westbound through lane from east of Bozeman Drive to the Wake Stone Driveway/Site Drive

US 64 Business at I-540 WB Off-Ramp:

- Construct an additional northbound right-turn lane on the I-540 WB Off-Ramp to provide triple right-turn lanes on that approach

Analysis indicates that with these improvements in place, all of the study intersections are expected to operate at an acceptable LOS in the projected (2029) build-out traffic condition. It should be noted that the intersections of US 64 Business at Widewaters Parkway, the Wake Stone Driveway, Bozeman Drive, and Parkside Commons Drive are all expected to operate at an unacceptable LOS in the year 2029 without the proposed ParkStone development in place. Additionally, queuing issues are expected to continue at several study intersections with particularly long queues anticipated for the eastbound left-turn movement on US 64 Business at Hinton Oaks Boulevard as well as the eastbound left-turn and southbound left-turn movements at the intersection of US 64 Business at Widewaters Parkway. However, these queuing issues would be present with or without the proposed ParkStone development in place, and no site traffic is added to movements on which long queues are expected. Site traffic is expected to generally account for only 2-6% of the total traffic at each of the off-site intersections along US 64 in both the AM and PM peak hours in the year 2029. The recommended 2029 roadway laneage is shown on Figure 9B.

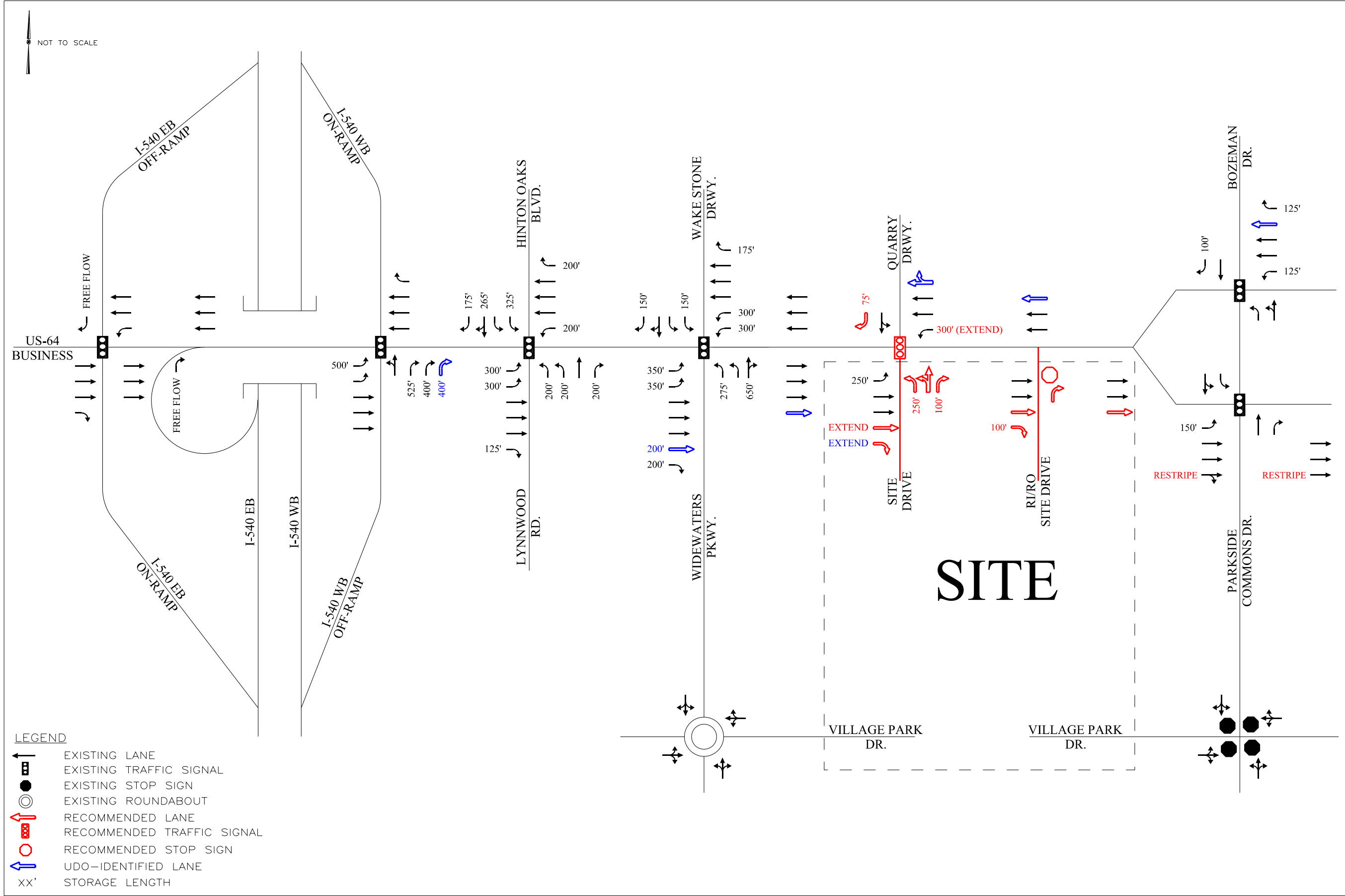


PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

RECOMMENDED ROADWAY LANEAGE  
- 2020

FIGURE  
9A

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC 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.



PARKSTONE  
KNIGHTDALE, NC  
TRAFFIC IMPACT ANALYSIS

UD0-IDENTIFIED ROADWAY LANEAAGE  
- 2029

FIGURE  
9B

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC 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.

# Appendix

**Appendix A:**  
**Memorandum of Understanding**



**Preliminary Assumptions  
ParkStone - Traffic Impact Analysis  
Knightdale, North Carolina**

KHA will perform analyses for the proposed ParkStone mixed-use development, located south of US-64 Business (Knightdale Boulevard) across from the Wake Stone Corporation Quarry in Knightdale, North Carolina. The following assumptions will be used in the analysis of the site:

**Study Area**

The study area will consist of the following intersections:

- US-64 Business at the I-540 EB Ramps
- US-64 Business at the I-540 WB Ramps
- US-64 Business at Hinton Oaks Boulevard/Lynnwood Road
- US-64 Business at Widewaters Parkway
- US-64 Business at Quarry Driveway/Site Driveway
- US-64 Business at Bozeman Drive/Parkside Commons Drive
- Widewaters Parkway at Village Park Drive
- Parkside Commons Drive at Village Park Drive
- US-64 Business at Right-in/Right-out Site Drive

**Analysis Scenarios**

The study scenarios will consist of:

- Existing (2016)
- Background +1 (2019 + 1 = 2020)
- Build-out +1 (2019 + 1 = 2020)
- Background +10 (2019 + 10 = 2029)
- Build-out +10 (2019 + 10 = 2029)

**Background Growth**

No approved developments were identified for inclusion in the analysis as background traffic. Additionally, while historic ADT volumes suggest varying growth rates in the study area, per Town of Knightdale requirements a 3% annual growth rate will also be applied to the existing traffic volumes up to the horizon years of 2020 and 2029.

**Site Traffic Distribution**

The following distribution will be used for the net new site trips (see attached distribution figure):

- 25% to/from the west on US-64 Business
- 25% to/from the east on US-64 Business
- 10% to/from the north on I-540
- 10% to/from the south on I-540
- 5% to/from the north on Widewaters Parkway
- 5% to/from the south on Widewaters Parkway
- 5% to/from the north on Hinton Oaks Boulevard
- 5% to/from the east on Village Park Drive
- 5% to/from the west on Village Park Drive
- 5% to/from the south on Parkside Commons Drive

The 5% to/from the north on Hinton Oaks Boulevard and the 5% to/from the north on Widewaters Parkway represent capture with the adjacent shopping centers. As these trips are already on the roadway network, they represent diverted link trips and will be assigned to the network as such rather than as net new trips.

**Trip Generation**

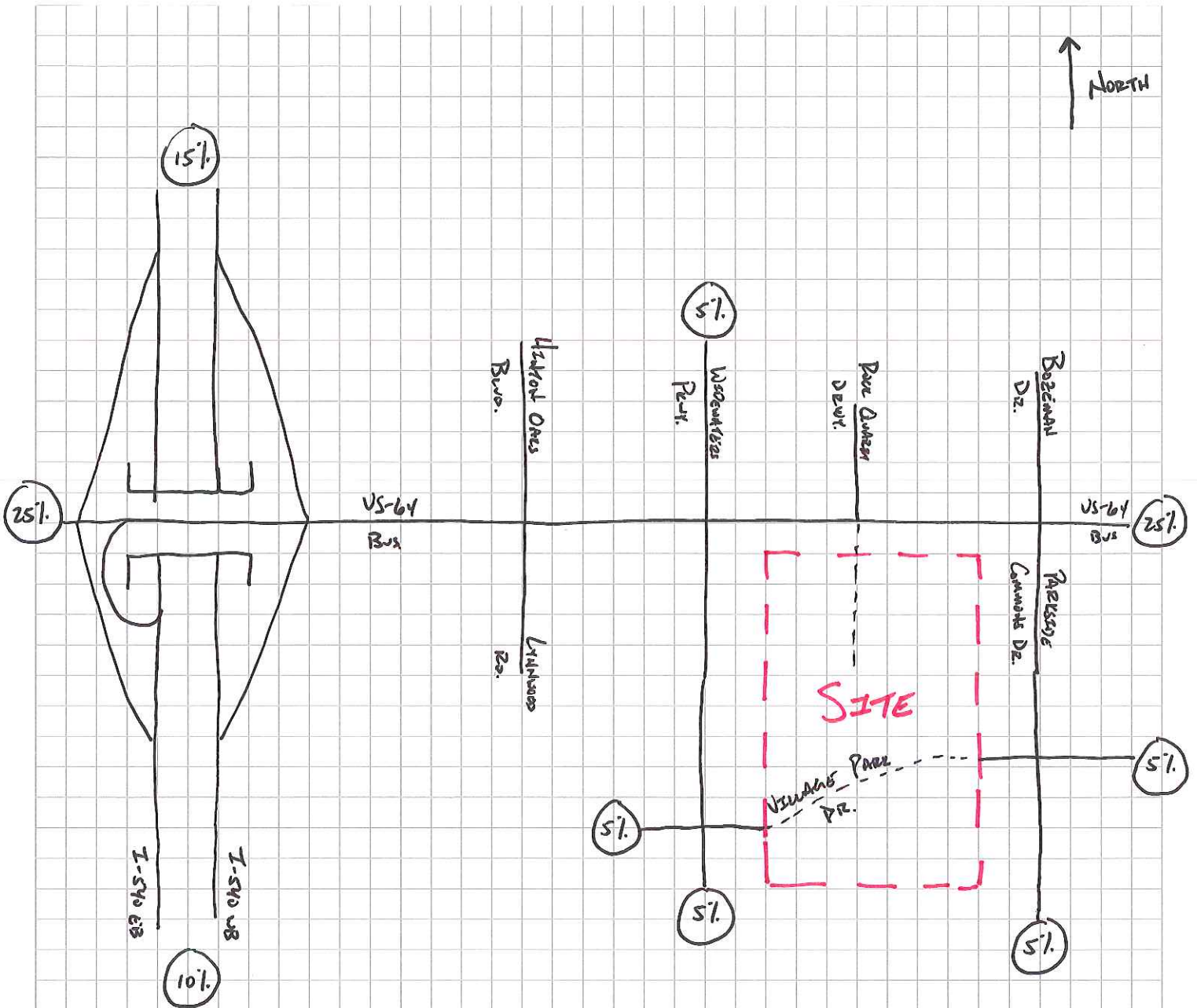
As currently envisioned, the development will consist of approximately 350 apartments, a 130-room hotel, a 12-screen movie theater, approximately 212,550 SF of general retail space, an 8,000 SF automobile parts sales store, a 3,500 SF fast-food restaurant, and a gas station with 12 fueling positions. The development is proposed to be accessed by a full-movement and a right-in right/out driveway on US-64 Business as well as the extension of Village Park Drive. The trip generation potential of the development will be generated using current ITE rates for the proposed land uses and is shown on the attached table.

**Stern Wheel Connection**

If a cross-access connection is made to Stern Wheel Way to the south, it is estimated that the amount of site traffic that would use this connection instead of Widewaters Parkway or Parkside Commons Drive is only approximately 2-3% (or at most 16 AM peak hour trips and 28 PM peak hour trips). The attached figure shows the likely capture area for residences that would use this connection to access the site and/or US 64 Business.

Analyses will be performed assuming this connection is not in place as that will represent the worst case condition at the intersections along Village Park Drive.

It is also doubtful that this connection will result in a reduction in traffic on US 64 Business (Knightdale Boulevard) as the residences in the capture area are likely using either Hinton Oaks/Lynnwood Road or Widewaters Parkway to go to/from the west. To use the new connection, these people could actually end up staying on US 64 Business longer. The same is true for those residents that are currently using Parkside Commons Drive or McKnight Drive to go to/from the east.



**ParkStone**  
**Table 1 - Trip Generation**

Land Use	Intensity		Daily			AM Peak Hour			PM Peak Hour			
			Total	In	Out	Total	In	Out	Total	In	Out	
220 Apartment	350	d.u.	2,246	1,123	1,123	175	35	140	210	137	73	
310 Hotel	130	rooms	1,062	531	531	69	41	28	78	40	38	
445 Multiplex Movie Theater <sup>3</sup>	12	screens	1,640	820	820	-	-	-	164	74	90	
820 Shopping Center	212,550	s.f.	11,086	5,543	5,543	247	153	94	993	477	516	
843 Automobile Parts Sales	8,000	s.f.	498	249	249	18	9	9	48	24	24	
934 Fast-Food Restaurant with Drive-Through Window	3,500	s.f.	1,736	868	868	159	81	78	114	59	55	
945 Gasoline/Service Station with Convenience Market	12	f.p.	1,954	977	977	122	61	61	162	81	81	
<b>Subtotal</b>			<b>20,222</b>	<b>10,111</b>	<b>10,111</b>	<b>790</b>	<b>380</b>	<b>410</b>	<b>1,769</b>	<b>892</b>	<b>877</b>	
<i>Internal Capture</i>												
Apartment			793	387	406	20	3	17	119	78	41	
Hotel			236	108	128	9	2	7	22	13	9	
Multiplex Movie Theater <sup>3</sup>			265	142	123	0	0	0	49	23	26	
Shopping Center			1,156	529	627	24	11	13	153	65	88	
Automobile Parts Sales			52	24	29	2	1	1	7	3	4	
Fast-Food Restaurant with Drive-Through Window			964	552	412	55	40	15	71	30	41	
Gasoline/Service Station with Convenience Market			204	93	110	13	4	8	25	11	14	
<b>Internal Capture Total</b>			<b>25.21%</b>	<b>3,670</b>	<b>1,835</b>	<b>1,835</b>	<b>122</b>	<b>61</b>	<b>61</b>	<b>446</b>	<b>223</b>	<b>223</b>
<b>Total External Trips</b>				<b>16,552</b>	<b>8,276</b>	<b>8,276</b>	<b>668</b>	<b>319</b>	<b>349</b>	<b>1,323</b>	<b>669</b>	<b>654</b>
<i>Pass-By Traffic (ITE)</i>			<u>AM</u>	<u>PM</u>								
820 Shopping Center	0%	34%	2,850	1425	1,425	0	0	0	285	140	145	
934 Fast-Food Restaurant with Drive-Through Window	49%	50%	220	110	110	51	20	31	22	15	7	
945 Gasoline/Service Station with Convenience Market	62%	56%	770	385	385	68	35	33	77	39	38	
Pass-By Total:	<b>21.71%</b>		<b>3,840</b>	<b>1,920</b>	<b>1,920</b>	<b>119</b>	<b>55</b>	<b>64</b>	<b>384</b>	<b>194</b>	<b>190</b>	
<b>Total Net New External Trips</b>				<b>12,712</b>	<b>6,356</b>	<b>6,356</b>	<b>549</b>	<b>264</b>	<b>285</b>	<b>939</b>	<b>475</b>	<b>464</b>

<sup>3</sup> For the Multiplex Movie Theater land use, daily trip generation was not provided in the ITE Trip Generation Manual. Therefore, it was estimated to be 10 times the PM peak hour.

# 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

ParkStone

## SUMMARY

### GROSS TRIP GENERATION

INPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office						
	Retail	6,769	6,769	223	164	582	621
	Restaurant	868	868	81	78	59	55
	Cinema/Entertainment	820	820	0	0	74	90
	Residential	1,123	1,123	35	140	137	73
	Hotel	531	531	41	28	40	38
		10,111	10,111	380	410	892	877

### INTERNAL TRIPS

OUTPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office	0	0	0	0	0	0
	Retail	646	765	16	22	79	106
	Restaurant	552	412	40	15	30	41
	Cinema/Entertainment	142	124	0	0	23	26
	Residential	387	406	3	17	78	41
	Hotel	108	128	2	7	13	9
		1,835	1,835	61	61	223	223
	% Reduction		18.1%		15.4%		25.2%

### EXTERNAL TRIPS

OUTPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office	0	0	0	0	0	0
	Retail	6,123	6,004	207	142	503	515
	Restaurant	316	456	41	63	29	14
	Cinema/Entertainment	678	696	0	0	51	64
	Residential	736	717	32	123	59	32
	Hotel	423	403	39	21	27	29
		8,276	8,276	319	349	669	654

## DAILY

### GROSS TRIP GENERATION

DAILY	Land Use	Daily	
		Enter	Exit
	Office	0	0
Retail	6,769	6,769	
Restaurant	868	868	
Cinema/Entertainment	820	820	
Residential	1,123	1,123	
Hotel	531	531	
	10,111	10,111	

### Estimated Trip Origins within a Mixed-Use Development (Daily) (Average of A.M. Peak Hour and P.M. Peak Hour)

DAILY	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office			24%	34%	0%	2%	0%
Retail	16%			21%	2%	20%	3%
Restaurant	17%	28%			4%	11%	5%
Cinema/Entertainment	1%	11%	16%			4%	1%
Residential	3%	22%	21%	0%			2%
Hotel	38%	15%	39%	0%	1%		

### Estimated Trip Destinations within a Mixed-Use Development (Daily) (Average of A.M. Peak Hour and P.M. Peak Hour)

DAILY	Origin Land Use	Destination Land Use				
		Office	Retail	Restaurant	Cinema/Ent.	Residential
Office		20%	13%	1%	2%	0%
Retail	18%		40%	13%	24%	9%
Restaurant	22%	29%		16%	11%	38%
Cinema/Entertainment	3%	2%	2%		2%	1%
Residential	30%	14%	17%	0%		6%
Hotel	2%	3%	6%	0%	0%	

\*\*\* BASED ON EXIT \*\*\*

DAILY	(Exit) Land Use	(Enter) Land Use				
		Office	Retail	Restaurant	Cinema/Ent.	Residential
Office		0	0	0	0	0
Retail	1,049		1,421	135	1,354	169
Restaurant	148	239		35	95	43
Cinema/Entertainment	8	86	127		33	8
Residential	34	241	230	0		17
Hotel	199	80	204	0	5	

\*\*\* BASED ON ENTER \*\*\*

DAILY	(Exit) Land Use	(Enter) Land Use				
		Office	Retail	Restaurant	Cinema/Ent.	Residential
Office		1,354	109	4	22	0
Retail	0		343	107	270	45
Restaurant	0	1,963		131	118	199
Cinema/Entertainment	0	135	13		22	3
Residential	0	914	148	0		32
Hotel	0	203	48	0	0	

\*\*\* MINIMUM \*\*\*

DAILY	(Exit) Land Use	(Enter) Land Use				
		Office	Retail	Restaurant	Cinema/Ent.	Residential
Office		0	0	0	0	0
Retail	0		343	107	270	45
Restaurant	0	239		35	95	43
Cinema/Entertainment	0	86	13		22	3
Residential	0	241	148	0		17
Hotel	0	80	48	0	0	

### INTERNAL TRIPS

DAILY	Land Use	Daily	
		Enter	Exit
	Office	0	0
Retail	646	765	
Restaurant	552	412	
Cinema/Entertainment	142	124	
Residential	387	406	
Hotel	108	128	
	1,835	1,835	

# 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

ParkStone

## A.M. PEAK HOUR

### GROSS TRIP GENERATION

A.M. PEAK	Land Use	A.M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	223	164	
Restaurant	81	78	
Cinema/Entertainment	0	0	
Residential	35	140	
Hotel	41	28	
	380	410	

Table 6.1 Unconstrained Internal Person Trip Capture Rates for Trip Origins within a Mixed-Use Development (A.M. Peak Hour)

A.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		28%	63%	0%	1%	0%
	Retail	29%		13%	0%	14%	0%
	Restaurant	31%	14%		0%	4%	3%
	Cinema/Entertainment	0%	0%	0%		0%	0%
	Residential	2%	1%	20%	0%		0%
	Hotel	75%	14%	9%	0%	0%	

Table 6.2 Unconstrained Internal Person Trip Capture Rates for Trip Destinations within a Mixed-Use Development (A.M. Peak Hour)

A.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		32%	23%	0%	0%	0%
	Retail	4%		50%	0%	2%	0%
	Restaurant	14%	8%		0%	5%	4%
	Cinema/Entertainment	0%	0%	0%		0%	0%
	Residential	3%	17%	20%	0%		0%
	Hotel	3%	4%	6%	0%	0%	

\*\*\* BASED ON EXIT \*\*\*

A.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	48		21	0	23	0
	Restaurant	24	11		0	3	2
	Cinema/Entertainment	0	0	0		0	0
	Residential	3	1	28	0		0
	Hotel	21	4	3	0	0	

\*\*\* BASED ON ENTER \*\*\*

A.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		71	19	0	0	0
	Retail	0		41	0	1	0
	Restaurant	0	18		0	2	2
	Cinema/Entertainment	0	0	0		0	0
	Residential	0	38	16	0		0
	Hotel	0	9	5	0	0	

\*\*\* MINIMUM \*\*\*

A.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	0		21	0	1	0
	Restaurant	0	11		0	2	2
	Cinema/Entertainment	0	0	0		0	0
	Residential	0	1	16	0		0
	Hotel	0	4	3	0	0	

### INTERNAL TRIPS

A.M. PEAK	Land Use	A. M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	16	22	
Restaurant	40	15	
Cinema/Entertainment	0	0	
Residential	3	17	
Hotel	2	7	
	61	61	

# 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

ParkStone

## P.M. PEAK HOUR

### GROSS TRIP GENERATION

P.M. PEAK	Land Use	P.M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	582	621	
Restaurant	59	55	
Cinema/Entertainment	74	90	
Residential	137	73	
Hotel	40	38	
	892	877	

Table 6.1 Unconstrained Internal Person Trip Capture Rates  
for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)

P.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		20%	4%	0%	2%	0%
	Retail	2%		29%	4%	26%	5%
	Restaurant	3%	41%		8%	18%	7%
	Cinema/Entertainment	2%	21%	31%		8%	2%
	Residential	4%	42%	21%	0%		3%
	Hotel	0%	16%	68%	0%	2%	

Table 6.2 Unconstrained Internal Person Trip Capture Rates  
for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)

P.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		8%	2%	1%	4%	0%
	Retail	31%		29%	26%	46%	17%
	Restaurant	30%	50%		32%	16%	71%
	Cinema/Entertainment	6%	4%	3%		4%	1%
	Residential	57%	10%	14%	0%		12%
	Hotel	0%	2%	5%	0%	0%	

\*\*\* BASED ON EXIT \*\*\*

P.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	12		180	25	161	31
	Restaurant	2	23		4	10	4
	Cinema/Entertainment	2	19	28		7	2
	Residential	3	31	15	0		2
	Hotel	0	6	26	0	1	

\*\*\* BASED ON ENTER \*\*\*

P.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		47	1	1	5	0
	Retail	0		17	19	63	7
	Restaurant	0	291		24	22	28
	Cinema/Entertainment	0	23	2		5	0
	Residential	0	58	8	0		5
	Hotel	0	12	3	0	0	

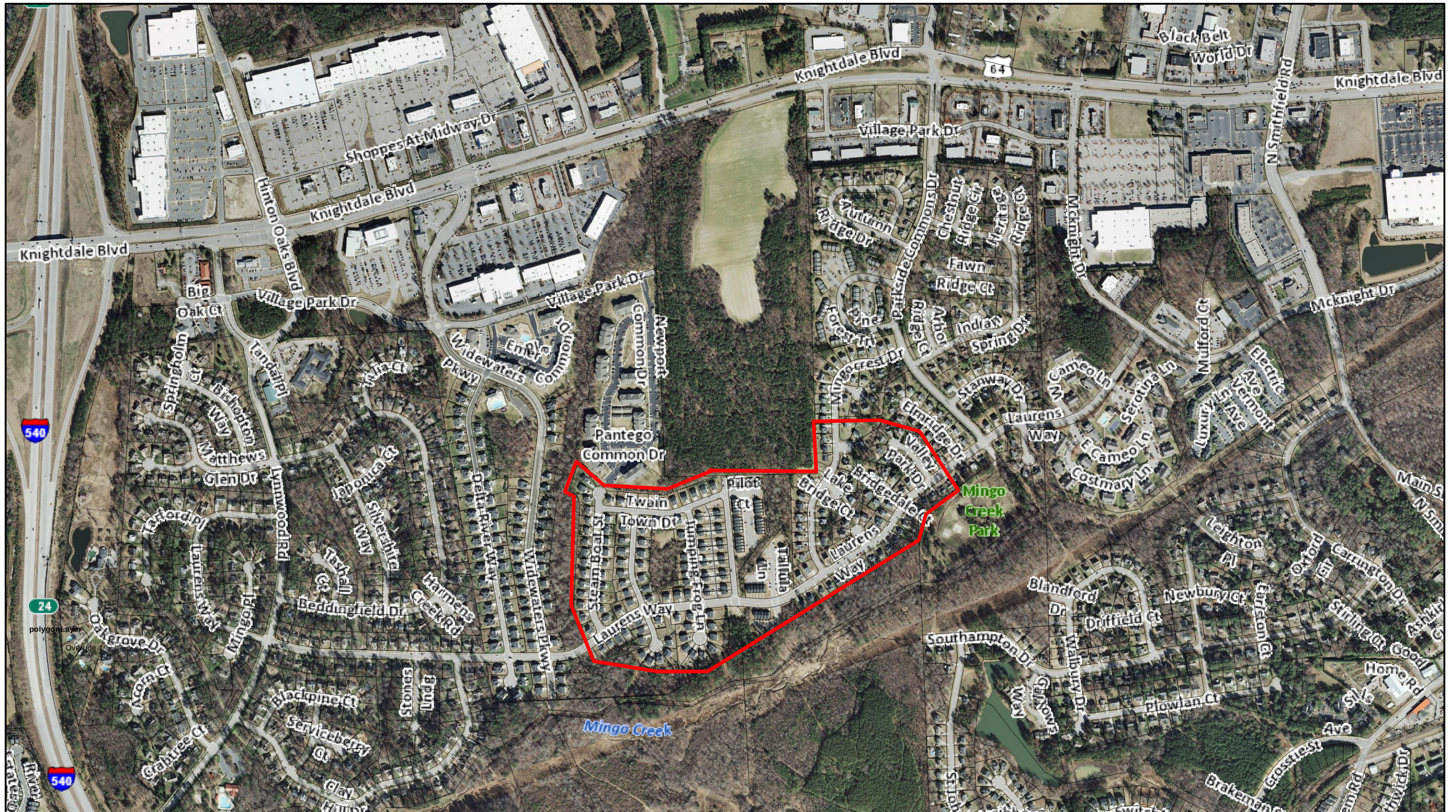
\*\*\* MINIMUM \*\*\*

P.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	0		17	19	63	7
	Restaurant	0	23		4	10	4
	Cinema/Entertainment	0	19	2		5	0
	Residential	0	31	8	0		2
	Hotel	0	6	3	0	0	

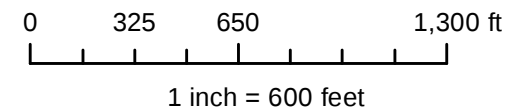
### INTERNAL TRIPS

P.M. PEAK	Land Use	P.M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	79	106	
Restaurant	30	41	
Cinema/Entertainment	23	26	
Residential	78	41	
Hotel	13	9	
	223	223	





# ParkStone - Area Affected by Stern Wheel Connection



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# **Appendix B: Trip Generation**

**ParkStone**  
**Table 1 - Trip Generation**

Land Use	Intensity		Daily			AM Peak Hour			PM Peak Hour			
			Total	In	Out	Total	In	Out	Total	In	Out	
220 Apartment	350	d.u.	2,246	1,123	1,123	175	35	140	210	137	73	
310 Hotel	130	rooms	1,062	531	531	69	41	28	78	40	38	
445 Multiplex Movie Theater <sup>3</sup>	12	screens	1,640	820	820	-	-	-	164	74	90	
820 Shopping Center	212,550	s.f.	11,086	5,543	5,543	247	153	94	993	477	516	
843 Automobile Parts Sales	8,000	s.f.	498	249	249	18	9	9	48	24	24	
934 Fast-Food Restaurant with Drive-Through Window	3,500	s.f.	1,736	868	868	159	81	78	114	59	55	
945 Gasoline/Service Station with Convenience Market	12	f.p.	1,954	977	977	122	61	61	162	81	81	
<b>Subtotal</b>			<b>20,222</b>	<b>10,111</b>	<b>10,111</b>	<b>790</b>	<b>380</b>	<b>410</b>	<b>1,769</b>	<b>892</b>	<b>877</b>	
<i>Internal Capture</i>												
Apartment			793	387	406	20	3	17	119	78	41	
Hotel			236	108	128	9	2	7	22	13	9	
Multiplex Movie Theater <sup>3</sup>			265	142	123	0	0	0	49	23	26	
Shopping Center			1,156	529	627	24	11	13	153	65	88	
Automobile Parts Sales			52	24	29	2	1	1	7	3	4	
Fast-Food Restaurant with Drive-Through Window			964	552	412	55	40	15	71	30	41	
Gasoline/Service Station with Convenience Market			204	93	110	13	4	8	25	11	14	
<b>Internal Capture Total</b>			<b>25.21%</b>	<b>3,670</b>	<b>1,835</b>	<b>1,835</b>	<b>122</b>	<b>61</b>	<b>61</b>	<b>446</b>	<b>223</b>	<b>223</b>
<b>Total External Trips</b>				<b>16,552</b>	<b>8,276</b>	<b>8,276</b>	<b>668</b>	<b>319</b>	<b>349</b>	<b>1,323</b>	<b>669</b>	<b>654</b>
<i>Pass-By Traffic (ITE)</i>												
		<u>AM</u>	<u>PM</u>									
820 Shopping Center		0%	34%	2,850	1425	1,425	0	0	0	285	140	145
934 Fast-Food Restaurant with Drive-Through Window		49%	50%	220	110	110	51	20	31	22	15	7
945 Gasoline/Service Station with Convenience Market		62%	56%	770	385	385	68	35	33	77	39	38
Pass-By Total:			<b>21.71%</b>	<b>3,840</b>	<b>1,920</b>	<b>1,920</b>	<b>119</b>	<b>55</b>	<b>64</b>	<b>384</b>	<b>194</b>	<b>190</b>
<b>Total Net New External Trips</b>				<b>12,712</b>	<b>6,356</b>	<b>6,356</b>	<b>549</b>	<b>264</b>	<b>285</b>	<b>939</b>	<b>475</b>	<b>464</b>

<sup>3</sup> For the Multiplex Movie Theater land use, daily trip generation was not provided in the ITE Trip Generation Manual. Therefore, it was estimated to be 10 times the PM peak hour.

# 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

ParkStone

## SUMMARY

### GROSS TRIP GENERATION

INPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office						
	Retail	6,769	6,769	223	164	582	621
	Restaurant	868	868	81	78	59	55
	Cinema/Entertainment	820	820	0	0	74	90
	Residential	1,123	1,123	35	140	137	73
	Hotel	531	531	41	28	40	38
		10,111	10,111	380	410	892	877

### INTERNAL TRIPS

OUTPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office	0	0	0	0	0	0
	Retail	646	765	16	22	79	106
	Restaurant	552	412	40	15	30	41
	Cinema/Entertainment	142	124	0	0	23	26
	Residential	387	406	3	17	78	41
	Hotel	108	128	2	7	13	9
		1,835	1,835	61	61	223	223
	% Reduction		18.1%		15.4%		25.2%

### EXTERNAL TRIPS

OUTPUT	Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office	0	0	0	0	0	0
	Retail	6,123	6,004	207	142	503	515
	Restaurant	316	456	41	63	29	14
	Cinema/Entertainment	678	696	0	0	51	64
	Residential	736	717	32	123	59	32
	Hotel	423	403	39	21	27	29
		8,276	8,276	319	349	669	654

## DAILY

### GROSS TRIP GENERATION

DAILY	Land Use	Daily	
		Enter	Exit
	Office	0	0
Retail	6,769	6,769	
Restaurant	868	868	
Cinema/Entertainment	820	820	
Residential	1,123	1,123	
Hotel	531	531	
	10,111	10,111	

### Estimated Trip Origins within a Mixed-Use Development (Daily) (Average of A.M. Peak Hour and P.M. Peak Hour)

DAILY	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office			24%	34%	0%	2%	0%
Retail	16%			21%	2%	20%	3%
Restaurant	17%	28%			4%	11%	5%
Cinema/Entertainment	1%	11%	16%			4%	1%
Residential	3%	22%	21%	0%			2%
Hotel	38%	15%	39%	0%	1%		

### Estimated Trip Destinations within a Mixed-Use Development (Daily) (Average of A.M. Peak Hour and P.M. Peak Hour)

DAILY	Origin Land Use	Destination Land Use				
		Office	Retail	Restaurant	Cinema/Ent.	Residential
Office		20%	13%	1%	2%	0%
Retail	18%		40%	13%	24%	9%
Restaurant	22%	29%		16%	11%	38%
Cinema/Entertainment	3%	2%	2%		2%	1%
Residential	30%	14%	17%	0%		6%
Hotel	2%	3%	6%	0%	0%	

\*\*\* BASED ON EXIT \*\*\*

DAILY	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		0	0	0	0	0	
Retail	1,049			1,421	135	1,354	169
Restaurant	148	239			35	95	43
Cinema/Entertainment	8	86	127			33	8
Residential	34	241	230	0			17
Hotel	199	80	204	0	5		

\*\*\* BASED ON ENTER \*\*\*

DAILY	(Exit) Land Use	(Enter) Land Use				
		Office	Retail	Restaurant	Cinema/Ent.	Residential
Office		1,354	109	4	22	0
Retail	0		343	107	270	45
Restaurant	0	1,963		131	118	199
Cinema/Entertainment	0	135	13		22	3
Residential	0	914	148	0		32
Hotel	0	203	48	0	0	

\*\*\* MINIMUM \*\*\*

DAILY	(Exit) Land Use	(Enter) Land Use				
		Office	Retail	Restaurant	Cinema/Ent.	Residential
Office		0	0	0	0	0
Retail	0		343	107	270	45
Restaurant	0	239		35	95	43
Cinema/Entertainment	0	86	13		22	3
Residential	0	241	148	0		17
Hotel	0	80	48	0	0	

### INTERNAL TRIPS

DAILY	Land Use	Daily	
		Enter	Exit
	Office	0	0
Retail	646	765	
Restaurant	552	412	
Cinema/Entertainment	142	124	
Residential	387	406	
Hotel	108	128	
	1,835	1,835	

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

ParkStone

## A.M. PEAK HOUR

### GROSS TRIP GENERATION

A.M. PEAK	Land Use	A.M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	223	164	
Restaurant	81	78	
Cinema/Entertainment	0	0	
Residential	35	140	
Hotel	41	28	
	380	410	

Table 6.1 Unconstrained Internal Person Trip Capture Rates for Trip Origins within a Mixed-Use Development (A.M. Peak Hour)

A.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		28%	63%	0%	1%	0%
	Retail	29%		13%	0%	14%	0%
	Restaurant	31%	14%		0%	4%	3%
	Cinema/Entertainment	0%	0%	0%		0%	0%
	Residential	2%	1%	20%	0%		0%
	Hotel	75%	14%	9%	0%	0%	

Table 6.2 Unconstrained Internal Person Trip Capture Rates for Trip Destinations within a Mixed-Use Development (A.M. Peak Hour)

A.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		32%	23%	0%	0%	0%
	Retail	4%		50%	0%	2%	0%
	Restaurant	14%	8%		0%	5%	4%
	Cinema/Entertainment	0%	0%	0%		0%	0%
	Residential	3%	17%	20%	0%		0%
	Hotel	3%	4%	6%	0%	0%	

\*\*\* BASED ON EXIT \*\*\*

A.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	48		21	0	23	0
	Restaurant	24	11		0	3	2
	Cinema/Entertainment	0	0	0		0	0
	Residential	3	1	28	0		0
	Hotel	21	4	3	0	0	

\*\*\* BASED ON ENTER \*\*\*

A.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		71	19	0	0	0
	Retail	0		41	0	1	0
	Restaurant	0	18		0	2	2
	Cinema/Entertainment	0	0	0		0	0
	Residential	0	38	16	0		0
	Hotel	0	9	5	0	0	

\*\*\* MINIMUM \*\*\*

A.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	0		21	0	1	0
	Restaurant	0	11		0	2	2
	Cinema/Entertainment	0	0	0		0	0
	Residential	0	1	16	0		0
	Hotel	0	4	3	0	0	

### INTERNAL TRIPS

A.M. PEAK	Land Use	A. M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	16	22	
Restaurant	40	15	
Cinema/Entertainment	0	0	
Residential	3	17	
Hotel	2	7	
	61	61	

# 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

ParkStone

## P.M. PEAK HOUR

### GROSS TRIP GENERATION

P.M. PEAK	Land Use	P.M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	582	621	
Restaurant	59	55	
Cinema/Entertainment	74	90	
Residential	137	73	
Hotel	40	38	
	892	877	

Table 6.1 Unconstrained Internal Person Trip Capture Rates  
for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)

P.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		20%	4%	0%	2%	0%
	Retail	2%		29%	4%	26%	5%
	Restaurant	3%	41%		8%	18%	7%
	Cinema/Entertainment	2%	21%	31%		8%	2%
	Residential	4%	42%	21%	0%		3%
	Hotel	0%	16%	68%	0%	2%	

Table 6.2 Unconstrained Internal Person Trip Capture Rates  
for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)

P.M. PEAK	Origin Land Use	Destination Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		8%	2%	1%	4%	0%
	Retail	31%		29%	26%	46%	17%
	Restaurant	30%	50%		32%	16%	71%
	Cinema/Entertainment	6%	4%	3%		4%	1%
	Residential	57%	10%	14%	0%		12%
	Hotel	0%	2%	5%	0%	0%	

\*\*\* BASED ON EXIT \*\*\*

P.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	12		180	25	161	31
	Restaurant	2	23		4	10	4
	Cinema/Entertainment	2	19	28		7	2
	Residential	3	31	15	0		2
	Hotel	0	6	26	0	1	

\*\*\* BASED ON ENTER \*\*\*

P.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		47	1	1	5	0
	Retail	0		17	19	63	7
	Restaurant	0	291		24	22	28
	Cinema/Entertainment	0	23	2		5	0
	Residential	0	58	8	0		5
	Hotel	0	12	3	0	0	

\*\*\* MINIMUM \*\*\*

P.M. PEAK	(Exit) Land Use	(Enter) Land Use					
		Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
	Office		0	0	0	0	0
	Retail	0		17	19	63	7
	Restaurant	0	23		4	10	4
	Cinema/Entertainment	0	19	2		5	0
	Residential	0	31	8	0		2
	Hotel	0	6	3	0	0	

### INTERNAL TRIPS

P.M. PEAK	Land Use	P.M. Peak Hour	
		Enter	Exit
	Office	0	0
Retail	79	106	
Restaurant	30	41	
Cinema/Entertainment	23	26	
Residential	78	41	
Hotel	13	9	
	223	223	

**Appendix C:  
Traffic Count Data**



# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-006

Day: Thursday

City: Knightdale

Date: 3/17/2016

AM

NS/EW Streets:	I-540 EB Ramps			I-540 EB Ramps			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	0	0	0	0	1	0	3	1	1	2	0	
6:00 AM	0	0	23	0	0	20	0	72	7	21	109	0	252
6:15 AM	0	0	31	0	0	29	0	116	15	36	123	0	350
6:30 AM	0	0	36	0	0	48	0	122	14	33	155	0	408
6:45 AM	0	0	35	0	0	58	0	191	12	42	194	0	532
7:00 AM	0	0	73	0	0	71	0	184	17	36	240	0	621
7:15 AM	0	0	74	0	0	77	0	250	23	45	288	0	757
7:30 AM	0	0	84	0	0	86	0	275	24	48	292	0	809
7:45 AM	0	0	99	0	0	94	0	280	23	53	305	0	854
8:00 AM	0	0	76	0	0	79	0	233	22	47	259	0	716
8:15 AM	0	0	82	0	0	64	0	210	15	45	243	0	659
8:30 AM	0	0	87	0	0	67	0	189	13	53	236	0	645
8:45 AM	0	0	96	0	0	60	0	230	10	40	201	0	637
9:00 AM	0	0	69	0	0	51	0	203	8	50	234	0	615
9:15 AM	0	0	90	0	0	61	0	176	6	49	181	0	563
9:30 AM	0	0	73	0	0	58	0	209	8	43	174	0	565
9:45 AM	0	0	62	0	0	40	0	208	12	47	203	0	572

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

TOTAL VOLUMES :	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
APPROACH %'s :	0	0	1090	0	0	963	0	3148	229	688	3437	0	9555
	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%	0.00%	93.22%	6.78%	16.68%	83.32%	0.00%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	3

PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	0	0	333	0	0	336	0	1038	92	193	1144	0	3136
PEAK HR FACTOR :	0.841			0.894			0.932			0.934			0.918

# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-006

Day: Thursday

City: Knightdale

Date: 3/17/2016

PM

NS/EW Streets:	I-540 EB Ramps		I-540 EB Ramps			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL	
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	0	0	0	0	1	0	3	1	1	2	0	
3:00 PM	0	0	106	0	0	82	0	270	9	47	208	0	722
3:15 PM	0	0	136	0	0	85	0	315	18	62	280	0	896
3:30 PM	0	0	129	0	0	70	0	283	26	69	241	0	818
3:45 PM	0	0	164	0	0	87	0	335	20	63	220	0	889
4:00 PM	0	0	136	0	0	83	0	332	21	71	268	0	911
4:15 PM	0	0	218	0	0	111	0	348	21	54	221	0	973
4:30 PM	0	0	228	0	0	88	0	412	17	56	247	0	1048
4:45 PM	0	0	249	0	0	137	0	402	16	46	240	0	1090
5:00 PM	0	0	230	0	0	116	0	420	21	40	273	0	1100
5:15 PM	0	0	240	0	0	139	1	413	19	32	254	0	1098
5:30 PM	0	0	227	0	0	152	0	369	28	34	290	0	1100
5:45 PM	0	0	220	0	0	157	1	374	29	38	265	0	1084
6:00 PM	0	0	174	0	0	130	0	480	34	43	260	0	1121
6:15 PM	0	0	202	0	0	118	0	408	16	75	247	0	1066
6:30 PM	0	0	160	0	0	111	0	319	17	72	260	0	939
6:45 PM	0	0	135	0	0	87	0	279	13	71	247	0	832

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	2
0	0	0	0
0	0	0	4
0	0	0	0
0	0	0	3
0	0	0	3
0	0	0	1
0	0	0	3
0	0	0	2
0	0	1	0
0	0	0	0
0	0	1	1
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	2954	0	0	1753	2	5759	325	873	4021	0	15687
APPROACH %'s :	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%	0.03%	94.63%	5.34%	17.84%	82.16%	0.00%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	2	20

PEAK HR START TIME :	515 PM												TOTAL
PEAK HR VOL :	0	0	861	0	0	578	2	1636	110	147	1069	0	4403
PEAK HR FACTOR :	0.897			0.920			0.850			0.938			0.982



# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-007

Day: Thursday

City: Knightdale

Date: 3/17/2016

AM																	
NS/EW Streets:	I-540 WB Ramps			I-540 WB Ramps			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd							
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND							
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB Uturns	SB Uturns	EB Uturns	WB Uturns
	0.5	0.5	2	0	0	0	2	3	0	0	3	1					
6:00 AM	6	0	17	0	0	0	36	62	0	0	125	64	310	0	0	0	0
6:15 AM	8	0	28	0	0	0	62	82	0	0	144	88	412	0	0	1	0
6:30 AM	5	0	24	0	0	0	52	94	0	0	191	138	504	0	0	0	0
6:45 AM	8	0	42	0	0	0	87	139	0	0	219	135	630	0	0	0	0
7:00 AM	10	0	43	0	0	0	85	174	0	0	280	198	790	0	0	0	0
7:15 AM	10	0	54	0	0	0	117	193	0	0	309	206	889	0	0	0	0
7:30 AM	9	0	49	0	0	0	119	246	0	0	326	181	930	0	0	0	0
7:45 AM	8	1	64	0	0	0	89	273	0	0	341	178	954	0	0	1	0
8:00 AM	7	0	55	0	0	0	93	223	0	0	289	136	803	0	0	0	0
8:15 AM	10	0	60	0	0	0	62	227	0	0	290	127	776	0	0	0	0
8:30 AM	6	0	90	0	0	0	67	206	0	0	269	126	764	0	0	1	0
8:45 AM	8	2	71	0	0	0	68	257	0	0	241	104	751	0	0	0	0
9:00 AM	5	0	56	0	0	0	45	222	0	0	280	103	711	0	0	1	0
9:15 AM	8	0	52	0	0	0	54	220	0	0	215	107	656	0	0	1	0
9:30 AM	5	0	67	0	0	0	36	236	0	0	226	97	667	0	0	0	0
9:45 AM	11	0	57	0	0	0	67	210	0	0	221	98	664	0	0	0	0
TOTAL VOLUMES :	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB Uturns	SB Uturns	EB Uturns	WB Uturns
APPROACH %'s :	124	3	829	0	0	0	1139	3064	0	0	3966	2086	11211	0	0	5	0
	12.97%	0.31%	86.72%	#DIV/0!	#DIV/0!	#DIV/0!	27.10%	72.90%	0.00%	0.00%	65.53%	34.47%					
PEAK HR START TIME :	715 AM												TOTAL				
PEAK HR VOL :	34	1	222	0	0	0	418	935	0	0	1265	701	3576				
PEAK HR FACTOR :	0.880			0.000			0.927			0.947			0.937				

# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-007

Day: Thursday

City: Knightdale

Date: 3/17/2016

PM

NS/EW Streets:	I-540 WB Ramps		I-540 WB Ramps			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL	
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	0.5	0.5	2	0	0	0	2	3	0	0	3	1	
3:00 PM	12	0	101	0	0	0	54	332	0	0	254	103	856
3:15 PM	15	1	96	0	0	0	42	399	0	0	311	95	959
3:30 PM	14	0	119	0	0	0	70	352	0	0	276	138	969
3:45 PM	9	0	88	0	0	0	56	448	0	0	292	110	1003
4:00 PM	17	1	161	0	0	0	55	409	0	0	300	111	1054
4:15 PM	14	0	162	0	0	0	45	517	0	0	271	109	1118
4:30 PM	11	0	149	0	0	0	80	549	0	0	282	119	1190
4:45 PM	22	0	139	0	0	0	60	565	0	0	269	122	1177
5:00 PM	13	0	128	0	0	0	86	514	0	0	296	135	1172
5:15 PM	16	1	132	0	0	0	94	568	0	0	254	115	1180
5:30 PM	15	0	134	0	0	0	62	527	0	0	316	122	1176
5:45 PM	14	0	133	0	0	0	78	538	0	0	273	119	1155
6:00 PM	15	0	106	0	0	0	51	596	0	0	311	102	1181
6:15 PM	13	1	124	0	0	0	97	571	0	0	295	111	1212
6:30 PM	13	1	106	0	0	0	40	429	0	0	326	115	1030
6:45 PM	11	0	88	0	0	0	48	379	0	0	304	100	930

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0
0	0	1	0
0	0	1	0
0	0	0	0
0	0	2	0
0	0	2	0
0	0	1	0
0	0	0	0
0	0	6	0
0	0	2	0
0	0	2	0
0	0	0	0
0	0	1	0
0	0	1	0
0	0	0	0
0	0	0	0

TOTAL VOLUMES :	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
APPROACH %'s :	224	5	1966	0	0	0	1018	7693	0	0	4630	1826	17362
	10.21%	0.23%	89.57%	#DIV/0!	#DIV/0!	#DIV/0!	11.69%	88.31%	0.00%	0.00%	71.72%	28.28%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	19	0

PEAK HR START TIME :	530 PM												TOTAL
PEAK HR VOL :	57	1	497	0	0	0	288	2232	0	0	1195	454	4724
PEAK HR FACTOR :	0.931			0.000			0.943			0.941			0.974



# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-008

Day: Thursday

City: Knightdale

Date: 3/17/2016

AM

NS/EW Streets:	Lynnwood Rd_Hinton Oaks Blvd		Lynnwood Rd_Hinton Oaks Blvd				US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND				EASTBOUND			WESTBOUND		
LANES:	NL 2	NT 1	NR 1	SL 2	ST 0.5	SR 1.5	EL 2	ET 3	ER 1	WL 1	WT 3	WR 1	
6:00 AM	19	1	1	0	0	3	4	72	2	2	164	1	269
6:15 AM	25	0	7	1	0	2	11	91	3	0	215	1	356
6:30 AM	44	1	10	0	0	4	7	110	2	1	264	3	446
6:45 AM	68	0	8	0	0	2	16	146	7	0	319	4	570
7:00 AM	79	2	7	2	0	4	18	176	10	7	390	7	702
7:15 AM	79	0	13	1	1	4	16	203	5	5	424	3	754
7:30 AM	60	1	19	1	0	2	18	276	12	2	483	5	879
7:45 AM	60	1	32	1	0	1	22	280	15	6	416	5	839
8:00 AM	46	2	18	5	0	5	27	230	13	5	405	6	762
8:15 AM	48	1	12	5	1	5	22	241	7	7	346	7	702
8:30 AM	61	1	5	4	1	4	25	235	15	7	346	10	714
8:45 AM	34	3	10	4	0	3	45	257	17	6	302	7	688
9:00 AM	26	3	12	4	1	4	23	222	13	8	327	8	651
9:15 AM	36	3	5	3	1	3	30	233	12	5	293	10	634
9:30 AM	36	3	14	9	5	6	34	240	10	4	263	5	629
9:45 AM	31	4	11	10	2	7	38	218	12	14	287	12	646
TOTAL VOLUMES :	NL 752	NT 26	NR 184	SL 50	ST 12	SR 59	EL 356	ET 3230	ER 155	WL 79	WT 5244	WR 94	TOTAL 10241
APPROACH %'s :	78.17%	2.70%	19.13%	41.32%	9.92%	48.76%	9.52%	86.34%	4.14%	1.46%	96.81%	1.74%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	245	4	82	8	1	12	83	989	45	18	1728	19	3234
PEAK HR FACTOR :	0.890			0.525			0.881			0.901			0.920

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	1
0	0	1	0
0	0	3	0
0	0	6	0
0	0	5	0
0	0	0	0
0	0	1	0
0	0	0	0
0	0	0	2
0	0	0	2
0	0	2	0
0	0	2	1
0	0	7	0
0	0	2	1
0	0	4	1
NB Uturns 0	SB Uturns 0	EB Uturns 35	WB Uturns 9

# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-008

Day: Thursday

City: Knightdale

Date: 3/17/2016

PM

NS/EW Streets:	Lynnwood Rd_Hinton Oaks Blvd		Lynnwood Rd_Hinton Oaks Blvd				US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND				EASTBOUND			WESTBOUND		
LANES:	NL 2	NT 1	NR 1	SL 2	ST 0.5	SR 1.5	EL 2	ET 3	ER 1	WL 1	WT 3	WR 1	
3:00 PM	12	3	7	16	4	17	49	355	10	13	334	10	830
3:15 PM	31	6	14	11	2	16	58	383	19	15	323	10	888
3:30 PM	37	7	8	17	5	15	65	350	24	13	391	14	946
3:45 PM	27	10	12	26	1	14	96	391	13	5	289	9	893
4:00 PM	28	3	7	28	4	29	65	439	25	19	340	16	1003
4:15 PM	32	8	20	23	4	30	91	527	26	10	294	14	1079
4:30 PM	34	8	14	24	3	21	82	507	31	11	317	14	1066
4:45 PM	31	11	15	28	3	23	89	517	39	8	333	15	1112
5:00 PM	49	12	21	29	9	24	116	464	46	10	296	13	1089
5:15 PM	47	3	8	25	6	10	96	513	46	13	332	13	1112
5:30 PM	36	9	9	27	4	23	115	476	48	7	328	17	1099
5:45 PM	30	12	10	23	4	19	96	452	57	13	316	9	1041
6:00 PM	28	6	10	22	2	14	127	518	43	6	355	20	1151
6:15 PM	23	10	13	23	2	15	114	515	43	8	328	15	1109
6:30 PM	31	3	14	18	4	21	92	421	15	5	377	15	1016
6:45 PM	14	5	14	20	3	16	76	331	20	15	333	22	869

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	1	0
0	0	4	5
0	0	9	3
0	0	3	2
0	0	5	2
0	0	2	2
0	0	4	3
0	0	2	0
0	0	5	2
0	0	2	1
0	0	6	2
0	0	4	2
0	0	5	1
0	0	1	2
0	0	2	2
0	0	7	2

TOTAL VOLUMES :	NL 490	NT 116	NR 196	SL 360	ST 60	SR 307	EL 1427	ET 7159	ER 505	WL 171	WT 5286	WR 226	TOTAL 16303
APPROACH %'s :	61.10%	14.46%	24.44%	49.52%	8.25%	42.23%	15.70%	78.75%	5.55%	3.01%	93.01%	3.98%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	62	31

PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	163	35	53	109	22	80	416	1970	179	38	1289	58	4412
PEAK HR FACTOR :	0.765			0.851			0.979			0.967			0.992





# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-009

Day: Thursday

City: Knightdale

Date: 3/17/2016

AM													
NS/EW Streets:	Widewaters Pkwy_Midway Plantation Entrance			Widewaters Pkwy_Midway Plantation Entrance			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	2	0.5	0.5	1	1.5	1.5	2	3	1	2	3	1	
6:00 AM	13	0	5	3	0	10	11	58	8	6	142	6	262
6:15 AM	25	0	7	3	0	10	13	67	12	9	168	5	319
6:30 AM	14	3	9	4	0	13	13	103	6	12	234	3	414
6:45 AM	21	1	12	4	1	15	13	140	9	18	272	3	509
7:00 AM	34	5	21	8	2	14	20	138	17	14	338	9	620
7:15 AM	21	0	16	13	1	26	16	172	17	28	389	5	704
7:30 AM	35	1	17	14	1	21	34	219	18	21	380	13	774
7:45 AM	24	6	19	12	2	28	26	280	25	45	417	5	889
8:00 AM	30	2	21	13	3	25	32	190	26	35	319	13	709
8:15 AM	28	3	15	26	3	25	26	187	23	45	317	22	720
8:30 AM	15	3	13	19	1	37	38	183	30	34	282	21	676
8:45 AM	32	7	17	26	8	25	31	189	28	42	229	19	653
9:00 AM	39	4	16	22	5	38	31	192	24	47	279	33	730
9:15 AM	32	9	18	19	7	33	37	140	42	56	205	35	633
9:30 AM	39	13	18	20	8	30	39	175	44	41	219	29	675
9:45 AM	36	13	16	33	12	33	42	173	28	46	214	38	684
<b>TOTAL VOLUMES :</b>	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
<b>APPROACH %'s :</b>	438	70	240	239	54	383	422	2606	357	499	4404	259	9971
	58.56%	9.36%	32.09%	35.36%	7.99%	56.66%	12.47%	76.99%	10.55%	9.67%	85.32%	5.02%	
<b>PEAK HR START TIME :</b>	730 AM												<b>TOTAL</b>
<b>PEAK HR VOL :</b>	117	12	72	65	9	99	118	876	92	146	1433	53	3092
<b>PEAK HR FACTOR :</b>	0.948			0.801			0.820			0.874			0.870

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	1
0	0	1	2
0	0	0	3
0	0	0	4
0	0	1	1
0	0	0	5
0	0	0	7
0	0	0	11
0	0	0	5
0	0	0	7
0	0	1	7
0	0	2	7
0	0	1	9
0	0	0	8
0	0	0	7
0	0	1	13
<b>NB Uturns</b>	<b>SB Uturns</b>	<b>EB Uturns</b>	<b>WB Uturns</b>
0	0	7	97

# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-009

Day: Thursday

City: Knightdale

Date: 3/17/2016

PM

NS/EW Streets:	Widewaters Pkwy_Midway Plantation Entrance		Widewaters Pkwy_Midway Plantation Entrance			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL	
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 2	NT 0.5	NR 0.5	SL 1	ST 1.5	SR 1.5	EL 2	ET 3	ER 1	WL 2	WT 3	WR 1	
3:00 PM	46	7	20	80	11	38	49	285	43	54	219	29	881
3:15 PM	40	14	27	81	14	25	51	299	58	84	298	38	1029
3:30 PM	56	16	22	83	9	38	38	293	70	65	257	35	982
3:45 PM	48	8	30	62	9	19	43	281	56	51	239	28	874
4:00 PM	41	13	14	64	11	42	51	394	87	58	270	37	1082
4:15 PM	49	20	31	78	21	35	42	387	81	61	192	34	1031
4:30 PM	51	11	25	63	15	25	46	458	78	69	245	34	1120
4:45 PM	64	11	29	95	19	28	51	385	80	51	210	45	1068
5:00 PM	45	11	30	79	21	45	19	405	84	76	234	45	1094
5:15 PM	57	16	23	86	12	40	38	407	106	76	214	44	1119
5:30 PM	70	21	39	86	21	32	32	346	110	73	245	42	1117
5:45 PM	48	14	30	71	18	36	36	409	90	70	232	36	1090
6:00 PM	98	25	35	90	21	32	36	371	115	53	226	38	1140
6:15 PM	76	19	23	85	17	41	86	423	119	67	227	37	1220
6:30 PM	67	21	27	95	23	43	85	324	65	74	227	27	1078
6:45 PM	71	15	22	83	6	48	54	269	66	80	250	61	1025

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	2	3	11
0	0	1	22
0	0	3	13
0	0	2	13
0	0	0	15
0	0	0	23
0	0	4	22
0	0	1	20
0	0	4	10
0	0	5	15
0	0	3	19
0	1	0	9
0	0	0	12
0	0	3	16
0	0	2	23
0	0	2	22

TOTAL VOLUMES :	NL 927	NT 242	NR 427	SL 1281	ST 248	SR 567	EL 757	ET 5736	ER 1308	WL 1062	WT 3785	WR 610	TOTAL 16950
APPROACH %'s :	58.08%	15.16%	26.75%	61.12%	11.83%	27.05%	9.70%	73.53%	16.77%	19.46%	69.36%	11.18%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	3	33	265

PEAK HR START TIME :	530 PM												TOTAL
PEAK HR VOL :	292	79	127	332	77	141	190	1549	434	263	930	153	4567
PEAK HR FACTOR :	0.788			0.962			0.865			0.935			0.936



Project ID: 16-9136-002

Day: Tuesday

City: Knightdale

Date: 3/22/2016

NS/EW Streets:	AM												TOTAL
	Quarry Dwy			Quarry Dwy			US 64 Business_Knightdale Blvd			US 64 Business_Knightdale Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	0	0	0	0	1	0	1	2	0	1	2	0	
6:00 AM	0	0	0	0	0	0	6	51	0	0	156	11	224
6:15 AM	0	0	0	1	0	0	10	79	0	0	182	9	281
6:30 AM	0	0	0	0	0	4	2	116	0	0	248	1	371
6:45 AM	0	0	0	0	0	4	8	162	0	0	341	2	517
7:00 AM	0	0	0	1	0	2	9	159	0	0	401	2	574
7:15 AM	0	0	0	1	0	3	9	205	0	0	436	2	656
7:30 AM	0	0	0	0	0	7	8	214	0	0	455	4	688
7:45 AM	0	0	0	1	0	4	8	284	0	0	383	2	682
8:00 AM	0	0	0	1	0	2	8	231	0	0	416	2	660
8:15 AM	0	0	0	0	0	7	11	212	0	0	386	3	619
8:30 AM	0	0	0	2	0	5	10	202	0	1	316	1	537
8:45 AM	0	0	0	1	0	6	14	226	0	1	343	4	595
9:00 AM	0	0	0	2	0	7	10	208	0	1	319	0	547
9:15 AM	0	0	0	2	0	6	13	194	0	3	327	4	549
9:30 AM	0	0	0	1	0	5	17	225	0	0	269	3	520
9:45 AM	0	0	0	2	0	7	11	231	0	1	266	2	520

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	1	0
0	0	4	0
0	0	1	0
0	0	2	0
0	0	4	0
0	0	3	0
0	0	4	0
0	0	3	0
0	0	3	0
0	0	4	0
0	0	6	1
0	0	7	1
0	0	2	1
0	0	9	3
0	0	13	0
0	0	6	1

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	15	0	69	154	2999	0	7	5244	52	8540
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	17.86%	0.00%	82.14%	4.88%	95.12%	0.00%	0.13%	98.89%	0.98%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	72	7

PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	0	0	0	3	0	16	33	934	0	0	1690	10	2686
PEAK HR FACTOR :	0.000			0.679			0.828			0.926			0.976

Project ID: 16-9136-002

Day: Tuesday

City: Knightdale

Date: 3/22/2016

NOON

NS/EW Streets:	Quarry Dwy			Quarry Dwy			US 64 Business_Knightdale Blvd			US 64 Business_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 0	NR 0	SL 0	ST 1	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
10:00 AM	0	0	0	1	0	6	15	199	0	2	245	3	471
10:15 AM	0	0	0	3	0	7	19	206	0	4	255	0	494
10:30 AM	0	0	0	2	0	6	8	221	0	2	263	4	506
10:45 AM	0	0	0	3	0	6	16	244	0	3	262	1	535
11:00 AM	0	0	0	2	0	7	9	271	0	1	301	3	594
11:15 AM	0	0	0	3	0	6	14	245	0	3	275	0	546
11:30 AM	0	0	0	2	0	5	7	306	0	6	334	6	666
11:45 AM	0	0	0	5	0	9	15	318	0	8	312	2	669
12:00 PM	0	0	0	1	0	8	17	344	0	2	362	3	737
12:15 PM	0	0	0	1	0	4	13	299	0	6	371	2	696
12:30 PM	0	0	0	2	0	7	20	375	0	4	334	3	745
12:45 PM	0	0	0	5	0	8	13	336	0	3	299	1	665
1:00 PM	0	0	0	1	0	4	13	369	0	1	306	3	697
1:15 PM	0	0	0	2	0	9	8	370	0	3	301	3	696
1:30 PM	0	0	0	2	0	3	15	311	0	3	298	2	634
1:45 PM	0	0	0	3	0	7	17	360	0	2	264	3	656
2:00 PM	0	0	0	4	0	3	8	303	0	4	304	3	629
2:15 PM	0	0	0	2	0	2	8	345	0	3	266	4	630
2:30 PM	0	0	0	3	0	9	10	329	0	2	280	5	638
2:45 PM	0	0	0	3	0	4	13	375	0	1	282	2	680

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	6	2
0	0	15	4
0	0	5	2
0	0	11	3
0	0	1	1
0	0	11	3
0	0	4	6
0	0	5	8
0	0	12	2
0	0	8	6
0	0	13	4
0	0	10	3
0	0	4	1
0	0	6	3
0	0	11	3
0	0	12	2
0	0	3	4
0	0	3	3
0	0	7	2
0	0	9	1

TOTAL VOLUMES :	NL 0	NT 0	NR 0	SL 50	ST 0	SR 120	EL 258	ET 6126	ER 0	WL 63	WT 5914	WR 53	TOTAL 12584
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	29.41%	0.00%	70.59%	4.04%	95.96%	0.00%	1.04%	98.08%	0.88%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	156	63

PEAK HR START TIME :	1145 AM												TOTAL
PEAK HR VOL :	0	0	0	9	0	28	65	1336	0	20	1379	10	2847
PEAK HR FACTOR :	0.000			0.661			0.887			0.929			0.955

Project ID: 16-9136-002

Day: Tuesday

City: Knightdale

Date: 3/22/2016

PM

NS/EW Streets:	Quarry Dwy			Quarry Dwy			US 64 Business_Knightdale Blvd			US 64 Business_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 0	NT 0	NR 0	SL 0	ST 1	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	
3:00 PM	0	0	0	1	0	7	15	367	0	1	325	3	719
3:15 PM	0	0	0	2	0	4	8	403	0	1	308	1	727
3:30 PM	0	0	0	2	0	2	8	431	0	4	339	0	786
3:45 PM	0	0	0	1	0	3	4	370	0	3	352	4	737
4:00 PM	0	0	0	3	0	2	10	417	0	3	323	7	765
4:15 PM	0	0	0	5	0	1	6	436	0	5	357	3	813
4:30 PM	0	0	0	1	0	1	8	506	0	5	373	0	894
4:45 PM	0	0	0	2	0	2	9	496	0	3	346	0	858
5:00 PM	0	0	0	4	0	2	5	520	0	5	378	0	914
5:15 PM	0	0	0	10	0	7	10	519	0	4	375	0	925
5:30 PM	0	0	0	3	0	0	6	511	0	3	404	1	928
5:45 PM	0	0	0	0	0	0	11	539	0	1	361	2	914
6:00 PM	0	0	0	0	0	0	5	444	0	4	339	1	793
6:15 PM	0	0	0	0	0	0	5	426	0	0	322	0	753
6:30 PM	0	0	0	0	0	0	10	396	0	6	279	0	691
6:45 PM	0	0	0	0	0	0	9	426	0	3	267	0	705
7:00 PM	0	0	0	0	0	0	11	369	0	4	309	0	693
7:15 PM	0	0	0	0	0	0	8	392	0	2	256	0	658
7:30 PM	0	0	0	0	0	1	6	385	0	3	249	0	644
7:45 PM	0	0	0	0	0	0	4	342	0	0	266	0	612

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	9	1
0	0	6	1
0	0	5	4
0	0	3	3
0	0	6	3
0	0	6	5
0	0	5	5
0	0	10	4
0	0	4	3
0	0	5	5
0	0	10	1
0	0	5	4
0	0	5	0
0	0	10	6
0	0	9	3
0	0	11	3
0	0	8	2
0	0	6	3
0	0	4	0

TOTAL VOLUMES :	NL 0	NT 0	NR 0	SL 34	ST 0	SR 32	EL 158	ET 8695	ER 0	WL 60	WT 6528	WR 22	TOTAL 15529
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	51.52%	0.00%	48.48%	1.78%	98.22%	0.00%	0.91%	98.76%	0.33%	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	134	59

PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	0	0	0	17	0	9	32	2089	0	13	1518	3	3681
PEAK HR FACTOR :	0.000			0.382			0.964			0.940			0.992





# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-010

Day: Thursday

City: Knightdale

Date: 3/17/2016

AM

NS/EW Streets:	Bozeman Dr_Cut Through			Bozeman Dr_Cut Through			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1.5	0.5	0	0	1	1	0	0	0	1	2	1	
6:00 AM	8	0	0	0	0	0	0	0	0	2	177	0	187
6:15 AM	11	0	0	0	0	0	0	0	0	1	192	0	204
6:30 AM	16	0	0	0	0	0	0	0	0	4	246	1	267
6:45 AM	21	0	0	0	0	0	0	0	0	5	313	1	340
7:00 AM	27	0	0	0	0	1	0	0	0	4	369	3	404
7:15 AM	23	1	0	0	0	0	0	0	0	8	398	3	433
7:30 AM	20	4	0	0	0	2	0	0	0	3	473	6	508
7:45 AM	21	8	0	0	0	0	0	0	0	7	448	9	493
8:00 AM	21	3	0	0	2	2	0	0	0	7	405	7	447
8:15 AM	35	2	0	0	1	3	0	0	0	16	364	5	426
8:30 AM	23	4	0	0	1	5	0	0	0	7	326	7	373
8:45 AM	15	11	0	0	3	3	0	0	0	6	324	7	369
9:00 AM	25	3	0	0	4	3	0	0	0	2	337	4	378
9:15 AM	11	5	0	0	8	3	0	0	0	5	318	4	354
9:30 AM	14	5	0	0	1	4	0	0	0	1	270	4	299
9:45 AM	29	7	0	0	3	7	0	0	0	6	286	4	342
<b>TOTAL VOLUMES :</b>	NL 320	NT 53	NR 0	SL 0	ST 23	SR 33	EL 0	ET 0	ER 0	WL 84	WT 5246	WR 65	TOTAL 5824
<b>APPROACH %'s :</b>	85.79%	14.21%	0.00%	0.00%	41.07%	58.93%	#DIV/0!	#DIV/0!	#DIV/0!	1.56%	97.24%	1.20%	
<b>PEAK HR START TIME :</b>	715 AM												<b>TOTAL</b>
<b>PEAK HR VOL :</b>	85	16	0	0	2	4	0	0	0	25	1724	25	1881
<b>PEAK HR FACTOR :</b>	0.871		0.375			0.000			0.920			0.926	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
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NB Uturns 0	SB Uturns 0	EB Uturns 0	WB Uturns 0
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# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-010

Day: Thursday

City: Knightdale

Date: 3/17/2016

PM

NS/EW Streets:	Bozeman Dr_Cut Through			Bozeman Dr_Cut Through			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	1.5	0.5	0	0	1	1	0	0	0	1	2	1	
3:00 PM	38	6	0	0	5	5	0	0	0	11	299	5	369
3:15 PM	36	3	0	0	7	9	0	0	0	8	383	5	451
3:30 PM	29	3	0	0	5	2	0	0	0	15	372	4	430
3:45 PM	40	6	0	0	6	7	0	0	0	10	275	10	354
4:00 PM	35	3	0	0	7	2	0	0	0	9	360	5	421
4:15 PM	37	2	0	0	7	6	0	0	0	12	290	4	358
4:30 PM	27	8	0	0	6	4	0	0	0	11	327	3	386
4:45 PM	35	3	0	0	14	7	0	0	0	5	322	1	387
5:00 PM	27	2	0	0	15	8	0	0	0	12	301	0	365
5:15 PM	26	4	0	0	6	2	0	0	0	7	337	4	386
5:30 PM	32	3	0	0	7	6	0	0	0	13	325	2	388
5:45 PM	23	0	0	0	6	4	0	0	0	12	331	0	376
6:00 PM	28	2	0	0	9	2	0	0	0	10	293	3	347
6:15 PM	31	4	0	0	4	5	0	0	0	6	304	1	355
6:30 PM	34	2	0	0	6	1	0	0	0	10	341	3	397
6:45 PM	22	0	0	0	7	0	0	0	0	10	340	3	382

TOTAL VOLUMES :	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
APPROACH %'s :	500	51	0	0	117	70	0	0	0	161	5200	53	6152
	90.74%	9.26%	0.00%	0.00%	62.57%	37.43%	#DIV/0!	#DIV/0!	#DIV/0!	2.97%	96.05%	0.98%	

PEAK HR START TIME :	315 PM												TOTAL
PEAK HR VOL :	140	15	0	0	25	20	0	0	0	42	1390	24	1656
PEAK HR FACTOR :	0.842			0.703			0.000			0.919			0.918

NB Uturns	SB Uturns	EB Uturns	WB Uturns
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NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0



# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-011

Day: Thursday

City: Knightdale

Date: 3/17/2016

AM

NS/EW Streets:	Parkside Commons Dr_Cut Through			Parkside Commons Dr_Cut Through			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	0	1	1	1.5	0.5	0	1	2	1	0	0	0	
6:00 AM	0	10	1	1	1	0	0	64	0	0	0	0	77
6:15 AM	0	11	0	1	0	0	0	70	2	0	0	0	84
6:30 AM	0	9	4	2	2	0	0	117	1	0	0	0	135
6:45 AM	0	26	5	3	2	0	1	143	2	0	0	0	182
7:00 AM	0	25	4	1	3	0	2	158	5	0	0	0	198
7:15 AM	0	22	3	3	4	0	0	179	4	0	0	0	215
7:30 AM	0	19	6	1	1	0	5	241	7	0	0	0	280
7:45 AM	0	15	7	3	5	0	9	271	6	0	0	0	316
8:00 AM	0	21	5	5	3	0	8	215	6	0	0	0	263
8:15 AM	0	28	8	5	12	0	6	205	13	0	0	0	277
8:30 AM	0	20	4	4	5	0	10	190	11	0	0	0	244
8:45 AM	0	15	5	5	5	0	11	218	15	0	0	0	274
9:00 AM	0	23	3	4	2	0	5	197	9	0	0	0	243
9:15 AM	0	11	5	8	5	0	5	177	10	0	0	0	221
9:30 AM	0	9	2	1	1	0	7	199	5	0	0	0	224
9:45 AM	0	25	3	6	3	0	14	182	9	0	0	0	242

NB Uturns	SB Uturns	EB Uturns	WB Uturns
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TOTAL VOLUMES :	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
APPROACH %'s :	0	289	65	53	54	0	83	2826	105	0	0	0	3475
	0.00%	81.64%	18.36%	49.53%	50.47%	0.00%	2.75%	93.76%	3.48%	#DIV/0!	#DIV/0!	#DIV/0!	

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0

PEAK HR START TIME :	730 AM												TOTAL
PEAK HR VOL :	0	83	26	14	21	0	28	932	32	0	0	0	1136
PEAK HR FACTOR :	0.757			0.515			0.867			0.000			0.899

# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9126-011

Day: Thursday

City: Knightdale

Date: 3/17/2016

PM

NS/EW Streets:	Parkside Commons Dr_Cut Through			Parkside Commons Dr_Cut Through			US 64 Bus_Knightdale Blvd			US 64 Bus_Knightdale Blvd			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	0	1	1	1.5	0.5	0	1	2	1	0	0	0	
3:00 PM	0	33	10	9	8	0	12	342	23	0	0	0	437
3:15 PM	0	28	7	6	6	0	11	386	22	0	0	0	466
3:30 PM	0	25	6	14	8	0	8	368	24	0	0	0	453
3:45 PM	0	22	4	6	6	0	20	380	23	0	0	0	461
4:00 PM	0	30	14	15	6	0	12	389	35	0	0	0	501
4:15 PM	0	23	8	8	8	0	15	454	41	0	0	0	557
4:30 PM	0	20	11	11	10	0	15	444	46	0	0	0	557
4:45 PM	0	30	16	14	4	0	8	474	52	0	0	0	598
5:00 PM	0	18	15	14	9	0	6	468	41	0	0	0	571
5:15 PM	0	24	13	12	5	0	12	480	51	0	0	0	597
5:30 PM	0	28	8	13	6	0	5	454	39	0	0	0	553
5:45 PM	0	19	14	12	7	0	7	445	46	0	0	0	550
6:00 PM	0	23	16	11	6	0	7	487	41	0	0	0	591
6:15 PM	0	24	9	8	4	0	11	466	56	0	0	0	578
6:30 PM	0	30	15	9	5	0	6	461	33	0	0	0	559
6:45 PM	0	16	11	5	12	0	2	383	42	0	0	0	471

NB Uturns	SB Uturns	EB Uturns	WB Uturns
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NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0

TOTAL VOLUMES :	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
APPROACH %'s :	0	393	177	167	110	0	157	6881	615	0	0	0	8500
	0.00%	68.95%	31.05%	60.29%	39.71%	0.00%	2.05%	89.91%	8.04%	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	0	92	55	51	28	0	41	1866	190	0	0	0	2323
PEAK HR FACTOR :	0.799			0.859			0.965			0.000			0.971



# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9136-003

Day: Tuesday

City: Knightdale

Date: 3/22/2016

AM

NS/EW Streets:	Parkside Commons Dr			Parkside Commons Dr			Village Park Dr			Village Park Dr			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	0	1	0	0	1	0	0	1	0	0	1	0	
7:00 AM	0	28	1	1	5	1	0	0	0	1	2	4	43
7:15 AM	0	25	0	3	6	3	3	0	0	1	0	0	41
7:30 AM	0	26	1	2	3	2	0	0	0	0	5	2	41
7:45 AM	0	21	0	6	6	2	0	0	0	2	8	2	47
8:00 AM	0	16	2	1	8	3	3	1	1	0	2	2	39
8:15 AM	0	23	3	4	7	6	6	0	0	6	3	2	60
8:30 AM	1	12	0	3	3	1	3	0	0	0	7	6	36
8:45 AM	2	10	1	5	6	6	6	0	0	1	4	2	43
<b>TOTAL VOLUMES :</b>	3	161	8	25	44	24	21	1	1	11	31	20	350
<b>APPROACH %'s :</b>	1.74%	93.60%	4.65%	26.88%	47.31%	25.81%	91.30%	4.35%	4.35%	17.74%	50.00%	32.26%	
<b>PEAK HR START TIME :</b>	730 AM												<b>TOTAL</b>
<b>PEAK HR VOL :</b>	0	86	6	13	24	13	9	1	1	8	18	8	187
<b>PEAK HR FACTOR :</b>	0.852			0.735			0.458			0.708			0.779

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NB Uturns	SB Uturns	EB Uturns	WB Uturns
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NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0



# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9136-003

Day: Tuesday

City: Knightdale

Date: 3/22/2016

PM

NS/EW Streets:	Parkside Commons Dr			Parkside Commons Dr			Village Park Dr			Village Park Dr			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
4:00 PM	1	8	4	13	13	11	9	10	0	6	4	12	91
4:15 PM	2	14	1	14	19	3	9	8	2	6	7	13	98
4:30 PM	2	7	3	36	14	1	12	10	2	5	3	14	109
4:45 PM	1	3	5	22	22	2	8	8	1	9	6	12	99
5:00 PM	1	14	2	23	17	1	14	10	6	1	10	19	118
5:15 PM	1	6	2	30	26	3	11	10	5	6	4	20	124
5:30 PM	1	20	5	21	17	6	15	6	3	6	2	15	117
5:45 PM	1	5	1	27	17	5	12	14	4	2	7	6	101
<b>TOTAL VOLUMES :</b>	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
<b>APPROACH %'s :</b>	10	77	23	186	145	32	90	76	23	41	43	111	857
	9.09%	70.00%	20.91%	51.24%	39.94%	8.82%	47.62%	40.21%	12.17%	21.03%	22.05%	56.92%	
<b>PEAK HR START TIME :</b>	500 PM												<b>TOTAL</b>
<b>PEAK HR VOL :</b>	4	45	10	101	77	15	52	40	18	15	23	60	460
<b>PEAK HR FACTOR :</b>	0.567			0.818			0.917			0.817			0.927

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0
0	1	0	0
0	0	0	0
0	0	0	0
0	0	0	0
<b>NB Uturns</b>	<b>SB Uturns</b>	<b>EB Uturns</b>	<b>WB Uturns</b>
0	1	0	1



# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9136-001

Day: Tuesday

City: Knightdale

Date: 3/22/2016

AM

NS/EW Streets:	Widewaters Pkwy			Widewaters Pkwy			Village Park Dr			Village Park Dr			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	0	1	0	0	1	0	0	1	0	0	1	0	
7:00 AM	16	18	0	5	3	9	5	2	3	0	14	21	96
7:15 AM	16	16	0	4	5	6	2	3	4	0	21	11	88
7:30 AM	25	22	0	7	2	16	4	7	6	1	17	17	124
7:45 AM	17	16	0	5	6	18	4	8	3	0	8	19	104
8:00 AM	14	12	0	4	10	12	4	3	1	0	8	16	84
8:15 AM	12	13	1	5	11	21	3	3	2	0	10	4	85
8:30 AM	11	15	1	4	7	15	7	6	1	1	3	8	79
8:45 AM	9	12	0	3	7	15	8	6	5	0	5	10	80
<b>TOTAL VOLUMES :</b>	120	124	2	37	51	112	37	38	25	2	86	106	740
<b>APPROACH %'s :</b>	48.78%	50.41%	0.81%	18.50%	25.50%	56.00%	37.00%	38.00%	25.00%	1.03%	44.33%	54.64%	
<b>PEAK HR START TIME :</b>	700 AM												<b>TOTAL</b>
<b>PEAK HR VOL :</b>	74	72	0	21	16	49	15	20	16	1	60	68	412
<b>PEAK HR FACTOR :</b>	0.777			0.741			0.750			0.921			0.831

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0	0	0
0	0	0	0
0	0	0	1
0	0	0	0
1	0	0	0
0	0	0	0
1	0	1	0
0	1	0	0
NB Uturns	SB Uturns	EB Uturns	WB Uturns
2	1	1	1

# Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 16-9136-001

Day: Tuesday

City: Knightdale

Date: 3/22/2016

PM

NS/EW Streets:	Widewaters Pkwy			Widewaters Pkwy			Village Park Dr			Village Park Dr			TOTAL
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	0	1	0	0	1	0	0	1	0	0	1	0	
4:00 PM	2	9	1	8	11	18	15	0	9	1	3	9	86
4:15 PM	5	10	2	8	20	22	10	7	15	0	3	6	108
4:30 PM	5	12	2	9	17	19	23	10	15	0	4	4	120
4:45 PM	9	19	0	14	19	27	28	14	20	0	1	10	161
5:00 PM	6	18	0	18	21	19	28	13	18	0	6	7	154
5:15 PM	4	17	0	14	29	17	24	27	16	1	6	11	166
5:30 PM	7	19	1	16	25	27	19	16	18	1	8	11	168
5:45 PM	7	31	0	17	27	24	23	10	27	0	10	10	186
<b>TOTAL VOLUMES :</b>	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
<b>APPROACH %'s :</b>	45	135	6	104	169	173	170	97	138	3	41	68	1149
	24.19%	72.58%	3.23%	23.32%	37.89%	38.79%	41.98%	23.95%	34.07%	2.68%	36.61%	60.71%	
<b>PEAK HR START TIME :</b>	500 PM												<b>TOTAL</b>
<b>PEAK HR VOL :</b>	24	85	1	65	102	87	94	66	79	2	30	39	674
<b>PEAK HR FACTOR :</b>	0.724			0.934			0.892			0.888			0.906

NB Uturns	SB Uturns	EB Uturns	WB Uturns
0	0		
0	0		
0	0		
1	1		
0	0		
0	0		
0	0		
0	0		
1	1		

NB Uturns	SB Uturns	EB Uturns	WB Uturns
1	1	0	0

# Intersection Turning Movement

Prepared by:  
 PREPARED BY NATIONAL DATA & SURVEYING SERVICES  
**National Data & Surveying Services**

PROJECT#: 16-9136-001  
 N/S Street: Widewaters Pkwy  
 E/W Street: Village Park Dr  
 DATE: 3/22/2016  
 CITY: Knightdale

DAY: Tuesday

A M

## PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	5	0	2	0	0
7:45 AM	0	0	1	1	0	1	0	0
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	3	5	0	0
8:45 AM	0	0	0	1	0	0	0	0
TOTALS	0	0	1	7	3	8	0	0

## BIKES

T I M E	NB			SB			EB			WB		
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0	0	0	0	0

P M

## PEDESTRIANS

T I M E	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG	
	EB	WB	EB	WB	NB	SB	NB	SB
4:00 PM	0	0	0	0	2	0	0	0
4:15 PM	0	0	0	1	0	0	0	0
4:30 PM	0	0	1	0	0	0	0	1
4:45 PM	0	0	0	1	0	1	0	0
5:00 PM	0	0	1	0	1	0	0	0
5:15 PM	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0
TOTALS	0	0	2	2	3	1	0	2

## BIKES

T I M E	NB			SB			EB			WB		
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	1	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	1	0	0	0	0	0	0	0	0	0	0
TOTALS	0	1	0	0	0	0	0	0	1	0	0	0

**Appendix D:**  
**Intersection Spreadsheets**

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/17/2016
N/S Street:	NC 540 EB Ramps
E/W Street:	US 64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

**AM PEAK HOUR  
AM PHF = 0.92**

Description	US 64 Business Eastbound				US 64 Business Westbound				NC 540 EB Ramps Northbound			NC 540 EB Ramps Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	0	0	1038	92	1	192	1144	0	0	0	333	0	0	336
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	0	0	1038	92	1	192	1144	0	0	0	333	0	0	336
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	0	0	130	12	0	24	144	0	0	0	42	0	0	42
2020 Background Traffic	0	0	1168	104	1	216	1288	0	0	0	375	0	0	378
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	66	0	0	0	0	0	0	0	26	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	10%	25%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	29	71	0	0	0	0	0	0	0
Total External Site Traffic	0	0	66	0	0	29	71	0	0	0	26	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	66	0	0	29	71	0	0	0	26	0	0	0
2020 Buildout Total	0	0	1234	104	1	245	1359	0	0	0	401	0	0	378
Percent Impact (Approach)			5.8%				7.5%				7.8%			0.0%
<b>Overall Percent Impact</b>	5.2%													

**PM PEAK HOUR  
PM PHF = 0.98**

Description	US 64 Business Eastbound				US 64 Business Westbound				NC 540 EB Ramps Northbound			NC 540 EB Ramps Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	2	0	1636	110	1	146	1069	0	0	0	861	0	0	578
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	2	0	1636	110	1	146	1069	0	0	0	861	0	0	578
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	0	0	205	14	0	18	134	0	0	0	108	0	0	73
2020 Background Traffic	2	0	1841	124	1	164	1203	0	0	0	969	0	0	651
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	119	0	0	0	0	0	0	0	48	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	10%	25%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	46	116	0	0	0	0	0	0	0
Total External Site Traffic	0	0	119	0	0	46	116	0	0	0	48	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	119	0	0	46	116	0	0	0	48	0	0	0
2020 Buildout Total	2	0	1960	124	1	210	1319	0	0	0	1017	0	0	651
Percent Impact (Approach)			6.8%				13.3%				5.6%			0.0%
<b>Overall Percent Impact</b>	6.2%													



## INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/17/2016
N/S Street:	NC 540 WB Ramps
E/W Street:	US 64 Business

Full Development Net New Trips:	AM In	AM Out	PM In	PM Out
Full Development Pass-By Trips:	264	285	475	464
	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

### AM PEAK HOUR AM PHF = 0.94

Description	US 64 Business Eastbound				US 64 Business Westbound			NC 540 WB Ramps Northbound			NC 540 WB Ramps Southbound		
	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	1	417	935	0	0	1265	701	34	1	222	0	0	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	1	417	935	0	0	1265	701	34	1	222	0	0	0
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	0	52	117	0	0	159	88	4	0	28	0	0	0
2020 Background Traffic	1	469	1052	0	0	1424	789	38	1	250	0	0	0
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	35%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	92	0	0	0	0	0	0	26	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	35%	10%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	100	29	0	0	0	0	0	0
Total External Site Traffic	0	0	92	0	0	100	29	0	0	26	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	92	0	0	100	29	0	0	26	0	0	0
2020 Buildout Total	1	469	1144	0	0	1524	818	38	1	276	0	0	0
Percent Impact (Approach)	6.8%				6.6%			10.1%			-		
<b>Overall Percent Impact</b>	5.8%												

### PM PEAK HOUR PM PHF = 0.97

Description	US 64 Business Eastbound				US 64 Business Westbound			NC 540 WB Ramps Northbound			NC 540 WB Ramps Southbound		
	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	4	284	2232	0	0	1195	454	57	1	497	0	0	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	4	284	2232	0	0	1195	454	57	1	497	0	0	0
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	1	36	280	0	0	150	57	7	0	62	0	0	0
2020 Background Traffic	5	320	2512	0	0	1345	511	64	1	559	0	0	0
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	35%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	166	0	0	0	0	0	0	48	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	35%	10%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	162	46	0	0	0	0	0	0
Total External Site Traffic	0	0	166	0	0	162	46	0	0	48	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	166	0	0	162	46	0	0	48	0	0	0
2020 Buildout Total	5	320	2678	0	0	1507	557	64	1	607	0	0	0
Percent Impact (Approach)	6.6%				12.6%			8.6%			-		
<b>Overall Percent Impact</b>	7.4%												

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/17/2016
N/S Street:	Hinton Oaks Blvd./Lynwood Rd.
E/W Street:	US 64 Business

AM In	AM Out	PM In	PM Out	
264	285	475	464	
Net New Trips:				
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

**AM PEAK HOUR  
AM PHF = 0.92**

Description	US 64 Business Eastbound				US 64 Business Westbound				Lynwood Rd. Northbound			Hinton Oaks Blvd. Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	1	82	989	45	2	16	1728	19	245	4	82	8	1	12
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	1	82	989	45	2	16	1728	19	245	4	82	8	1	12
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	0	10	124	6	0	2	217	2	31	1	10	1	0	2
2020 Background Traffic	1	92	1113	51	2	18	1945	21	276	5	92	9	1	14
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	119	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	128	0	0	0	0	0	0	0
Total External Site Traffic	0	0	119	0	0	0	128	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	0	0	0	0	0	-14	0	0	0	-13	0	0
Diverted Link Assignment	0	0	0	0	0	0	0	14	0	0	0	13	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	119	0	0	0	128	0	0	0	0	0	0	0
2020 Buildout Total	1	92	1232	51	2	18	2073	21	276	5	92	9	1	14
Percent Impact (Approach)			10.7%				7.3%				0.0%			0.0%
<b>Overall Percent Impact</b>			6.4%											

**PM PEAK HOUR  
PM PHF = 0.99**

Description	US 64 Business Eastbound				US 64 Business Westbound				Lynwood Rd. Northbound			Hinton Oaks Blvd. Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	15	401	1970	179	5	33	1289	58	163	35	53	109	22	80
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	15	401	1970	179	5	33	1289	58	163	35	53	109	22	80
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	2	50	247	22	1	4	162	7	20	4	7	14	3	10
2020 Background Traffic	17	451	2217	201	6	37	1451	65	183	39	60	123	25	90
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	214	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	209	0	0	0	0	0	0	0
Total External Site Traffic	0	0	214	0	0	0	209	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	0	0	0	0	0	-23	0	0	0	-24	0	0
Diverted Link Assignment	0	0	0	0	0	0	0	23	0	0	0	24	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	214	0	0	0	209	0	0	0	0	0	0	0
2020 Buildout Total	17	451	2431	201	6	37	1660	65	183	39	60	123	25	90
Percent Impact (Approach)			8.3%				15.1%				0.0%			0.0%
<b>Overall Percent Impact</b>			7.9%											

### INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightsdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/17/2016
N/S Street:	Widewaters Parkway
E/W Street:	US 64 Business

AM In	AM Out	PM In	PM Out
264	285	475	464
Pass-By Trips:	55	64	194
		190	

Annual Growth Rate:	3.0%
Growth Factor:	0.125509

Existing Year:	2016
Buildout Year:	2020

#### AM PEAK HOUR AM PHF = 0.87

Description	US 64 Business Eastbound				US 64 Business Westbound				Widewaters Parkway Northbound			Widewaters Parkway Southbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	0	118	876	92	30	116	1433	53	117	12	72	0	65	9	99
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	0	118	876	92	30	116	1433	53	117	12	72	0	65	9	99
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	0	15	110	12	4	15	180	7	15	2	9	0	8	1	12
2020 Background Traffic	0	133	986	104	34	131	1613	60	132	14	81	0	73	10	111
<b>Project Traffic</b>															
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	119	0	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	119	0	0	0	128	0	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	-13	0	0	0	-14	-14	0	0	0	0	-13	0	0
Diverted Link Assignment	0	0	13	0	0	0	14	14	0	0	0	0	13	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	119	0	0	0	128	0	0	0	0	0	0	0	0
2020 Buildout Total	0	133	1105	104	34	131	1741	60	132	14	81	0	73	10	111
Percent Impact (Approach)	11.0%				7.8%				0.0%			0.0%			
<b>Overall Percent Impact</b>	6.8%														

#### PM PEAK HOUR PM PHF = 0.94

Description	US 64 Business Eastbound				US 64 Business Westbound				Widewaters Parkway Northbound			Widewaters Parkway Southbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	6	184	1549	434	56	207	930	153	292	79	127	1	331	77	141
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	6	184	1549	434	56	207	930	153	292	79	127	1	331	77	141
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	1	23	194	54	7	26	117	19	37	10	16	0	42	10	18
2020 Background Traffic	7	207	1743	488	63	233	1047	172	329	89	143	1	373	87	159
<b>Project Traffic</b>															
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.00%
Inbound Project Traffic	0	0	214	0	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0.00%
Outbound Project Traffic	0	0	0	0	0	0	209	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	214	0	0	0	209	0	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	-24	0	0	0	-23	-23	0	0	0	0	-24	0	0
Diverted Link Assignment	0	0	24	0	0	0	23	23	0	0	0	0	24	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	214	0	0	0	209	0	0	0	0	0	0	0	0
2020 Buildout Total	7	207	1957	488	63	233	1256	172	329	89	143	1	373	87	159
Percent Impact (Approach)	9.8%				15.5%				0.0%			0.0%			
<b>Overall Percent Impact</b>	7.8%														

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/22/2016
N/S Street:	Quarry Drwy./Site Drive
E/W Street:	US 64 Business

AM In	AM Out	PM In	PM Out	
264	285	475	464	
Net New Trips:				
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

**AM PEAK HOUR  
AM PHF = 0.98**

Description	US 64 Business Eastbound				US 64 Business Westbound				Site Drive Northbound			Quarry Drwy. Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	13	20	934	0	0	0	1690	10	0	0	0	3	0	16
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	13	20	934	0	0	0	1690	10	0	0	0	3	0	16
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	2	3	117	0	0	0	212	1	0	0	0	0	0	2
2020 Background Traffic	15	23	1051	0	0	0	1902	11	0	0	0	3	0	18
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	20%	25%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	53	66	0	53	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	0%	0%	45%	0%	10%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	0	0	128	0	29	0	0	0
Total External Site Traffic	0	0	53	66	0	53	0	0	128	0	29	0	0	0
Pass-By Capture Reduction	0	0	-19	0	0	0	-36	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	14	5	0	36	0	0	42	0	6	0	0	0
Total Pass-By Traffic	0	0	-5	5	0	36	-36	0	42	0	6	0	0	0
Diverted Link Reduction	0	0	-26	0	0	0	-28	0	0	0	0	0	0	0
Diverted Link Assignment	0	0	10	16	0	0	0	0	28	0	0	0	0	0
Total Diverted Link Trips	0	0	-16	16	0	0	-28	0	28	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	32	87	0	89	-64	0	198	0	35	0	0	0
2020 Buildout Total	15	23	1083	87	0	89	1838	11	198	0	35	3	0	18
Percent Impact (Approach)			12.3%				1.5%		-					0.0%
Overall Percent Impact				11.1%										

**PM PEAK HOUR  
PM PHF = 0.99**

Description	US 64 Business Eastbound				US 64 Business Westbound				Site Drive Northbound			Quarry Drwy. Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	29	3	2089	0	13	0	1518	3	0	0	0	17	0	9
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	29	3	2089	0	13	0	1518	3	0	0	0	17	0	9
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	4	0	262	0	2	0	191	0	0	0	0	2	0	1
2020 Background Traffic	33	3	2351	0	15	0	1709	3	0	0	0	19	0	10
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	20%	25%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	95	119	0	95	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	0%	0%	45%	0%	10%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	0	0	209	0	46	0	0	0
Total External Site Traffic	0	0	95	119	0	95	0	0	209	0	46	0	0	0
Pass-By Capture Reduction	0	0	-116	0	0	0	-78	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	78	38	0	78	0	0	76	0	38	0	0	0
Total Pass-By Traffic	0	0	-38	38	0	78	-78	0	76	0	38	0	0	0
Diverted Link Reduction	0	0	-48	0	0	0	-46	0	0	0	0	0	0	0
Diverted Link Assignment	0	0	20	28	0	0	0	0	46	0	0	0	0	0
Total Diverted Link Trips	0	0	-28	28	0	0	-46	0	46	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	29	185	0	173	-124	0	331	0	84	0	0	0
2020 Buildout Total	33	3	2380	185	15	173	1585	3	331	0	84	19	0	10
Percent Impact (Approach)			10.1%				3.2%		-					0.0%
Overall Percent Impact				14.1%										

## INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date	3/17/2016
N/S Street:	Bozeman Drive/Cut-Through
E/W Street:	US 64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

### AM PEAK HOUR AM PHF = 0.93

Description	US 64 Business <u>Eastbound</u>			US 64 Business <u>Westbound</u>			Cut-Through <u>Northbound</u>			Bozeman Drive <u>Southbound</u>		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	25	1724	25	85	16	0	0	2	4
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	0	0	25	1724	25	85	16	0	0	2	4
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
<b>2020 Background Growth</b>	0	0	0	3	216	3	11	2	0	0	0	1
<b>2020 Background Traffic</b>	0	0	0	28	1940	28	96	18	0	0	2	5
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	5%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	0	13	53	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	0	13	53	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	0	13	53	0	0	0	0	0	0	0
<b>2020 Buildout Total</b>	0	0	0	41	1993	28	96	18	0	0	2	5
Percent Impact (Approach)		52.0%			3.7%			0.0%			0.0%	
<b>Overall Percent Impact</b>	3.0%											

### PM PEAK HOUR PM PHF = 0.92

Description	US 64 Business <u>Eastbound</u>			US 64 Business <u>Westbound</u>			Cut-Through <u>Northbound</u>			Bozeman Drive <u>Southbound</u>		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	42	1390	24	140	15	0	0	25	20
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	0	0	42	1390	24	140	15	0	0	25	20
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
<b>2020 Background Growth</b>	0	0	0	5	174	3	18	2	0	0	3	3
<b>2020 Background Traffic</b>	0	0	0	47	1564	27	158	17	0	0	28	23
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	5%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	0	24	95	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	0	24	95	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	0	24	95	0	0	0	0	0	0	0
<b>2020 Buildout Total</b>	0	0	0	71	1659	27	158	17	0	0	28	23
Percent Impact (Approach)		57.1%			8.2%			0.0%			0.0%	
<b>Overall Percent Impact</b>	6.0%											

## INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/17/2016
N/S Street:	Parkside Commons Drive/Cut-Through
E/W Street:	US 64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

### AM PEAK HOUR AM PHF = 0.90

Description	US 64 Business <u>Eastbound</u>			US 64 Business <u>Westbound</u>			Parkside Commons Drive <u>Northbound</u>			Cut-Through <u>Southbound</u>		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	28	932	32	0	0	0	0	83	26	14	21	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	28	932	32	0	0	0	0	83	26	14	21	0
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
<b>2020 Background Growth</b>	4	117	4	0	0	0	0	10	3	2	3	0
<b>2020 Background Traffic</b>	32	1049	36	0	0	0	0	93	29	16	24	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Inbound Project Traffic	0	0	0	0	0	0	0	0	0	0	13	0
Percent Assignment Outbound	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	71	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	71	0	0	0	0	0	0	0	0	13	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	71	0	0	0	0	0	0	0	0	13	0
<b>2020 Buildout Total</b>	32	1120	36	0	0	0	0	93	29	16	37	0
Percent Impact (Approach)		7.2%			-			0.0%			37.1%	
<b>Overall Percent Impact</b>	6.2%											

### PM PEAK HOUR PM PHF = 0.97

Description	US 64 Business <u>Eastbound</u>			US 64 Business <u>Westbound</u>			Parkside Commons Drive <u>Northbound</u>			Cut-Through <u>Southbound</u>		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	41	1866	190	0	0	0	0	92	55	51	28	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	41	1866	190	0	0	0	0	92	55	51	28	0
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
<b>2020 Background Growth</b>	5	234	24	0	0	0	0	12	7	6	4	0
<b>2020 Background Traffic</b>	46	2100	214	0	0	0	0	104	62	57	32	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Inbound Project Traffic	0	0	0	0	0	0	0	0	0	0	24	0
Percent Assignment Outbound	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	116	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	116	0	0	0	0	0	0	0	0	24	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	116	0	0	0	0	0	0	0	0	24	0
<b>2020 Buildout Total</b>	46	2216	214	0	0	0	0	104	62	57	56	0
Percent Impact (Approach)		5.5%			-			0.0%			30.4%	
<b>Overall Percent Impact</b>	5.1%											

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/22/2016
N/S Street:	Parkside Commons Drive
E/W Street:	Village Park Drive

AM In	AM Out	PM In	PM Out
264	285	475	464
Net New Trips:			
55	64	194	190
Pass-By Trips:			

Annual Growth Rate:	3.0%
Growth Factor:	0.125509

Existing Year:	2016
Buildout Year:	2020

**AM PEAK HOUR  
AM PHF = 0.78**

Description	Village Park Drive Eastbound			Village Park Drive Westbound			Parkside Commons Drive Northbound			Parkside Commons Drive Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	9	1	1	8	18	8	0	86	6	0	13	24	13
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	9	1	1	8	18	8	0	86	6	0	13	24	13
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	1	0	0	1	2	1	0	11	1	0	2	3	2
2020 Background Traffic	10	1	1	9	20	9	0	97	7	0	15	27	15
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	0%	0%	5%	0%	5%	0%	0%	0%	0%	0%	5%
Inbound Project Traffic	0	0	0	0	13	0	13	0	0	0	0	0	13
Percent Assignment Outbound	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	14	14	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	14	14	0	13	0	13	0	0	0	0	0	13
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	14	14	0	13	0	13	0	0	0	0	0	13
2020 Buildout Total	10	15	15	9	33	9	13	97	7	0	15	27	28
Percent Impact (Approach)		254.5%			38.2%			14.1%			26.0%		
<b>Overall Percent Impact</b>	21.6%												

**PM PEAK HOUR  
PM PHF = 0.93**

Description	Village Park Drive Eastbound			Village Park Drive Westbound			Parkside Commons Drive Northbound			Parkside Commons Drive Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	52	40	18	15	23	60	4	45	10	1	100	77	15
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	52	40	18	15	23	60	4	45	10	1	100	77	15
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	7	5	2	2	3	8	1	6	1	0	13	10	2
2020 Background Traffic	59	45	20	17	26	68	5	51	11	1	113	87	17
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	0%	0%	5%	0%	5%	0%	0%	0%	0%	0%	5%
Inbound Project Traffic	0	0	0	0	24	0	24	0	0	0	0	0	24
Percent Assignment Outbound	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	23	23	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	23	23	0	24	0	24	0	0	0	0	0	24
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	23	23	0	24	0	24	0	0	0	0	0	24
2020 Buildout Total	59	68	43	17	50	68	29	51	11	1	113	87	41
Percent Impact (Approach)		41.8%			24.5%			40.7%			12.4%		
<b>Overall Percent Impact</b>	15.7%												



**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	3/22/2016
N/S Street:	Widewaters Parkway
E/W Street:	Village Park Drive

Net New Trips:	AM In	AM Out	PM In	PM Out
Pass-By Trips:	264	285	475	464
	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

**AM PEAK HOUR  
AM PHF = 0.83**

Description	Village Park Drive Eastbound			U-Turn	Village Park Drive Westbound			Widewaters Parkway Northbound			Widewaters Parkway Southbound		
	Left	Through	Right		Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	15	20	16	1	0	60	68	74	72	0	21	16	49
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	15	20	16	1	0	60	68	74	72	0	21	16	49
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	2	3	2	0	0	8	9	9	9	0	3	2	6
2020 Background Traffic	17	23	18	1	0	68	77	83	81	0	24	18	55
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	5%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Inbound Project Traffic	0	13	0	0	0	0	0	0	0	13	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	14	14	0	0	0	0	0	0	0
Total External Site Traffic	0	13	0	0	14	14	0	0	0	13	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	13	0	0	14	14	0	0	0	13	0	0	0
2020 Buildout Total	17	36	18	1	14	82	77	83	81	13	24	18	55
Percent Impact (Approach)	25.5%			21.7%				8.9%			0.0%		
<b>Overall Percent Impact</b>	10.4%												

**PM PEAK HOUR  
PM PHF = 0.91**

Description	Village Park Drive Eastbound			U-Turn	Village Park Drive Westbound			Widewaters Parkway Northbound			Widewaters Parkway Southbound		
	Left	Through	Right		Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	94	66	79	0	2	30	39	24	85	1	65	102	87
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	94	66	79	0	2	30	39	24	85	1	65	102	87
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
2020 Background Growth	12	8	10	0	0	4	5	3	11	0	8	13	11
2020 Background Traffic	106	74	89	0	2	34	44	27	96	1	73	115	98
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	5%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Inbound Project Traffic	0	24	0	0	0	0	0	0	0	24	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	23	23	0	0	0	0	0	0	0
Total External Site Traffic	0	24	0	0	23	23	0	0	0	24	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	24	0	0	23	23	0	0	0	24	0	0	0
2020 Buildout Total	106	98	89	0	25	57	44	27	96	25	73	115	98
Percent Impact (Approach)	10.0%			64.8%				21.8%			0.0%		
<b>Overall Percent Impact</b>	11.0%												

## INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +1 Analysis
Ct. Date:	Balanced with Quarry Drwy.
N/S Street:	RI/RO Site Drive
E/W Street:	US-64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.125509	Buildout Year:	2020

### AM PEAK HOUR AM PHF = 0.90

Description	US-64 Business Eastbound			US-64 Business Westbound			RI/RO Site Drive Northbound			RI/RO Site Drive Southbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	0	0	0	0	0	0	0	0	0
Count Balancing	0	937	0	0	1700	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	937	0	0	1700	0	0	0	0	0	0	0
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
<b>2020 Background Growth</b>	0	118	0	0	213	0	0	0	0	0	0	0
<b>2020 Background Traffic</b>	0	1055	0	0	1913	0	0	0	0	0	0	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	20%	0%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	53	0	53	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	10%	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%
Outbound Project Traffic	0	29	0	0	0	0	0	0	43	0	0	0
Total External Site Traffic	0	29	53	0	53	0	0	0	43	0	0	0
Pass-By Capture Reduction	0	-19	0	0	-36	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	6	14	0	36	0	0	0	16	0	0	0
Total Pass-By Traffic	0	-13	14	0	0	0	0	0	16	0	0	0
Diverted Link Reduction	0	-26	0	0	-28	0	0	0	0	0	0	0
Diverted Link Assignment	0	0	10	0	28	0	0	0	0	0	0	0
Total Diverted Link Trips	0	-26	10	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	-10	77	0	53	0	0	0	59	0	0	0
<b>2020 Buildout Total</b>	0	1045	77	0	1966	0	0	0	59	0	0	0
Percent Impact (Approach)		7.2%			3.1%				-			

Overall Percent Impact 5.7%

### PM PEAK HOUR PM PHF = 0.90

Description	US-64 Business Eastbound			US-64 Business Westbound			RI/RO Site Drive Northbound			RI/RO Site Drive Southbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	0	0	0	0	0	0	0	0	0
Count Balancing	0	2119	0	0	1534	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	2119	0	0	1534	0	0	0	0	0	0	0
Growth Factor (0.03 per year)	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126	0.126
<b>2020 Background Growth</b>	0	266	0	0	193	0	0	0	0	0	0	0
<b>2020 Background Traffic</b>	0	2385	0	0	1727	0	0	0	0	0	0	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	20%	0%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	95	0	95	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	10%	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%
Outbound Project Traffic	0	46	0	0	0	0	0	0	69	0	0	0
Total External Site Traffic	0	46	95	0	95	0	0	0	69	0	0	0
Pass-By Capture Reduction	0	-116	0	0	-78	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	38	78	0	78	0	0	0	76	0	0	0
Total Pass-By Traffic	0	-78	78	0	0	0	0	0	76	0	0	0
Diverted Link Reduction	0	-48	0	0	-46	0	0	0	0	0	0	0
Diverted Link Assignment	0	0	20	0	46	0	0	0	0	0	0	0
Total Diverted Link Trips	0	-48	20	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	-80	193	0	95	0	0	0	145	0	0	0
<b>2020 Buildout Total</b>	0	2305	193	0	1822	0	0	0	145	0	0	0
Percent Impact (Approach)		5.3%			6.2%				-			

Overall Percent Impact 7.9%

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	3/17/2016
N/S Street:	NC 540 EB Ramps
E/W Street:	US 64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.468534	Buildout Year:	2029

**AM PEAK HOUR  
AM PHF = 0.92**

Description	US 64 Business Eastbound				US 64 Business Westbound				NC 540 EB Ramps Northbound			NC 540 EB Ramps Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	0	0	1038	92	1	192	1144	0	0	0	333	0	0	336
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	0	0	1038	92	1	192	1144	0	0	0	333	0	0	336
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	0	0	486	43	0	90	536	0	0	0	156	0	0	157
2029 Background Traffic	0	0	1524	135	1	282	1680	0	0	0	489	0	0	493
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	66	0	0	0	0	0	0	0	26	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	10%	25%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	29	71	0	0	0	0	0	0	0
Total External Site Traffic	0	0	66	0	0	29	71	0	0	0	26	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	66	0	0	29	71	0	0	0	26	0	0	0
2029 Buildout Total	0	0	1590	135	1	311	1751	0	0	0	515	0	0	493
Percent Impact (Approach)			5.8%				7.5%				7.8%			0.0%
<b>Overall Percent Impact</b>	4.0%													

**PM PEAK HOUR  
PM PHF = 0.98**

Description	US 64 Business Eastbound				US 64 Business Westbound				NC 540 EB Ramps Northbound			NC 540 EB Ramps Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	2	0	1636	110	1	146	1069	0	0	0	861	0	0	578
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	2	0	1636	110	1	146	1069	0	0	0	861	0	0	578
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	1	0	767	52	0	68	501	0	0	0	403	0	0	271
2029 Background Traffic	3	0	2403	162	1	214	1570	0	0	0	1264	0	0	849
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	119	0	0	0	0	0	0	0	48	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	10%	25%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	46	116	0	0	0	0	0	0	0
Total External Site Traffic	0	0	119	0	0	46	116	0	0	0	48	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	119	0	0	46	116	0	0	0	48	0	0	0
2029 Buildout Total	3	0	2522	162	1	260	1686	0	0	0	1312	0	0	849
Percent Impact (Approach)			6.8%				13.3%				5.6%			0.0%
<b>Overall Percent Impact</b>	4.8%													

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	3/17/2016
N/S Street:	NC 540 WB Ramps
E/W Street:	US 64 Business

Full Development Net New Trips:	AM In	AM Out	PM In	PM Out
Full Development Pass-By Trips:	264	285	475	464
	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.468534	Buildout Year:	2029

**AM PEAK HOUR  
AM PHF = 0.94**

Description	US 64 Business Eastbound				US 64 Business Westbound			NC 540 WB Ramps Northbound			NC 540 WB Ramps Southbound		
	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	1	417	935	0	0	1265	701	34	1	222	0	0	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	1	417	935	0	0	1265	701	34	1	222	0	0	0
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	0	195	438	0	0	593	328	16	0	104	0	0	0
2029 Background Traffic	1	612	1373	0	0	1858	1029	50	1	326	0	0	0
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	35%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	92	0	0	0	0	0	0	26	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	35%	10%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	100	29	0	0	0	0	0	0
Total External Site Traffic	0	0	92	0	0	100	29	0	0	26	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	92	0	0	100	29	0	0	26	0	0	0
2029 Buildout Total	1	612	1465	0	0	1958	1058	50	1	352	0	0	0
Percent Impact (Approach)			6.8%			6.6%			10.1%				
<b>Overall Percent Impact</b>			4.5%										

**PM PEAK HOUR  
PM PHF = 0.97**

Description	US 64 Business Eastbound				US 64 Business Westbound			NC 540 WB Ramps Northbound			NC 540 WB Ramps Southbound		
	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	4	284	2232	0	0	1195	454	57	1	497	0	0	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	4	284	2232	0	0	1195	454	57	1	497	0	0	0
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	2	133	1046	0	0	560	213	27	0	233	0	0	0
2029 Background Traffic	6	417	3278	0	0	1755	667	84	1	730	0	0	0
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	35%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
Inbound Project Traffic	0	0	166	0	0	0	0	0	0	48	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	35%	10%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	162	46	0	0	0	0	0	0
Total External Site Traffic	0	0	166	0	0	162	46	0	0	48	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	166	0	0	162	46	0	0	48	0	0	0
2029 Buildout Total	6	417	3444	0	0	1917	713	84	1	778	0	0	0
Percent Impact (Approach)			6.6%			12.6%			8.6%				
<b>Overall Percent Impact</b>			5.7%										

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	3/17/2016
N/S Street:	Hinton Oaks Blvd./Lynwood Rd.
E/W Street:	US 64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.468534	Buildout Year:	2029

**AM PEAK HOUR  
AM PHF = 0.92**

Description	US 64 Business Eastbound				US 64 Business Westbound				Lynwood Rd. Northbound			Hinton Oaks Blvd. Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	1	82	989	45	2	16	1728	19	245	4	82	8	1	12
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	1	82	989	45	2	16	1728	19	245	4	82	8	1	12
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	0	38	463	21	1	7	810	9	115	2	38	4	0	6
2029 Background Traffic	1	120	1452	66	3	23	2538	28	360	6	120	12	1	18
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	119	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	128	0	0	0	0	0	0	0
Total External Site Traffic	0	0	119	0	0	0	128	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	0	0	0	0	0	-14	0	0	0	-13	0	0
Diverted Link Assignment	0	0	0	0	0	0	0	14	0	0	0	13	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	119	0	0	0	128	0	0	0	0	0	0	0
2029 Buildout Total	1	120	1571	66	3	23	2666	28	360	6	120	12	1	18
Percent Impact (Approach)			10.7%				7.3%				0.0%			0.0%
<b>Overall Percent Impact</b>	4.9%													

**PM PEAK HOUR  
PM PHF = 0.99**

Description	US 64 Business Eastbound				US 64 Business Westbound				Lynwood Rd. Northbound			Hinton Oaks Blvd. Southbound		
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	15	401	1970	179	5	33	1289	58	163	35	53	109	22	80
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	15	401	1970	179	5	33	1289	58	163	35	53	109	22	80
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	7	188	923	84	2	15	604	27	76	16	25	51	10	37
2029 Background Traffic	22	589	2893	263	7	48	1893	85	239	51	78	160	32	117
<b>Project Traffic</b>														
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	214	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	209	0	0	0	0	0	0	0
Total External Site Traffic	0	0	214	0	0	0	209	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	0	0	0	0	0	-23	0	0	0	-24	0	0
Diverted Link Assignment	0	0	0	0	0	0	0	23	0	0	0	24	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	214	0	0	0	209	0	0	0	0	0	0	0
2029 Buildout Total	22	589	3107	263	7	48	2102	85	239	51	78	160	32	117
Percent Impact (Approach)			8.3%				15.1%				0.0%			0.0%
<b>Overall Percent Impact</b>	6.1%													

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightsdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	3/17/2016
N/S Street:	Widewaters Parkway
E/W Street:	US 64 Business

AM In	AM Out	PM In	PM Out
264	285	475	464
Pass-By Trips:	55	64	194
		190	

Annual Growth Rate:	3.0%
Growth Factor:	0.468534

Existing Year:	2016
Buildout Year:	2029

**AM PEAK HOUR  
AM PHF = 0.87**

Description	US 64 Business Eastbound				US 64 Business Westbound				Widewaters Parkway Northbound			Widewaters Parkway Southbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	0	118	876	92	30	116	1433	53	117	12	72	0	65	9	99
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	0	118	876	92	30	116	1433	53	117	12	72	0	65	9	99
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	0	55	410	43	14	54	671	25	55	6	34	0	30	4	46
2029 Background Traffic	0	173	1286	135	44	170	2104	78	172	18	106	0	95	13	145
<b>Project Traffic</b>															
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	119	0	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	119	0	0	0	128	0	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	-13	0	0	0	-14	-14	0	0	0	0	-13	0	0
Diverted Link Assignment	0	0	13	0	0	0	14	14	0	0	0	0	13	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	119	0	0	0	128	0	0	0	0	0	0	0	0
2029 Buildout Total	0	173	1405	135	44	170	2232	78	172	18	106	0	95	13	145
Percent Impact (Approach)			11.0%				7.8%				0.0%			0.0%	
<b>Overall Percent Impact</b>	5.3%														

**PM PEAK HOUR  
PM PHF = 0.94**

Description	US 64 Business Eastbound				US 64 Business Westbound				Widewaters Parkway Northbound			Widewaters Parkway Southbound			
	U-Turn	Left	Through	Right	U-Turn	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	6	184	1549	434	56	207	930	153	292	79	127	1	331	77	141
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	6	184	1549	434	56	207	930	153	292	79	127	1	331	77	141
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	3	86	726	203	26	97	436	72	137	37	60	0	155	36	66
2029 Background Traffic	9	270	2275	637	82	304	1366	225	429	116	187	1	486	113	207
<b>Project Traffic</b>															
Percent Assignment Inbound	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.00%
Inbound Project Traffic	0	0	214	0	0	0	0	0	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0.00%
Outbound Project Traffic	0	0	0	0	0	0	209	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	214	0	0	0	209	0	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Link Reduction	0	0	-24	0	0	0	-23	-23	0	0	0	0	-24	0	0
Diverted Link Assignment	0	0	24	0	0	0	23	23	0	0	0	0	24	0	0
Total Diverted Link Trips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	214	0	0	0	209	0	0	0	0	0	0	0	0
2029 Buildout Total	9	270	2489	637	82	304	1575	225	429	116	187	1	486	113	207
Percent Impact (Approach)			9.8%				15.5%				0.0%			0.0%	
<b>Overall Percent Impact</b>	6.1%														



## INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date	3/17/2016
N/S Street:	Bozeman Drive/Cut-Through
E/W Street:	US 64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.468534	Buildout Year:	2029

### AM PEAK HOUR AM PHF = 0.93

Description	US 64 Business Eastbound			US 64 Business Westbound			Cut-Through Northbound			Bozeman Drive Southbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	25	1724	25	85	16	0	0	2	4
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	0	0	25	1724	25	85	16	0	0	2	4
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
<b>2029 Background Growth</b>	0	0	0	12	808	12	40	7	0	0	1	2
<b>2029 Background Traffic</b>	0	0	0	37	2532	37	125	23	0	0	3	6
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	5%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	0	13	53	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	0	13	53	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	0	13	53	0	0	0	0	0	0	0
<b>2029 Buildout Total</b>	0	0	0	50	2585	37	125	23	0	0	3	6
Percent Impact (Approach)		52.0%			3.7%			0.0%			0.0%	
<b>Overall Percent Impact</b>	2.3%											

### PM PEAK HOUR PM PHF = 0.92

Description	US 64 Business Eastbound			US 64 Business Westbound			Cut-Through Northbound			Bozeman Drive Southbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	42	1390	24	140	15	0	0	25	20
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	0	0	42	1390	24	140	15	0	0	25	20
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
<b>2029 Background Growth</b>	0	0	0	20	651	11	66	7	0	0	12	9
<b>2029 Background Traffic</b>	0	0	0	62	2041	35	206	22	0	0	37	29
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	5%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	0	24	95	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	0	0	24	95	0	0	0	0	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	0	0	24	95	0	0	0	0	0	0	0
<b>2029 Buildout Total</b>	0	0	0	86	2136	35	206	22	0	0	37	29
Percent Impact (Approach)		57.1%			8.2%			0.0%			0.0%	
<b>Overall Percent Impact</b>	4.7%											



## INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	3/17/2016
N/S Street:	Parkside Commons Drive/Cut-Through
E/W Street:	US 64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.468534	Buildout Year:	2029

### AM PEAK HOUR AM PHF = 0.90

Description	US 64 Business <u>Eastbound</u>			US 64 Business <u>Westbound</u>			Parkside Commons Drive <u>Northbound</u>			Cut-Through <u>Southbound</u>		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	28	932	32	0	0	0	0	83	26	14	21	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	28	932	32	0	0	0	0	83	26	14	21	0
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
<b>2029 Background Growth</b>	13	437	15	0	0	0	0	39	12	7	10	0
<b>2029 Background Traffic</b>	41	1369	47	0	0	0	0	122	38	21	31	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Inbound Project Traffic	0	0	0	0	0	0	0	0	0	0	13	0
Percent Assignment Outbound	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	71	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	71	0	0	0	0	0	0	0	0	13	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	71	0	0	0	0	0	0	0	0	13	0
<b>2029 Buildout Total</b>	41	1440	47	0	0	0	0	122	38	21	44	0
Percent Impact (Approach)		7.2%			-			0.0%			37.1%	
<b>Overall Percent Impact</b>	4.8%											

### PM PEAK HOUR PM PHF = 0.97

Description	US 64 Business <u>Eastbound</u>			US 64 Business <u>Westbound</u>			Parkside Commons Drive <u>Northbound</u>			Cut-Through <u>Southbound</u>		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	41	1866	190	0	0	0	0	92	55	51	28	0
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	41	1866	190	0	0	0	0	92	55	51	28	0
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
<b>2029 Background Growth</b>	19	874	89	0	0	0	0	43	26	24	13	0
<b>2029 Background Traffic</b>	60	2740	279	0	0	0	0	135	81	75	41	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Inbound Project Traffic	0	0	0	0	0	0	0	0	0	0	24	0
Percent Assignment Outbound	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	116	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	116	0	0	0	0	0	0	0	0	24	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	116	0	0	0	0	0	0	0	0	24	0
<b>2029 Buildout Total</b>	60	2856	279	0	0	0	0	135	81	75	65	0
Percent Impact (Approach)		5.5%			-			0.0%			30.4%	
<b>Overall Percent Impact</b>	3.9%											

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	3/22/2016
N/S Street:	Parkside Commons Drive
E/W Street:	Village Park Drive

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%
Growth Factor:	0.468534

Existing Year:	2016
Buildout Year:	2029

**AM PEAK HOUR  
AM PHF = 0.78**

Description	Village Park Drive Eastbound			Village Park Drive Westbound			Parkside Commons Drive Northbound			Parkside Commons Drive Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	9	1	1	8	18	8	0	86	6	0	13	24	13
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	9	1	1	8	18	8	0	86	6	0	13	24	13
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	4	0	0	4	8	4	0	40	3	0	6	11	6
2029 Background Traffic	13	1	1	12	26	12	0	126	9	0	19	35	19
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	0%	0%	5%	0%	5%	0%	0%	0%	0%	0%	5%
Inbound Project Traffic	0	0	0	0	13	0	13	0	0	0	0	0	13
Percent Assignment Outbound	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	14	14	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	14	14	0	13	0	13	0	0	0	0	0	13
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	14	14	0	13	0	13	0	0	0	0	0	13
2029 Buildout Total	13	15	15	12	39	12	13	126	9	0	19	35	32
Percent Impact (Approach)	254.5%			38.2%			14.1%			26.0%			
<b>Overall Percent Impact</b>	17.5%												

**PM PEAK HOUR  
PM PHF = 0.93**

Description	Village Park Drive Eastbound			Village Park Drive Westbound			Parkside Commons Drive Northbound			Parkside Commons Drive Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	U-Turn	Left	Through	Right
2016 Traffic Count	52	40	18	15	23	60	4	45	10	1	100	77	15
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	52	40	18	15	23	60	4	45	10	1	100	77	15
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	24	19	8	7	11	28	2	21	5	0	47	36	7
2029 Background Traffic	76	59	26	22	34	88	6	66	15	1	147	113	22
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	0%	0%	0%	5%	0%	5%	0%	0%	0%	0%	0%	5%
Inbound Project Traffic	0	0	0	0	24	0	24	0	0	0	0	0	24
Percent Assignment Outbound	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	23	23	0	0	0	0	0	0	0	0	0	0
Total External Site Traffic	0	23	23	0	24	0	24	0	0	0	0	0	24
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	23	23	0	24	0	24	0	0	0	0	0	24
2029 Buildout Total	76	82	49	22	58	88	30	66	15	1	147	113	46
Percent Impact (Approach)	41.8%			24.5%			40.7%			12.4%			
<b>Overall Percent Impact</b>	12.6%												

**INTERSECTION ANALYSIS SHEET**

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	3/22/2016
N/S Street:	Widewaters Parkway
E/W Street:	Village Park Drive

AM In	AM Out	PM In	PM Out	
264	285	475	464	
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.468534	Buildout Year:	2029

**AM PEAK HOUR  
AM PHF = 0.83**

Description	Village Park Drive Eastbound			U-Turn	Village Park Drive Westbound			Widewaters Parkway Northbound			Widewaters Parkway Southbound		
	Left	Through	Right		Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	15	20	16	1	0	60	68	74	72	0	21	16	49
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	15	20	16	1	0	60	68	74	72	0	21	16	49
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	7	9	7	0	0	28	32	35	34	0	10	7	23
2029 Background Traffic	22	29	23	1	0	88	100	109	106	0	31	23	72
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	5%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Inbound Project Traffic	0	13	0	0	0	0	0	0	0	13	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	14	14	0	0	0	0	0	0	0
Total External Site Traffic	0	13	0	0	14	14	0	0	0	13	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	13	0	0	14	14	0	0	0	13	0	0	0
2029 Buildout Total	22	42	23	1	14	102	100	109	106	13	31	23	72
Percent Impact (Approach)	25.5%			21.7%				8.9%			0.0%		
<b>Overall Percent Impact</b>	8.2%												

**PM PEAK HOUR  
PM PHF = 0.91**

Description	Village Park Drive Eastbound			U-Turn	Village Park Drive Westbound			Widewaters Parkway Northbound			Widewaters Parkway Southbound		
	Left	Through	Right		Left	Through	Right	Left	Through	Right	Left	Through	Right
2016 Traffic Count	94	66	79	0	2	30	39	24	85	1	65	102	87
Count Balancing	0	0	0	0	0	0	0	0	0	0	0	0	0
2016 Existing Traffic	94	66	79	0	2	30	39	24	85	1	65	102	87
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
2029 Background Growth	44	31	37	0	1	14	18	11	40	0	30	48	41
2029 Background Traffic	138	97	116	0	3	44	57	35	125	1	95	150	128
<b>Project Traffic</b>													
Percent Assignment Inbound	0%	5%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Inbound Project Traffic	0	24	0	0	0	0	0	0	0	24	0	0	0
Percent Assignment Outbound	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%	0%	0%	0%
Outbound Project Traffic	0	0	0	0	23	23	0	0	0	0	0	0	0
Total External Site Traffic	0	24	0	0	23	23	0	0	0	24	0	0	0
Pass-By Capture Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Pass-By Traffic	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	24	0	0	23	23	0	0	0	24	0	0	0
2029 Buildout Total	138	121	116	0	26	67	57	35	125	25	95	150	128
Percent Impact (Approach)	10.0%			64.8%				21.8%			0.0%		
<b>Overall Percent Impact</b>	8.7%												

## INTERSECTION ANALYSIS SHEET

Project:	ParkStone
Location:	Knightdale, NC
Scenario:	Build +10 Analysis
Ct. Date:	Balanced with Quarry Drwy.
N/S Street:	RI/RO Site Drive
E/W Street:	US-64 Business

	AM In	AM Out	PM In	PM Out
Net New Trips:	264	285	475	464
Pass-By Trips:	55	64	194	190

Annual Growth Rate:	3.0%	Existing Year:	2016
Growth Factor:	0.468534	Buildout Year:	2029

### AM PEAK HOUR AM PHF = 0.90

Description	US-64 Business Eastbound			US-64 Business Westbound			RI/RO Site Drive Northbound			RI/RO Site Drive Southbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	0	0	0	0	0	0	0	0	0
Count Balancing	0	937	0	0	1700	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	937	0	0	1700	0	0	0	0	0	0	0
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
<b>2029 Background Growth</b>	0	439	0	0	797	0	0	0	0	0	0	0
<b>2029 Background Traffic</b>	0	1376	0	0	2497	0	0	0	0	0	0	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	20%	0%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	53	0	53	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	10%	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%
Outbound Project Traffic	0	29	0	0	0	0	0	0	43	0	0	0
Total External Site Traffic	0	29	53	0	53	0	0	0	43	0	0	0
Pass-By Capture Reduction	0	-19	0	0	-36	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	6	14	0	36	0	0	0	16	0	0	0
Total Pass-By Traffic	0	-13	14	0	0	0	0	0	16	0	0	0
Diverted Link Reduction	0	-26	0	0	-28	0	0	0	0	0	0	0
Diverted Link Assignment	0	0	10	0	28	0	0	0	0	0	0	0
Total Diverted Link Trips	0	-26	10	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	-10	77	0	53	0	0	0	59	0	0	0
<b>2029 Buildout Total</b>	0	1366	77	0	2550	0	0	0	59	0	0	0
Percent Impact (Approach)		7.2%			3.1%				-			

Overall Percent Impact 4.4%

### PM PEAK HOUR PM PHF = 0.90

Description	US-64 Business Eastbound			US-64 Business Westbound			RI/RO Site Drive Northbound			RI/RO Site Drive Southbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
<b>2016 Traffic Count</b>	0	0	0	0	0	0	0	0	0	0	0	0
Count Balancing	0	2119	0	0	1534	0	0	0	0	0	0	0
<b>2016 Existing Traffic</b>	0	2119	0	0	1534	0	0	0	0	0	0	0
Growth Factor (0.03 per year)	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469	0.469
<b>2029 Background Growth</b>	0	993	0	0	719	0	0	0	0	0	0	0
<b>2029 Background Traffic</b>	0	3112	0	0	2253	0	0	0	0	0	0	0
<b>Project Traffic</b>												
Percent Assignment Inbound	0%	0%	20%	0%	20%	0%	0%	0%	0%	0%	0%	0%
Inbound Project Traffic	0	0	95	0	95	0	0	0	0	0	0	0
Percent Assignment Outbound	0%	10%	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%
Outbound Project Traffic	0	46	0	0	0	0	0	0	69	0	0	0
Total External Site Traffic	0	46	95	0	95	0	0	0	69	0	0	0
Pass-By Capture Reduction	0	-116	0	0	-78	0	0	0	0	0	0	0
Pass-By Capture Assignment	0	38	78	0	78	0	0	0	76	0	0	0
Total Pass-By Traffic	0	-78	78	0	0	0	0	0	76	0	0	0
Diverted Link Reduction	0	-48	0	0	-46	0	0	0	0	0	0	0
Diverted Link Assignment	0	0	20	0	46	0	0	0	0	0	0	0
Total Diverted Link Trips	0	-48	20	0	0	0	0	0	0	0	0	0
<b>Total Project Traffic</b>	0	-80	193	0	95	0	0	0	145	0	0	0
<b>2029 Buildout Total</b>	0	3032	193	0	2348	0	0	0	145	0	0	0
Percent Impact (Approach)		5.3%			6.2%				-			

Overall Percent Impact 6.2%

**Appendix E:**  
**Synchro, SimTraffic, & HCS Output:**  
**Existing (2016)**



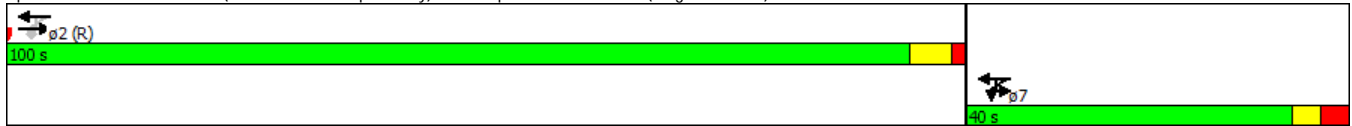
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1038	92	4	192	0	0	0
Future Volume (vph)	1038	92	4	192	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.239			
Satd. Flow (perm)	5060	1543	0	447	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		100					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)		1		1			
Confl. Bikes (#/hr)							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1128	100	0	213	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	121.9	121.9		130.0			
Actuated g/C Ratio	0.87	0.87		0.93			
v/c Ratio	0.26	0.07		0.43			
Control Delay	1.7	0.3		4.7			
Queue Delay	0.0	0.0		0.0			
Total Delay	1.7	0.3		4.7			
LOS	A	A		A			
Approach Delay	1.5						
Approach LOS	A						
Queue Length 50th (ft)	44	0		3			
Queue Length 95th (ft)	52	6		42			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4405	1356		763			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.26	0.07		0.28			

**Intersection Summary**

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 25 (18%), Referenced to phase 2:EBWB and 6.; Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.43

Intersection Signal Delay: 2.0	Intersection LOS: A
Intersection Capacity Utilization 47.4%	ICU Level of Service A
Analysis Period (min) 15	
Description: 05-2153	

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↕↕↕			↕↕↕	↕		↕	↕↕			
Traffic Volume (vph)	4	417	935	0	0	1265	701	34	4	222	0	0	0
Future Volume (vph)	4	417	935	0	0	1265	701	34	4	222	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	4963	1545	0	1714	2680	0	0	0
Flt Permitted		0.950							0.957				
Satd. Flow (perm)	0	3450	5111	0	0	4963	1545	0	1714	2680	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							643			236			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)				1	1								
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	448	995	0	0	1346	746	0	40	236	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	120.8			90.8	90.8		9.2	9.2			
Actuated g/C Ratio		0.18	0.86			0.65	0.65		0.07	0.07			
v/c Ratio		0.73	0.23			0.42	0.61		0.36	0.59			
Control Delay		61.1	1.8			3.5	3.9		71.1	13.8			
Queue Delay		0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay		61.1	1.8			3.5	3.9		71.1	13.8			
LOS		E	A			A	A		E	B			
Approach Delay			20.2			3.6			22.1				
Approach LOS			C			A			C				
Queue Length 50th (ft)		183	39			75	26		36	0			
Queue Length 95th (ft)		232	57			28	104		75	46			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	4408			3217	1228		428	847			
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		0.73	0.23			0.42	0.61		0.09	0.28			

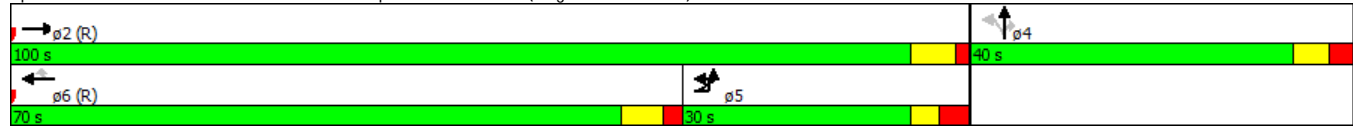
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 70 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73



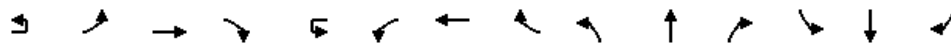
Intersection Signal Delay: 11.3	Intersection LOS: B
Intersection Capacity Utilization 73.7%	ICU Level of Service D
Analysis Period (min) 15	
Description: 05-2152	

Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business



3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)

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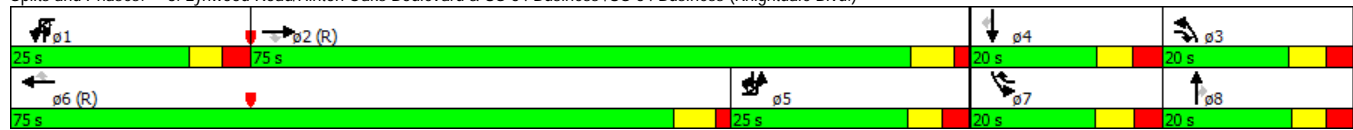


Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	4	82	989	45	4	16	1728	19	245	4	82	8	4	12
Future Volume (vph)	4	82	989	45	4	16	1728	19	245	4	82	8	4	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3417	5061	1576	0	1761	5060	1575	3382	1835	1560	2943	1391	1289
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3416	5061	1576	0	1761	5060	1556	3382	1835	1560	2943	1391	1289
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				82				81			130			126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)		1						1						
Confl. Bikes (#/hr)														
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	19%	19%	19%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														37%
Lane Group Flow (vph)	0	93	1075	49	0	21	1878	21	266	4	89	9	9	8
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	97.5	117.7		8.5	86.0	98.3	16.2	10.9	13.6	12.3		8.9	22.8
Actuated g/C Ratio	0.14	0.70	0.84		0.06	0.61	0.70	0.12	0.08	0.10	0.09		0.06	0.16
v/c Ratio	0.19	0.31	0.04		0.20	0.60	0.02	0.68	0.03	0.33	0.03		0.10	0.03
Control Delay	52.8	7.7	0.4		91.8	4.8	0.0	68.1	56.5	5.1	58.4		46.5	0.1
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	52.8	7.7	0.4		91.8	4.8	0.0	68.1	56.5	5.1	58.4		46.5	0.1
LOS		D	A	A		F	A	A	E	E	A	E	D	A
Approach Delay			10.8				5.7			52.4			36.3	
Approach LOS			B				A			D			D	
Queue Length 50th (ft)		38	94	0		20	81	0	121	4	0	3	4	0
Queue Length 95th (ft)		67	228	0		m33	112	m0	164	15	15	13	24	0
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		488	3523	1345		251	3107	1155	409	210	386	333	153	315
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.19	0.31	0.04		0.08	0.60	0.02	0.65	0.02	0.23	0.03	0.06	0.03

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.68

Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 62.1%	ICU Level of Service B
Analysis Period (min) 15	
Description: 05-2152	
m Volume for 95th percentile queue is metered by upstream signal.	
! Phase conflict between lane groups.	

Splits and Phases: 3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)



4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)

8/17/2016



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	118	876	92	30	116	1433	53	117	12	72	65	9	99
Future Volume (vph)	118	876	92	30	116	1433	53	117	12	72	65	9	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			-2%			0%			
Storage Length (ft)	350		200		300		175	275		650	150		150
Storage Lanes	2		1		2		1	1		1	1		1
Taper Length (ft)	300				300			100			100		
Satd. Flow (prot)	3400	5036	1568	0	3433	5085	1583	3467	1641	0	3433	1547	1504
Flt Permitted	0.950				0.950			0.950			0.950		
Satd. Flow (perm)	3399	5036	1568	0	3433	5085	1563	3467	1641	0	3433	1547	1504
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)			106				87		83			52	141
Link Speed (mph)		45				45			35			35	
Link Distance (ft)		1286				1388			1043			593	
Travel Time (s)		19.5				21.0			20.3			11.6	
Confl. Peds. (#/hr)	1						1						
Confl. Bikes (#/hr)													
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													46%
Lane Group Flow (vph)	118	1007	106	0	167	1647	61	134	97	0	75	62	62
Turn Type	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	1	6	7	3	8		7	4	5
Permitted Phases			2			6							4
Detector Phase	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase													
Minimum Initial (s)	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)	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	15.0	23.0
Total Split (s)	30.0	65.0	25.0	25.0	25.0	60.0	25.0	25.0	25.0		25.0	25.0	30.0
Total Split (%)	21.4%	46.4%	17.9%	17.9%	17.9%	42.9%	17.9%	17.9%	17.9%		17.9%	17.9%	21.4%
Yellow Time (s)	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.8	3.0
All-Red Time (s)	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	3.1	4.1
Lost Time Adjust (s)	-2.1	-2.1	-1.8		-2.4	-1.6	-2.1	-1.8	-2.1		-2.1	-1.9	-2.1
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	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
Recall Mode	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effect Green (s)	25.0	85.1	104.6		13.6	73.7	83.7	14.5	11.3		10.0	9.6	32.8
Actuated g/C Ratio	0.18	0.61	0.75		0.10	0.53	0.60	0.10	0.08		0.07	0.07	0.23
v/c Ratio	0.19	0.33	0.09		0.50	0.62	0.06	0.37	0.47		0.31	0.40	0.13
Control Delay	40.8	9.9	0.2		76.1	16.3	1.0	62.6	23.5		64.8	27.9	0.6
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	40.8	9.9	0.2		76.1	16.3	1.0	62.6	23.5		64.8	27.9	0.6
LOS	D	A	A		E	B	A	E	C		E	C	A
Approach Delay		12.0				21.1			46.2			33.3	
Approach LOS		B				C			D			C	
Queue Length 50th (ft)	47	84	0		73	135	0	61	12		34	9	0
Queue Length 95th (ft)	75	93	2		m99	241	m5	91	63		58	54	0
Internal Link Dist (ft)		1206				1308			963			513	
Turn Bay Length (ft)	350		200		300		175	275			150		150
Base Capacity (vph)	607	3060	1262		490	2676	1077	511	305		490	265	460
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	0.19	0.33	0.08		0.34	0.62	0.06	0.26	0.32		0.15	0.23	0.13

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.62

Intersection Signal Delay: 20.3

Intersection LOS: C

Intersection Capacity Utilization 56.0%

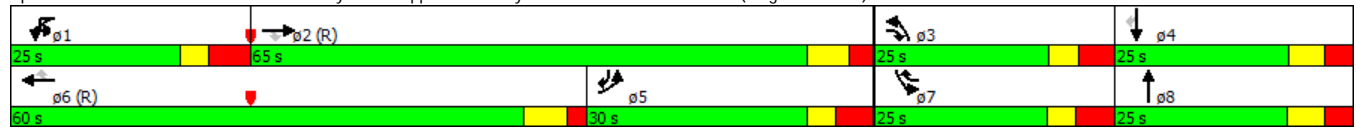
ICU Level of Service B

Analysis Period (min) 15

Description: 05-2148

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

Splits and Phases: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	13	30	934	0	1690	15	5	24
Future Volume (vph)	13	30	934	0	1690	15	5	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1752	5036	1863	3536	0	880	0
Flt Permitted		0.950					0.991	
Satd. Flow (perm)	0	1752	5036	1863	3536	0	880	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			1388		888		288	
Travel Time (s)			21.0		13.5		7.9	
Confl. Peds. (#/hr)								
Confl. Bikes (#/hr)								
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	90%	90%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	44	953	0	1739	0	29	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.2%
ICU Level of Service	B
Analysis Period (min)	15

Intersection	
Int Delay, s/veh	1.4

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	13	30	934	0	1690	15	5	24
Future Vol, veh/h	13	30	934	0	1690	15	5	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98
Heavy Vehicles, %	3	3	3	2	2	2	90	90
Mvmt Flow	13	31	953	0	1724	15	5	24

Major/Minor	Major1			Major2			Minor2	
Conflicting Flow All	1295	1740	0	696	-	0	2201	870
Stage 1	-	-	-	-	-	-	1732	-
Stage 2	-	-	-	-	-	-	469	-
Critical Hdwy	6.46	4.16	-	5.64	-	-	8.05	8.7
Critical Hdwy Stg 1	-	-	-	-	-	-	7.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.8	-
Follow-up Hdwy	2.53	2.23	-	2.32	-	-	4.55	4.2
Pot Cap-1 Maneuver	212	353	-	647	-	-	17	167
Stage 1	-	-	-	-	-	-	50	-
Stage 2	-	-	-	-	-	-	380	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	275	275	-	647	-	-	17	167
Mov Cap-2 Maneuver	-	-	-	-	-	-	17	-
Stage 1	-	-	-	-	-	-	50	-
Stage 2	-	-	-	-	-	-	380	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	97.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	275	-	647	-	-	66
HCM Lane V/C Ratio	0.16	-	-	-	-	0.448
HCM Control Delay (s)	20.6	-	0	-	-	97.9
HCM Lane LOS	C	-	A	-	-	F
HCM 95th %tile Q(veh)	0.6	-	0	-	-	1.8



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	25	1724	25	85	16	0	0	4	4			
Future Volume (vph)	0	0	0	25	1724	25	85	16	0	0	4	4			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.967							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						22						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							41%								
Lane Group Flow (vph)	0	0	0	27	1854	27	54	54	0	0	4	4			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				7.0	99.7	118.6	23.9	23.9			8.2	8.2			
Actuated g/C Ratio				0.05	0.71	0.85	0.17	0.17			0.06	0.06			
v/c Ratio				0.31	0.74	0.02	0.19	0.19			0.04	0.02			
Control Delay				73.2	17.5	1.2	7.0	7.0			63.0	0.2			
Queue Delay				0.0	0.0	0.0	0.7	0.7			0.0	0.0			
Total Delay				73.2	17.5	1.2	7.7	7.6			63.0	0.2			
LOS				E	B	A	A	A			E	A			
Approach Delay					18.1			7.7			31.6				
Approach LOS					B			A			C				
Queue Length 50th (ft)				24	588	1	4	4			4	0			
Queue Length 95th (ft)				57	813	6	4	4			17	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2508	1408	372	379			197	289			
Starvation Cap Reductn				0	0	0	167	172			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				0.11	0.74	0.02	0.26	0.26			0.02	0.01			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74



Intersection Signal Delay: 17.6

Intersection LOS: B

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations															
Traffic Volume (vph)	28	932	32	0	0	0	0	83	26	14	21	0			
Future Volume (vph)	28	932	32	0	0	0	0	83	26	14	21	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%				-3%			
Storage Length (ft)	150		275	0		0	0		0	0		0			
Storage Lanes	1		1	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	3504	1567	0	0	0	0	1816	1544	1706	1789	0			
Flt Permitted	0.950									0.950	0.996				
Satd. Flow (perm)	1752	3504	1567	0	0	0	0	1816	1544	1706	1789	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)			95						139						
Link Speed (mph)		45			30			25				25			
Link Distance (ft)		941			722			372				148			
Travel Time (s)		14.3			16.4			10.1				4.0			
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%				0%			
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	31	1036	36	0	0	0	0	92	29	14	25	0			
Turn Type	Prot	NA	custom					NA	Perm	Split	NA				
Protected Phases	5!	2	3					3		14!	14!		1	4	6
Permitted Phases			2						3						
Detector Phase	5	2	3					3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0	7.0					7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0	14.0					14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0	25.0					25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%	17.9%					17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3	3.2					3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3	2.6					2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6	-0.8					-0.8	-0.8						
Total Lost Time (s)	5.0	5.0	5.0					5.0	5.0						
Lead/Lag	Lead	Lag	Lag					Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes					Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max	None					None	None				None	None	C-Max
Act Effect Green (s)	7.4	100.1	115.4					12.3	12.3	12.9	12.9				
Actuated g/C Ratio	0.05	0.72	0.82					0.09	0.09	0.09	0.09				
v/c Ratio	0.34	0.41	0.03					0.58	0.11	0.09	0.15				
Control Delay	85.0	8.7	0.7					74.9	0.8	11.2	12.2				
Queue Delay	0.0	0.0	0.0					0.0	0.0	0.1	0.1				
Total Delay	85.0	8.7	0.7					74.9	0.8	11.2	12.4				
LOS	F	A	A					E	A	B	B				
Approach Delay		10.6						57.2			12.0				
Approach LOS		B						E			B				
Queue Length 50th (ft)	28	313	1					82	0	2	4				
Queue Length 95th (ft)	57	298	3					138	0	6	9				
Internal Link Dist (ft)		861			642			292			68				
Turn Bay Length (ft)	150		275												
Base Capacity (vph)	187	2504	1363					259	339	315	330				
Starvation Cap Reductn	0	0	0					0	0	87	87				
Spillback Cap Reductn	0	0	0					0	0	0	0				
Storage Cap Reductn	0	0	0					0	0	0	0				
Reduced v/c Ratio	0.17	0.41	0.03					0.36	0.09	0.06	0.10				

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 15.1

Intersection LOS: B

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	9	4	4	8	18	8	4	86	6	13	24	13
Future Volume (vph)	9	4	4	8	18	8	4	86	6	13	24	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1756	0	0	1785	0	0	1796	0	0	1774	0
Flt Permitted		0.973			0.989			0.998			0.987	
Satd. Flow (perm)	0	1756	0	0	1785	0	0	1796	0	0	1774	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		388			485			508			372	
Travel Time (s)		10.6			13.2			13.9			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	43	0	0	123	0	0	65	0
Sign Control		Stop			Stop			Free			Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	18.0%
	ICU Level of Service A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	9	4	4	8	18	8	4	86	6	13	24	13
Future Vol, veh/h	9	4	4	8	18	8	4	86	6	13	24	13
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	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	5	5	10	23	10	5	110	8	17	31	17
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	213	200	39	202	205	114	47	0	0	118	0	0
Stage 1	72	72	-	124	124	-	-	-	-	-	-	-
Stage 2	141	128	-	78	81	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	744	696	1033	756	691	939	1560	-	-	1470	-	-
Stage 1	938	835	-	880	793	-	-	-	-	-	-	-
Stage 2	862	790	-	931	828	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	709	686	1033	739	681	939	1560	-	-	1470	-	-
Mov Cap-2 Maneuver	709	686	-	739	681	-	-	-	-	-	-	-
Stage 1	935	825	-	877	791	-	-	-	-	-	-	-
Stage 2	825	788	-	910	818	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	9.9			10.1			0.3			1.9		
HCM LOS	A			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1560	-	-	759	743	1470	-	-				
HCM Lane V/C Ratio	0.003	-	-	0.029	0.059	0.011	-	-				
HCM Control Delay (s)	7.3	0	-	9.9	10.1	7.5	0	-				
HCM Lane LOS	A	A	-	A	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-				



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕				↕			↕			↕	
Traffic Volume (vph)	15	20	16	4	4	60	68	74	72	4	21	16	49
Future Volume (vph)	15	20	16	4	4	60	68	74	72	4	21	16	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			-2%			0%	
Storage Length (ft)	0		0		0		0	0		0	0		0
Storage Lanes	0		0		0		0	0		0	0		0
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	1758	0	0	0	1731	0	0	1829	0	0	1699	0
Flt Permitted		0.985				0.997			0.976			0.988	
Satd. Flow (perm)	0	1758	0	0	0	1731	0	0	1829	0	0	1699	0
Link Speed (mph)		35				35			35			35	
Link Distance (ft)		518				573			488			1043	
Travel Time (s)		10.1				11.2			9.5			20.3	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	61	0	0	0	164	0	0	181	0	0	103	0
Sign Control		Yield				Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	29.5%
	ICU Level of Service A
Analysis Period (min)	15

ROUNDBABOUT REPORT																
<b>General Information</b>								<b>Site Information</b>								
Analyst	Kimley-Horn							Intersection	Wide Waters at Village Park							
Agency or Co.								E/W Street Name	Village Park Drive							
Date Performed	4/26/2016							N/S Street Name								
Time Period	AM Peak Hour							Analysis Year	Existing AM							
Peak Hour Factor	0.83							Project ID	017254000							
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	15	20	16	0	0	60	68	1	74	2	0	0	21	16	49	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	47			111			70			166						
Exiting Flow ( $V_{ex}$ ), pc/h	52			225			104			39						
Entry Flow ( $V_e$ ), pc/h		63			159			93			106					
Entry Volume veh/h		62			156			91			104					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		1078			1010			1054			957					
Capacity (c), veh/h		1056			989			1031			937					
v/c Ratio (X)		0.06			0.16			0.09			0.11					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		3.9			5.1			4.3			4.9					
Lane LOS		A			A			A			A					
Lane 95% Queue		0.2			0.6			0.3			0.4					
Approach Delay, s/veh	3.91			5.11			4.27			4.88						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	4.69															
Intersection LOS	A															



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1636	110	4	146	0	0	0
Future Volume (vph)	1636	110	4	146	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.130			
Satd. Flow (perm)	5060	1575	0	243	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		112					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1669	112	0	153	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	120.7	120.7		130.0			
Actuated g/C Ratio	0.86	0.86		0.93			
v/c Ratio	0.38	0.08		0.47			
Control Delay	2.3	0.4		16.3			
Queue Delay	0.0	0.0		0.0			
Total Delay	2.3	0.4		16.3			
LOS	A	A		B			
Approach Delay	2.2						
Approach LOS	A						
Queue Length 50th (ft)	76	0		35			
Queue Length 95th (ft)	122	9		118			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4362	1373		618			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.38	0.08		0.25			

**Intersection Summary**

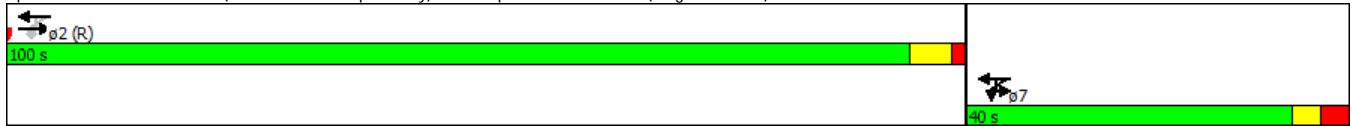
Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 5 (4%), Referenced to phase 2:EBWB and 6:, Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.47



Intersection Signal Delay: 3.3  
Intersection Capacity Utilization 91.7%  
Analysis Period (min) 15  
Description: 05-2153

Intersection LOS: A  
ICU Level of Service F

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





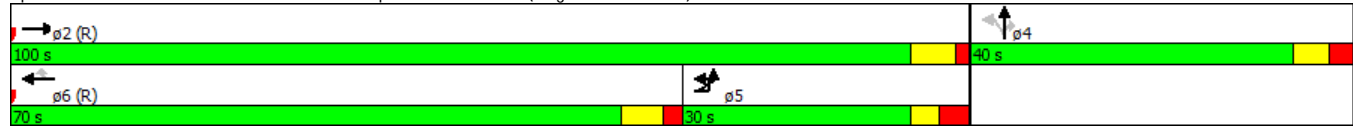
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑↑			↑↑↑	↑		↑	↑↑			
Traffic Volume (vph)	4	284	2232	0	0	1195	454	57	4	497	0	0	0
Future Volume (vph)	4	284	2232	0	0	1195	454	57	4	497	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	5060	1575	0	1761	2759	0	0	0
Flt Permitted		0.950							0.955				
Satd. Flow (perm)	0	3450	5111	0	0	5060	1575	0	1761	2759	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							468			76			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	297	2301	0	0	1232	468	0	63	512	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	102.4			72.4	72.4		27.6	27.6			
Actuated g/C Ratio		0.18	0.73			0.52	0.52		0.20	0.20			
v/c Ratio		0.48	0.62			0.47	0.45		0.18	0.85			
Control Delay		61.9	14.5			9.2	1.9		46.1	59.1			
Queue Delay		0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay		61.9	14.5			9.2	1.9		46.1	59.1			
LOS		E	B			A	A		D	E			
Approach Delay			19.9			7.2			57.6				
Approach LOS			B			A			E				
Queue Length 50th (ft)		137	432			94	3		48	222			
Queue Length 95th (ft)		189	564			130	14		85	278			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	3737			2616	1040		440	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		0.48	0.62			0.47	0.45		0.14	0.69			

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 35 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85

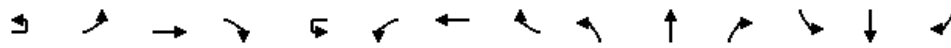
Intersection Signal Delay: 19.9	Intersection LOS: B
Intersection Capacity Utilization 68.8%	ICU Level of Service C
Analysis Period (min) 15	
Description: 05-2152	

Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business



3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)

8/17/2016



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	15	401	1970	179	5	33	1289	58	163	35	53	109	22	80
Future Volume (vph)	15	401	1970	179	5	33	1289	58	163	35	53	109	22	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				98				81			130			126
Link Speed (mph)			45				45			35				35
Link Distance (ft)			1128				1286			476				408
Travel Time (s)			17.1				19.5			9.3				7.9
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%				0%
Shared Lane Traffic (%)														38%
Lane Group Flow (vph)	0	420	1990	181	0	38	1302	59	165	35	54	110	53	50
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	94.9	109.0		9.1	81.2	92.7	12.1	11.1	22.4	10.4	9.4	31.6	
Actuated g/C Ratio	0.14	0.68	0.78		0.06	0.58	0.66	0.09	0.08	0.16	0.07	0.07	0.23	
v/c Ratio	0.85	0.57	0.14		0.34	0.44	0.06	0.57	0.24	0.15	0.43	0.39	0.11	
Control Delay	64.1	7.4	1.1		79.3	9.2	1.3	68.7	63.9	0.9	67.0	39.8	0.5	
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	64.1	7.4	1.1		79.3	9.2	1.3	68.7	63.9	0.9	67.0	39.8	0.5	
LOS		E	A	A		E	A	A	E	E	A	E	D	A
Approach Delay			16.2				10.8			53.6			44.6	
Approach LOS			B				B			D			D	
Queue Length 50th (ft)		197	191	7		36	150	3	75	31	0	50	20	0
Queue Length 95th (ft)		#280	210	11		m72	191	m9	111	66	0	80	67	0
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		492	3463	1279		251	2936	1106	364	196	470	367	200	437
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.85	0.57	0.14		0.15	0.44	0.05	0.45	0.18	0.11	0.30	0.27	0.11

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 50 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

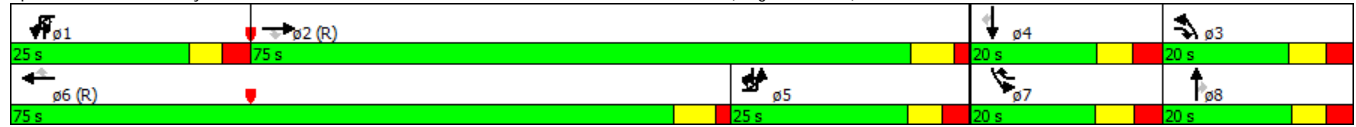
Maximum v/c Ratio: 0.85

3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)

8/17/2016

Intersection Signal Delay: 18.0    Intersection LOS: B  
Intersection Capacity Utilization 72.2%                                    ICU Level of Service C  
Analysis Period (min) 15  
Description: 05-2152  
# 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: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)



4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)

8/17/2016



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔↔	↔↔↔	↔	↔↔	↔			↔↔	↔	↔
Traffic Volume (vph)	6	184	1549	434	56	207	930	153	292	79	127	4	331	77	141
Future Volume (vph)	6	184	1549	434	56	207	930	153	292	79	127	4	331	77	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%			-2%				0%	
Storage Length (ft)		350		200		300		175	275		0		150		150
Storage Lanes		2		1		2		1	1		0		1		1
Taper Length (ft)		300				300			100				100		
Satd. Flow (prot)	0	3433	5085	1583	0	3433	5085	1583	3467	1708	0	0	3433	1681	1504
Flt Permitted		0.950				0.950			0.950				0.950		
Satd. Flow (perm)	0	3433	5085	1583	0	3433	5085	1583	3467	1708	0	0	3433	1681	1504
Right Turn on Red				Yes				Yes			Yes				Yes
Satd. Flow (RTOR)				334				163		48				15	141
Link Speed (mph)			45				45			35				35	
Link Distance (ft)			1286				1388			1012				597	
Travel Time (s)			19.5				21.0			19.7				11.6	
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)															
Mid-Block Traffic (%)			0%				0%			0%				0%	
Shared Lane Traffic (%)															27%
Lane Group Flow (vph)	0	202	1648	462	0	280	989	163	311	219	0	0	356	123	109
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7!	3	8		7!	7	4	5!
Permitted Phases				2				6							4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	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	7.0
Minimum Split (s)	23.0	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	16.0	15.0	23.0
Total Split (s)	25.0	25.0	65.0	25.0	25.0	25.0	65.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0
Total Split (%)	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%		17.9%	17.9%	17.9%	17.9%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.0	3.8	3.0
All-Red Time (s)	4.1	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	4.1	3.1	4.1
Lost Time Adjust (s)		-2.1	-2.1	-1.8			-2.4	-1.6	-2.1	-1.8			-2.1	-1.9	-2.1
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	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)		20.0	65.1	88.0			17.6	62.7	81.7	17.9			19.0	19.4	39.4
Actuated g/C Ratio		0.14	0.46	0.63			0.13	0.45	0.58	0.13			0.14	0.14	0.28
v/c Ratio		0.41	0.70	0.41			0.65	0.43	0.16	0.70			0.77	0.50	0.21
Control Delay		44.2	19.9	1.5			58.8	17.3	1.2	67.3			69.9	56.2	2.3
Queue Delay		0.0	0.0	0.0			0.0	0.0	0.0	0.0			0.0	0.0	0.0
Total Delay		44.2	19.9	1.5			58.8	17.3	1.2	67.3			69.9	56.2	2.3
LOS		D	B	A			E	B	A	E			E	E	A
Approach Delay			18.3				23.6			68.7				54.5	
Approach LOS			B				C			E				D	
Queue Length 50th (ft)		87	355	3			109	219	15	141			161	94	0
Queue Length 95th (ft)		120	390	2			158	149	m3	190			218	168	16
Internal Link Dist (ft)			1206				1308			932				517	
Turn Bay Length (ft)		350		200			300		175	275			150		150
Base Capacity (vph)		490	2365	1138			490	2278	1001	495			490	257	524
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		0.41	0.70	0.41			0.57	0.43	0.16	0.63			0.73	0.48	0.21

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 57 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83

4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)

8/17/2016

Intersection Signal Delay: 29.7 Intersection LOS: C

Intersection Capacity Utilization 75.6% ICU Level of Service D

Analysis Period (min) 15

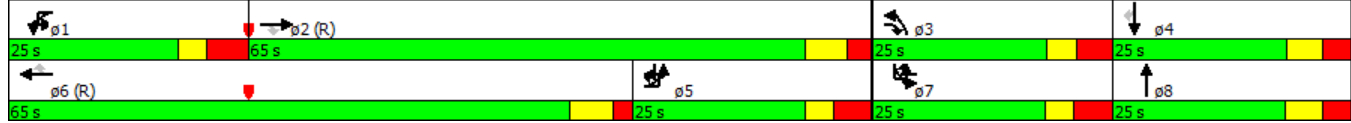
Description: 05-2148

# 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: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations		↔	↑↑↑	↔	↑↑		↔	
Traffic Volume (vph)	29	5	2089	13	1518	5	26	14
Future Volume (vph)	29	5	2089	13	1518	5	26	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1770	5085	1770	3539	0	1720	0
Flt Permitted		0.950		0.950			0.969	
Satd. Flow (perm)	0	1770	5085	1770	3539	0	1720	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			1388		888		288	
Travel Time (s)			21.0		13.5		7.9	
Confl. Peds. (#/hr)		1				1		
Confl. Bikes (#/hr)								
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	34	2110	13	1538	0	40	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	52.1%
ICU Level of Service	A
Analysis Period (min)	15



**Intersection**

Int Delay, s/veh	2.3
------------------	-----

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	29	5	2089	13	1518	5	26	14
Future Vol, veh/h	29	5	2089	13	1518	5	26	14
Conflicting Peds, #/hr	0	1	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	99	99	99	99	99	99	99	99
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	29	5	2110	13	1533	5	26	14

Major/Minor	Major1			Major2			Minor2	
Conflicting Flow All	1137	1538	0	1540	-	0	2475	770
Stage 1	-	-	-	-	-	-	1562	-
Stage 2	-	-	-	-	-	-	913	-
Critical Hdwy	6.44	4.14	-	5.64	-	-	6.29	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.04	-
Follow-up Hdwy	2.52	2.22	-	2.32	-	-	3.67	3.32
Pot Cap-1 Maneuver	271	428	-	219	-	-	36	343
Stage 1	-	-	-	-	-	-	156	-
Stage 2	-	-	-	-	-	-	326	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	276	276	-	219	-	-	36	343
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	-
Stage 1	-	-	-	-	-	-	156	-
Stage 2	-	-	-	-	-	-	326	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0.2	187.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	276	-	219	-	-	52
HCM Lane V/C Ratio	0.124	-	0.06	-	-	0.777
HCM Control Delay (s)	19.9	-	22.5	-	-	187.5
HCM Lane LOS	C	-	C	-	-	F
HCM 95th %tile Q(veh)	0.4	-	0.2	-	-	3.2



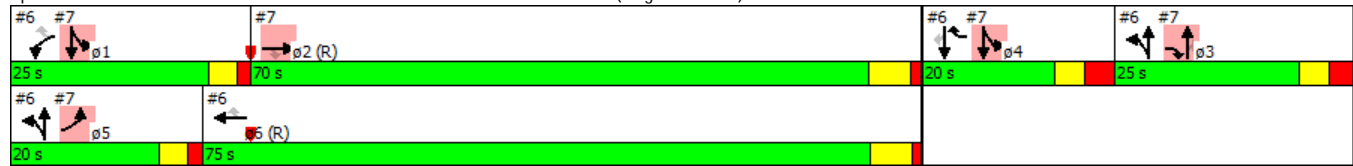
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	42	1390	24	140	15	0	0	25	20			
Future Volume (vph)	0	0	0	42	1390	24	140	15	0	0	25	20			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.961							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						24						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							45%								
Lane Group Flow (vph)	0	0	0	46	1511	26	84	84	0	0	27	22			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				8.0	93.4	113.9	24.7	24.7			8.7	8.7			
Actuated g/C Ratio				0.06	0.67	0.81	0.18	0.18			0.06	0.06			
v/c Ratio				0.46	0.64	0.02	0.29	0.28			0.24	0.10			
Control Delay				77.9	16.8	1.0	15.5	15.5			67.4	0.8			
Queue Delay				0.0	0.0	0.0	1.2	1.2			0.0	0.0			
Total Delay				77.9	16.8	1.0	16.8	16.7			67.4	0.8			
LOS				E	B	A	B	B			E	A			
Approach Delay					18.3			16.7			37.5				
Approach LOS					B			B			D				
Queue Length 50th (ft)				42	407	0	16	16			24	0			
Queue Length 95th (ft)				84	594	6	25	25			56	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2350	1355	375	379			197	289			
Starvation Cap Reductn				0	0	0	161	164			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				0.18	0.64	0.02	0.39	0.39			0.14	0.08			

Intersection Summary															
Area Type:	Other														
Cycle Length:	140														
Actuated Cycle Length:	140														
Offset:	125 (89%), Referenced to phase 2:EBT and 6:, Start of Green														
Natural Cycle:	100														
Control Type:	Actuated-Coordinated														
Maximum v/c Ratio:	0.80														

6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)

Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 111.7%	ICU Level of Service H
Analysis Period (min) 15	
Description: 05-0020	
! Phase conflict between lane groups.	

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↖↗	↗					↖	↖↗	↗	↖	↖↗			
Traffic Volume (vph)	41	1866	190	0	0	0	0	92	55	51	28	0			
Future Volume (vph)	41	1866	190	0	0	0	0	92	55	51	28	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		275	0		0	0		0	0		0			
Storage Lanes	1		1	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	3504	1567	0	0	0	0	1816	1544	1706	1769	0			
Flt Permitted	0.950									0.950	0.985				
Satd. Flow (perm)	1752	3504	1567	0	0	0	0	1816	1544	1706	1769	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)			152						139						
Link Speed (mph)		45			30			25				25			
Link Distance (ft)		941			722			405				148			
Travel Time (s)		14.3			16.4			11.0				4.0			
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%				0%			
Shared Lane Traffic (%)										24%					
Lane Group Flow (vph)	42	1924	196	0	0	0	0	95	57	40	42	0			
Turn Type	Prot	NA	custom					NA	Perm	Split	NA				
Protected Phases	5!	2	3					3		14!	14!		1	4	6
Permitted Phases			2						3						
Detector Phase	5	2	3					3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0	7.0					7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0	14.0					14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0	25.0					25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%	17.9%					17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3	3.2					3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3	2.6					2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6	-0.8					-0.8	-0.8						
Total Lost Time (s)	5.0	5.0	5.0					5.0	5.0						
Lead/Lag	Lead	Lag	Lag					Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes					Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max	None					None	None				None	None	C-Max
Act Effect Green (s)	8.0	95.7	110.2					12.5	12.5	16.2	16.2				
Actuated g/C Ratio	0.06	0.68	0.79					0.09	0.09	0.12	0.12				
v/c Ratio	0.42	0.80	0.15					0.59	0.22	0.20	0.21				
Control Delay	95.0	12.1	0.2					75.2	1.9	7.7	7.7				
Queue Delay	0.0	0.0	0.0					0.0	0.0	0.2	0.2				
Total Delay	95.0	12.1	0.2					75.2	1.9	7.9	7.9				
LOS	F	B	A					E	A	A	A				
Approach Delay		12.7						47.7			7.9				
Approach LOS		B						D			A				
Queue Length 50th (ft)	41	756	0					85	0	3	4				
Queue Length 95th (ft)	m60	#945	m0					141	0	6	6				
Internal Link Dist (ft)		861			642			325			68				
Turn Bay Length (ft)	150		275												
Base Capacity (vph)	187	2394	1316					259	339	343	355				
Starvation Cap Reductn	0	0	0					0	0	84	88				
Spillback Cap Reductn	0	0	0					0	0	0	0				
Storage Cap Reductn	0	0	0					0	0	0	0				
Reduced v/c Ratio	0.22	0.80	0.15					0.37	0.17	0.15	0.16				

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	125 (89%), Referenced to phase 2:EBT and 6:, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.80

Intersection Signal Delay: 14.7 Intersection LOS: B

Intersection Capacity Utilization 111.7% ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

# 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: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				↔	
Traffic Volume (vph)	52	40	18	15	23	60	4	45	10	4	100	77	15
Future Volume (vph)	52	40	18	15	23	60	4	45	10	4	100	77	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%				0%	
Storage Length (ft)	0		0	0		0	0		0		0		0
Storage Lanes	0		0	0		0	0		0		0		0
Taper Length (ft)	25			25			25				25		
Satd. Flow (prot)	0	1780	0	0	1696	0	0	1767	0	0	0	1796	0
Flt Permitted		0.977			0.993			0.997				0.974	
Satd. Flow (perm)	0	1780	0	0	1696	0	0	1767	0	0	0	1796	0
Link Speed (mph)		25			25			25				25	
Link Distance (ft)		388			485			508				405	
Travel Time (s)		10.6			13.2			13.9				11.0	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%			0%			0%				0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	118	0	0	106	0	0	63	0	0	0	211	0
Sign Control		Stop			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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (veh/h)	52	40	18	15	23	60	4	45	10	4	100	77	15
Future Volume (Veh/h)	52	40	18	15	23	60	4	45	10	4	100	77	15
Sign Control		Stop			Stop			Free				Free	
Grade		0%			0%			5%				0%	
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
Hourly flow rate (vph)	56	43	19	16	25	65	4	48	11	0	108	83	16
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type													
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume													
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol													
IC, single (s)													
IC, 2 stage (s)													
IF (s)													
p0 queue free %													
cM capacity (veh/h)													
<b>Direction, Lane #</b>													
	EB 1	WB 1	NB 1	SB 1									
Volume Total	118	106	63	207									
Volume Left	56	16	4	108									
Volume Right	19	65	11	16									
cSH	516	726	1494	1545									
Volume to Capacity	0.23	0.15	0.00	0.07									
Queue Length 95th (ft)	22	13	0	6									
Control Delay (s)	14.0	10.8	0.5	4.2									
Lane LOS	B	B	A	A									
Approach Delay (s)	14.0	10.8	0.5	4.2									
Approach LOS	B	B											
<b>Intersection Summary</b>													
Average Delay				7.5									
Intersection Capacity Utilization				36.8%	ICU Level of Service	A							
Analysis Period (min)				15									



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	94	66	79	4	30	39	24	85	4	65	102	87
Future Volume (vph)	94	66	79	4	30	39	24	85	4	65	102	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			-2%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1745	0	0	1723	0	0	1855	0	0	1754	0
Flt Permitted		0.981			0.998			0.990			0.987	
Satd. Flow (perm)	0	1745	0	0	1723	0	0	1855	0	0	1754	0
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		518			573			488			1012	
Travel Time (s)		10.1			13.0			9.5			19.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	263	0	0	80	0	0	123	0	0	279	0
Sign Control		Yield			Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	47.3%
ICU Level of Service	A
Analysis Period (min)	15



ROUNDBABOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name									
Time Period	PM Peak Hour						Analysis Year	Existing PM								
Peak Hour Factor	0.91						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	94	66	79	0	2	30	39	0	24	85	1	0	65	102	87	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	189			227			252			63						
Exiting Flow ( $V_{ex}$ ), pc/h	148			158			244			205						
Entry Flow ( $V_e$ ), pc/h		268			80			123			285					
Entry Volume veh/h		263			78			121			279					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		935			900			878			1061					
Capacity (c), veh/h		915			881			860			1039					
v/c Ratio (X)		0.29			0.09			0.14			0.27					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		6.9			4.9			5.6			6.1					
Lane LOS		A			A			A			A					
Lane 95% Queue		1.2			0.3			0.5			1.1					
Approach Delay, s/veh	6.95			4.93			5.57			6.08						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	6.18															
Intersection LOS	A															

**Appendix F:**  
**Synchro, SimTraffic, & HCS Output:**  
**Background (2020)**

1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1168	104	4	216	0	0	0
Future Volume (vph)	1168	104	4	216	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.204			
Satd. Flow (perm)	5060	1543	0	382	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		113					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)		1		1			
Confl. Bikes (#/hr)							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1270	113	0	239	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	120.4	120.4		130.0			
Actuated g/C Ratio	0.86	0.86		0.93			
v/c Ratio	0.29	0.08		0.53			
Control Delay	2.1	0.5		8.1			
Queue Delay	0.0	0.0		0.0			
Total Delay	2.1	0.5		8.1			
LOS	A	A		A			
Approach Delay	2.0						
Approach LOS	A						
Queue Length 50th (ft)	52	0		11			
Queue Length 95th (ft)	93	9		60			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4349	1342		717			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.29	0.08		0.33			

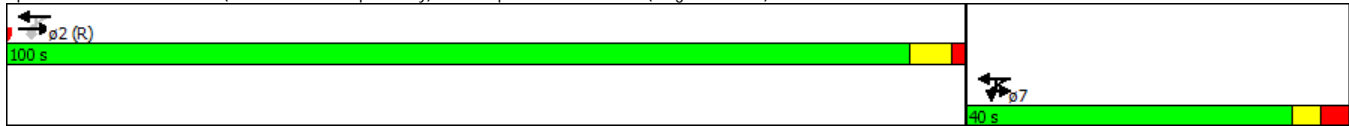
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 25 (18%), Referenced to phase 2:EBWB and 6.; Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.53

1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)

Intersection Signal Delay: 2.9	Intersection LOS: A
Intersection Capacity Utilization 52.5%	ICU Level of Service A
Analysis Period (min) 15	
Description: 05-2153	

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)



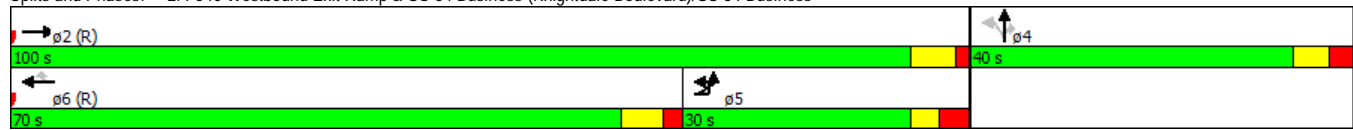


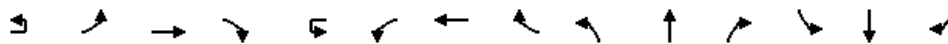
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔			↔↔↔	↔		↔	↔↔			
Traffic Volume (vph)	4	469	1052	0	0	1424	789	38	4	250	0	0	0
Future Volume (vph)	4	469	1052	0	0	1424	789	38	4	250	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	4963	1545	0	1714	2680	0	0	0
Flt Permitted		0.950							0.957				
Satd. Flow (perm)	0	3450	5111	0	0	4963	1545	0	1714	2680	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							637			217			
Link Speed (mph)			45			45			35				30
Link Distance (ft)			763			1128			821				417
Travel Time (s)			11.6			17.1			16.0				9.5
Confl. Peds. (#/hr)				1	1								
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	503	1119	0	0	1515	839	0	44	266	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	120.2			90.2	90.2		9.8	9.8			
Actuated g/C Ratio		0.18	0.86			0.64	0.64		0.07	0.07			
v/c Ratio		0.82	0.26			0.47	0.69		0.37	0.68			
Control Delay		68.4	2.6			3.8	5.5		70.3	23.4			
Queue Delay		0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay		68.4	2.6			3.8	5.5		70.3	23.4			
LOS		E	A			A	A		E	C			
Approach Delay			23.0			4.4			30.1				
Approach LOS			C			A			C				
Queue Length 50th (ft)		206	45			94	34		39	25			
Queue Length 95th (ft)		#286	123			34	177		78	73			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	4388			3197	1222		428	832			
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		0.82	0.26			0.47	0.69		0.10	0.32			

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 70 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.82

Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 80.7%	ICU Level of Service D
Analysis Period (min) 15	
Description: 05-2152	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business



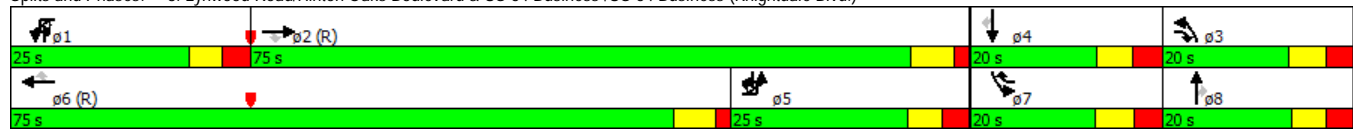


Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔	↔↔↔	↔	↔↔	↔	↔	↔↔	↔	↔
Traffic Volume (vph)	4	92	1113	51	4	18	1945	21	276	5	92	9	4	14
Future Volume (vph)	4	92	1113	51	4	18	1945	21	276	5	92	9	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3417	5061	1576	0	1761	5060	1575	3382	1835	1560	2943	1380	1289
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3416	5061	1576	0	1761	5060	1556	3382	1835	1560	2943	1380	1289
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				82				81			130			126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)		1						1						
Confl. Bikes (#/hr)														
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	19%	19%	19%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														39%
Lane Group Flow (vph)	0	104	1210	55	0	24	2114	23	300	5	100	10	10	9
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	95.9	117.6		8.6	84.5	97.5	17.8	11.1	13.8	13.1	8.9	22.8	
Actuated g/C Ratio	0.14	0.68	0.84		0.06	0.60	0.70	0.13	0.08	0.10	0.09	0.06	0.16	
v/c Ratio		0.21	0.35	0.04		0.22	0.69	0.02	0.70	0.03	0.37	0.04	0.11	0.03
Control Delay		52.3	7.7	0.4		92.5	5.9	0.0	67.4	56.4	6.7	57.7	44.1	0.1
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		52.3	7.7	0.4		92.5	5.9	0.0	67.4	56.4	6.7	57.7	44.1	0.1
LOS		D	A	A		F	A	A	E	E	A	E	D	A
Approach Delay			10.8				6.8			52.3			35.1	
Approach LOS			B				A			D			D	
Queue Length 50th (ft)		43	118	0		23	105	0	136	4	0	4	4	0
Queue Length 95th (ft)		74	273	0		m35	126	m0	183	18	25	14	24	0
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		488	3466	1340		251	3052	1147	436	211	387	349	153	315
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.21	0.35	0.04		0.10	0.69	0.02	0.69	0.02	0.26	0.03	0.07	0.03

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.70

Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 67.3%	ICU Level of Service C
Analysis Period (min) 15	
Description: 05-2152	
m Volume for 95th percentile queue is metered by upstream signal.	
! Phase conflict between lane groups.	

Splits and Phases: 3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)







Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	133	986	104	34	131	1613	60	132	14	81	73	10	111
Future Volume (vph)	133	986	104	34	131	1613	60	132	14	81	73	10	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			-2%			0%	
Storage Length (ft)	350		200		300		175	275		650	150		150
Storage Lanes	2		1		2		1	1		1	1		1
Taper Length (ft)	300				300			100			100		
Satd. Flow (prot)	3400	5036	1568	0	3433	5085	1583	3467	1641	0	3433	1547	1504
Flt Permitted	0.950				0.950			0.950			0.950		
Satd. Flow (perm)	3399	5036	1568	0	3433	5085	1563	3467	1641	0	3433	1547	1504
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)			120				87		93			59	141
Link Speed (mph)		45				45			35			35	
Link Distance (ft)		1286				1388			847			593	
Travel Time (s)		19.5				21.0			16.5			11.6	
Confl. Peds. (#/hr)	1						1						
Confl. Bikes (#/hr)													
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													46%
Lane Group Flow (vph)	133	1133	120	0	190	1854	69	152	109	0	84	70	69
Turn Type	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	1	6	7	3	8		7	4	5
Permitted Phases			2				6						4
Detector Phase	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase													
Minimum Initial (s)	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)	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	15.0	23.0
Total Split (s)	30.0	65.0	25.0	25.0	25.0	60.0	25.0	25.0	25.0		25.0	25.0	30.0
Total Split (%)	21.4%	46.4%	17.9%	17.9%	17.9%	42.9%	17.9%	17.9%	17.9%		17.9%	17.9%	21.4%
Yellow Time (s)	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.8	3.0
All-Red Time (s)	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	3.1	4.1
Lost Time Adjust (s)	-2.1	-2.1	-1.8		-2.4	-1.6	-2.1	-1.8	-2.1		-2.1	-1.9	-2.1
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	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
Recall Mode	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effect Green (s)	25.0	83.5	103.6		14.5	73.0	83.2	15.1	11.8		10.3	9.7	32.9
Actuated g/C Ratio	0.18	0.60	0.74		0.10	0.52	0.59	0.11	0.08		0.07	0.07	0.24
v/c Ratio	0.22	0.38	0.10		0.54	0.70	0.07	0.41	0.49		0.33	0.43	0.15
Control Delay	40.3	10.2	0.2		75.5	18.3	1.5	62.6	23.2		64.9	27.4	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	40.3	10.2	0.2		75.5	18.3	1.5	62.6	23.2		64.9	27.4	0.7
LOS	D	B	A		E	B	A	E	C		E	C	A
Approach Delay		12.2				22.9			46.1			33.3	
Approach LOS		B				C			D			C	
Queue Length 50th (ft)	54	92	0		84	173	0	69	14		38	10	0
Queue Length 95th (ft)	84	104	1		m97	321	m5	100	67		62	57	0
Internal Link Dist (ft)		1206				1308			767			513	
Turn Bay Length (ft)	350		200		300		175	275			150		150
Base Capacity (vph)	607	3002	1248		490	2650	1069	511	314		490	271	461
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	0.22	0.38	0.10		0.39	0.70	0.06	0.30	0.35		0.17	0.26	0.15

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.70

Intersection Signal Delay: 21.3

Intersection LOS: C

Intersection Capacity Utilization 59.9%

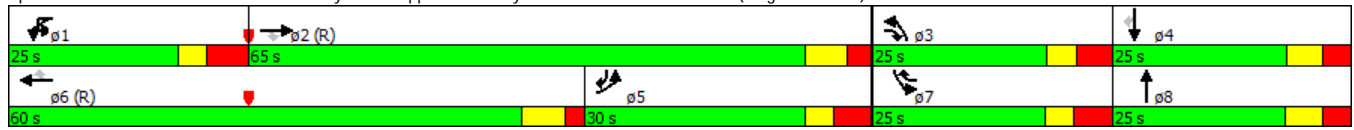
ICU Level of Service B

Analysis Period (min) 15

Description: 05-2148

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

Splits and Phases: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	15	30	1051	0	1902	15	5	24
Future Volume (vph)	15	30	1051	0	1902	15	5	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1752	5036	1863	3536	0	880	0
Flt Permitted		0.950					0.991	
Satd. Flow (perm)	0	1752	5036	1863	3536	0	880	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			1388		888		288	
Travel Time (s)			21.0		13.5		7.9	
Confl. Peds. (#/hr)								
Confl. Bikes (#/hr)								
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	90%	90%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	46	1072	0	1956	0	29	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	63.1%
	ICU Level of Service B
Analysis Period (min)	15

Intersection	
Int Delay, s/veh	2.2

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	15	30	1051	0	1902	15	5	24
Future Vol, veh/h	15	30	1051	0	1902	15	5	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98
Heavy Vehicles, %	3	3	3	2	2	2	90	90
Mvmt Flow	15	31	1072	0	1941	15	5	24

Major/Minor	Major1		Major2			Minor2		
Conflicting Flow All	1452	1956	0	783	-	0	2469	978
Stage 1	-	-	-	-	-	-	1948	-
Stage 2	-	-	-	-	-	-	521	-
Critical Hdwy	6.46	4.16	-	5.64	-	-	8.05	8.7
Critical Hdwy Stg 1	-	-	-	-	-	-	7.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.8	-
Follow-up Hdwy	2.53	2.23	-	2.32	-	-	4.55	4.2
Pot Cap-1 Maneuver	168	291	-	579	-	-	10	135
Stage 1	-	-	-	-	-	-	35	-
Stage 2	-	-	-	-	-	-	349	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	212	212	-	579	-	-	10	135
Mov Cap-2 Maneuver	-	-	-	-	-	-	10	-
Stage 1	-	-	-	-	-	-	35	-
Stage 2	-	-	-	-	-	-	349	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	194.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	212	-	579	-	-	43
HCM Lane V/C Ratio	0.217	-	-	-	-	0.688
HCM Control Delay (s)	26.6	-	0	-	-	194.2
HCM Lane LOS	D	-	A	-	-	F
HCM 95th %tile Q(veh)	0.8	-	0	-	-	2.6



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	28	1940	28	96	18	0	0	4	5			
Future Volume (vph)	0	0	0	28	1940	28	96	18	0	0	4	5			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.967							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						22						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							41%								
Lane Group Flow (vph)	0	0	0	30	2086	30	61	61	0	0	4	5			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				7.1	96.3	115.4	25.0	25.0			8.2	8.2			
Actuated g/C Ratio				0.05	0.69	0.82	0.18	0.18			0.06	0.06			
v/c Ratio				0.34	0.86	0.02	0.21	0.20			0.04	0.02			
Control Delay				74.1	23.8	1.4	6.4	6.3			63.0	0.2			
Queue Delay				0.0	0.0	0.0	0.8	0.8			0.0	0.0			
Total Delay				74.1	23.8	1.4	7.2	7.1			63.0	0.2			
LOS				E	C	A	A	A			E	A			
Approach Delay					24.2			7.1			28.1				
Approach LOS					C			A			C				
Queue Length 50th (ft)				27	790	1	4	4			4	0			
Queue Length 95th (ft)				61	#1160	7	4	4			17	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2422	1377	382	388			197	289			
Starvation Cap Reductn				0	0	0	174	179			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				0.12	0.86	0.02	0.29	0.29			0.02	0.02			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 23.3 Intersection LOS: C

Intersection Capacity Utilization 68.5% ICU Level of Service C

Analysis Period (min) 15

Description: 05-0020

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

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↗	↘					↖	↗	↘	↖	↗			
Traffic Volume (vph)	32	1049	36	0	0	0	0	93	29	16	24	0			
Future Volume (vph)	32	1049	36	0	0	0	0	93	29	16	24	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%				-3%			
Storage Length (ft)	150		275	0		0	0		0	0		0			
Storage Lanes	1		1	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	3504	1567	0	0	0	0	1816	1544	1706	1791	0			
Flt Permitted	0.950									0.950	0.997				
Satd. Flow (perm)	1752	3504	1567	0	0	0	0	1816	1544	1706	1791	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)			95						139						
Link Speed (mph)		45			30			25				25			
Link Distance (ft)		941			722			372				148			
Travel Time (s)		14.3			16.4			10.1				4.0			
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%				0%			
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	36	1166	40	0	0	0	0	103	32	16	29	0			
Turn Type	Prot	NA	custom					NA	Perm	Split	NA				
Protected Phases	5!	2	3					3		14!	14!		1	4	6
Permitted Phases			2						3						
Detector Phase	5	2	3					3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0	7.0					7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0	14.0					14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0	25.0					25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%	17.9%					17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3	3.2					3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3	2.6					2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6	-0.8					-0.8	-0.8						
Total Lost Time (s)	5.0	5.0	5.0					5.0	5.0						
Lead/Lag	Lead	Lag	Lag					Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes					Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max	None					None	None				None	None	C-Max
Act Effect Green (s)	7.7	99.1	115.2					13.1	13.1	13.0	13.0				
Actuated g/C Ratio	0.06	0.71	0.82					0.09	0.09	0.09	0.09				
v/c Ratio	0.38	0.47	0.03					0.61	0.12	0.10	0.17				
Control Delay	87.2	9.8	0.7					75.4	0.9	12.1	14.1				
Queue Delay	0.0	0.0	0.0					0.0	0.0	0.1	0.2				
Total Delay	87.2	9.8	0.7					75.4	0.9	12.1	14.3				
LOS	F	A	A					E	A	B	B				
Approach Delay		11.8						57.7			13.5				
Approach LOS		B						E			B				
Queue Length 50th (ft)	32	381	1					92	0	3	5				
Queue Length 95th (ft)	64	502	4					150	0	8	11				
Internal Link Dist (ft)		861			642			292			68				
Turn Bay Length (ft)	150		275												
Base Capacity (vph)	187	2481	1354					259	339	315	331				
Starvation Cap Reductn	0	0	0					0	0	87	87				
Spillback Cap Reductn	0	0	0					0	0	0	0				
Storage Cap Reductn	0	0	0					0	0	0	0				
Reduced v/c Ratio	0.19	0.47	0.03					0.40	0.09	0.07	0.12				

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 16.2

Intersection LOS: B

Intersection Capacity Utilization 68.5%

ICU Level of Service C

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)







Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	4	4	9	20	9	4	97	7	15	27	15
Future Volume (vph)	10	4	4	9	20	9	4	97	7	15	27	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1760	0	0	1781	0	0	1796	0	0	1774	0
Flt Permitted		0.973			0.988			0.998			0.987	
Satd. Flow (perm)	0	1760	0	0	1781	0	0	1796	0	0	1774	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		388			485			508			372	
Travel Time (s)		10.6			13.2			13.9			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	23	0	0	50	0	0	138	0	0	73	0
Sign Control		Stop			Stop			Free			Free	

**Intersection Summary**

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 19.6%      ICU Level of Service A  
 Analysis Period (min) 15

Intersection												
Int Delay, s/veh	3.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	4	4	9	20	9	4	97	7	15	27	15
Future Vol, veh/h	10	4	4	9	20	9	4	97	7	15	27	15
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	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	5	5	12	26	12	5	124	9	19	35	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	241	227	44	227	231	129	54	0	0	133	0	0
Stage 1	83	83	-	139	139	-	-	-	-	-	-	-
Stage 2	158	144	-	88	92	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	713	672	1026	728	669	921	1551	-	-	1452	-	-
Stage 1	925	826	-	864	782	-	-	-	-	-	-	-
Stage 2	844	778	-	920	819	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	674	661	1026	711	658	921	1551	-	-	1452	-	-
Mov Cap-2 Maneuver	674	661	-	711	658	-	-	-	-	-	-	-
Stage 1	922	814	-	861	780	-	-	-	-	-	-	-
Stage 2	804	776	-	897	808	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	10.4	0.3	2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1551	-	-	726	719	1452	-	-
HCM Lane V/C Ratio	0.003	-	-	0.032	0.068	0.013	-	-
HCM Control Delay (s)	7.3	0	-	10.1	10.4	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕				↕			↕			↕	
Traffic Volume (vph)	17	23	18	4	4	68	77	83	81	4	24	18	55
Future Volume (vph)	17	23	18	4	4	68	77	83	81	4	24	18	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			-2%			0%	
Storage Length (ft)	0		0		0		0	0		0	0		0
Storage Lanes	0		0		0		0	0		0	0		0
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	1760	0	0	0	1731	0	0	1831	0	0	1701	0
Flt Permitted		0.986				0.997			0.976			0.988	
Satd. Flow (perm)	0	1760	0	0	0	1731	0	0	1831	0	0	1701	0
Link Speed (mph)		35				35			35			35	
Link Distance (ft)		518				573			488			191	
Travel Time (s)		10.1				11.2			9.5			3.7	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	70	0	0	0	185	0	0	203	0	0	117	0
Sign Control		Yield				Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization 31.8%	ICU Level of Service A
Analysis Period (min)	15

ROUNDBABOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name									
Time Period	AM Peak Hour						Analysis Year	Background AM - 2020								
Peak Hour Factor	0.83						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	17	23	18	0	0	68	77	1	83	81	0	0	24	18	55	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	52			223			79			187						
Exiting Flow ( $V_{ex}$ ), pc/h	59			253			215			44						
Entry Flow ( $V_e$ ), pc/h		71			179			202			119					
Entry Volume veh/h		70			175			198			117					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		1072			905			1043			937					
Capacity (c), veh/h		1049			886			1021			918					
v/c Ratio (X)		0.07			0.20			0.19			0.13					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		4.0			6.1			5.3			5.1					
Lane LOS		A			A			A			A					
Lane 95% Queue		0.2			0.7			0.7			0.4					
Approach Delay, s/veh	4.01			6.05			5.34			5.13						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	5.35															
Intersection LOS	A															

1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)



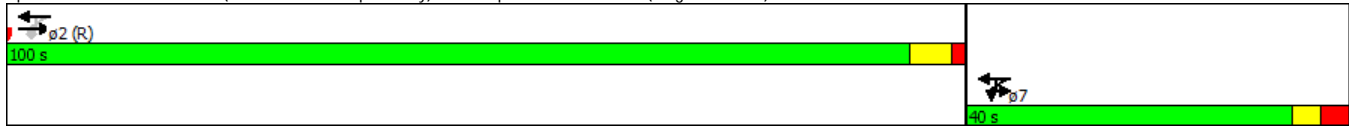
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1841	124	4	164	0	0	0
Future Volume (vph)	1841	124	4	164	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.100			
Satd. Flow (perm)	5060	1575	0	187	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		127					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1879	127	0	171	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	118.3	118.3		130.0			
Actuated g/C Ratio	0.84	0.84		0.93			
v/c Ratio	0.44	0.09		0.56			
Control Delay	3.3	0.6		23.6			
Queue Delay	0.0	0.0		0.0			
Total Delay	3.3	0.6		23.6			
LOS	A	A		C			
Approach Delay	3.1						
Approach LOS	A						
Queue Length 50th (ft)	113	0		75			
Queue Length 95th (ft)	185	11		164			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4275	1350		578			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.44	0.09		0.30			

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	5 (4%), Referenced to phase 2:EBWB and 6:, Start of Green
Natural Cycle:	40
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.56

Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 102.3%	ICU Level of Service G
Analysis Period (min) 15	
Description: 05-2153	

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔			↔↔↔	↔		↔	↔↔			
Traffic Volume (vph)	5	320	2512	0	0	1345	511	64	4	559	0	0	0
Future Volume (vph)	5	320	2512	0	0	1345	511	64	4	559	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	5060	1575	0	1761	2759	0	0	0
Flt Permitted		0.950							0.955				
Satd. Flow (perm)	0	3450	5111	0	0	5060	1575	0	1761	2759	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							527			76			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	335	2590	0	0	1387	527	0	70	576	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	99.8			69.8	69.8		30.2	30.2			
Actuated g/C Ratio		0.18	0.71			0.50	0.50		0.22	0.22			
v/c Ratio		0.54	0.71			0.55	0.50		0.18	0.88			
Control Delay		62.7	17.8			11.1	2.1		44.6	61.5			
Queue Delay		0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay		62.7	17.8			11.1	2.1		44.6	61.5			
LOS		E	B			B	A		D	E			
Approach Delay			22.9			8.6			59.6				
Approach LOS			C			A			E				
Queue Length 50th (ft)		156	586			108	7		52	254			
Queue Length 95th (ft)		212	705			139	14		93	322			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	3644			2524	1049		440	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		0.54	0.71			0.55	0.50		0.16	0.77			

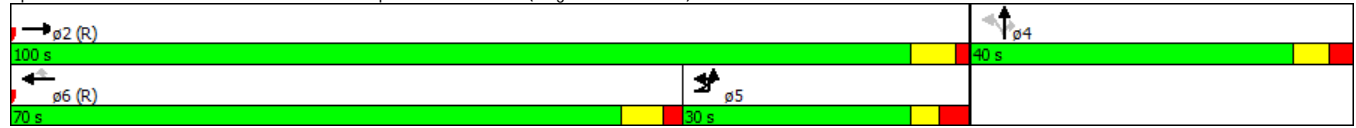
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 35 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88

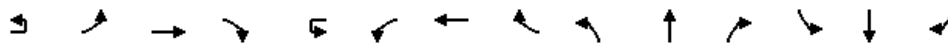
Intersection Signal Delay: 22.3  
Intersection Capacity Utilization 76.4%  
Analysis Period (min) 15  
Description: 05-2152

Intersection LOS: C  
ICU Level of Service D

Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business







Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔	↔↔↔	↔	↔↔	↔	↔	↔↔	↔	↔
Traffic Volume (vph)	17	451	2217	201	6	37	1451	65	183	39	60	123	25	90
Future Volume (vph)	17	451	2217	201	6	37	1451	65	183	39	60	123	25	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				97				81			130			35
Link Speed (mph)			45				45			35				35
Link Distance (ft)			1128				1286			476				408
Travel Time (s)			17.1				19.5			9.3				7.9
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														38%
Lane Group Flow (vph)	0	473	2239	203	0	43	1466	66	185	39	61	124	60	56
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	93.7	108.5	7.8	9.3	80.3	92.2	12.9	11.5	23.1	10.9	9.6	31.8	
Actuated g/C Ratio	0.14	0.67	0.78	0.07	0.07	0.57	0.66	0.09	0.08	0.16	0.08	0.07	0.23	
v/c Ratio	0.96	0.65	0.16	0.37	0.51	0.06	0.60	0.26	0.17	0.46	0.42	0.13		
Control Delay	74.2	8.5	1.3	79.5	10.3	1.5	68.8	63.7	1.0	67.2	39.8	0.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	74.2	8.5	1.3	79.5	10.3	1.5	68.8	63.7	1.0	67.2	39.8	0.6		
LOS		E	A	A		E	B	A	E	E	A	E	D	A
Approach Delay			18.6				11.8			53.6			44.8	
Approach LOS			B				B			D			D	
Queue Length 50th (ft)		225	217	7		40	170	3	85	34	0	56	23	0
Queue Length 95th (ft)		#331	289	m13		m75	234	m10	122	71	0	89	73	0
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		492	3420	1269		251	2902	1096	369	196	475	367	204	439
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.96	0.65	0.16		0.17	0.51	0.06	0.50	0.20	0.13	0.34	0.29	0.13

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 50 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96

Intersection Signal Delay: 19.7 Intersection LOS: B

Intersection Capacity Utilization 77.0% ICU Level of Service D

Analysis Period (min) 15

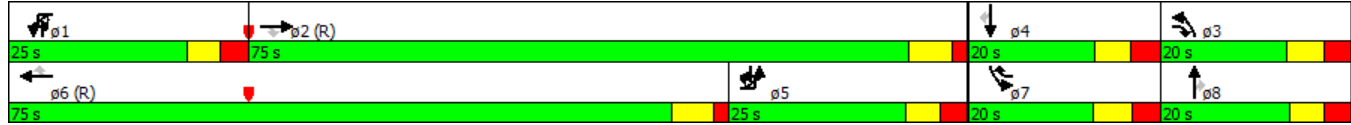
Description: 05-2152

# 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: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔↔	↔↔↔	↔	↔↔	↔			↔↔	↔	↔
Traffic Volume (vph)	7	207	1743	488	63	233	1047	172	329	89	143	4	373	87	159
Future Volume (vph)	7	207	1743	488	63	233	1047	172	329	89	143	4	373	87	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%			-2%				0%	
Storage Length (ft)		350		200		300		175	275		650		150		150
Storage Lanes		2		1		2		1	1		1		1		1
Taper Length (ft)		300				300			100				100		
Satd. Flow (prot)	0	3433	5085	1583	0	3433	5085	1583	3467	1708	0	0	3433	1681	1504
Flt Permitted		0.950				0.950			0.950				0.950		
Satd. Flow (perm)	0	3433	5085	1583	0	3433	5085	1583	3467	1708	0	0	3433	1681	1504
Right Turn on Red				Yes				Yes			Yes				Yes
Satd. Flow (RTOR)				292				183		48				15	141
Link Speed (mph)			45				45			35				35	
Link Distance (ft)			1286				1388			850				597	
Travel Time (s)			19.5				21.0			16.6				11.6	
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)															
Mid-Block Traffic (%)			0%				0%			0%				0%	
Shared Lane Traffic (%)															27%
Lane Group Flow (vph)	0	227	1854	519	0	315	1114	183	350	247	0	0	401	139	123
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7!	3	8		7!	7	4	5!
Permitted Phases				2				6							4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	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	7.0
Minimum Split (s)	23.0	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	16.0	15.0	23.0
Total Split (s)	25.0	25.0	65.0	25.0	25.0	25.0	65.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0
Total Split (%)	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%		17.9%	17.9%	17.9%	17.9%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.0	3.8	3.0
All-Red Time (s)	4.1	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	4.1	3.1	4.1
Lost Time Adjust (s)		-2.1	-2.1	-1.8			-2.4	-1.6	-2.1	-1.8			-2.1	-1.9	-2.1
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	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)		20.0	62.7	86.4			18.4	61.1	80.7	18.7			19.6	20.2	40.2
Actuated g/C Ratio		0.14	0.45	0.62			0.13	0.44	0.58	0.13			0.14	0.14	0.29
v/c Ratio		0.46	0.81	0.48			0.70	0.50	0.18	0.76			0.84	0.55	0.23
Control Delay		45.6	25.0	1.9			63.0	18.9	1.3	69.4			74.4	58.3	3.3
Queue Delay		0.0	0.0	0.0			0.0	0.0	0.0	0.0			0.0	0.0	0.0
Total Delay		45.6	25.0	1.9			63.0	18.9	1.3	69.4			74.4	58.3	3.3
LOS		D	C	A			E	B	A	E			E	E	A
Approach Delay			22.2				25.5			73.7					57.9
Approach LOS			C				C			E					E
Queue Length 50th (ft)		90	419	9			126	225	12	158			185	111	0
Queue Length 95th (ft)		136	469	4			m181	186	m14	213			#258	188	25
Internal Link Dist (ft)			1206					1308						517	
Turn Bay Length (ft)		350		200			300		175	275			150		150
Base Capacity (vph)		490	2278	1100			490	2220	994	495	285		490	257	531
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		0.46	0.81	0.47			0.64	0.50	0.18	0.71			0.82	0.54	0.23

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 57 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 33.1 Intersection LOS: C

Intersection Capacity Utilization 83.0% ICU Level of Service E

Analysis Period (min) 15

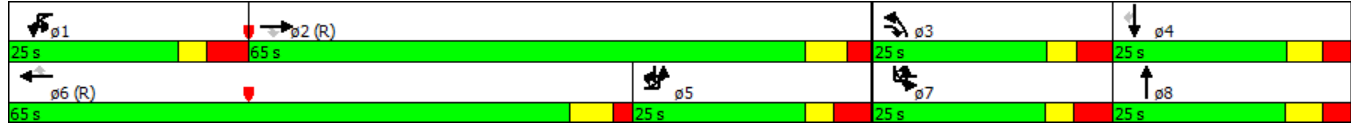
Description: 05-2148

# 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: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	33	5	2351	15	1709	5	26	14
Future Volume (vph)	33	5	2351	15	1709	5	26	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1770	5085	1770	3539	0	1720	0
Flt Permitted		0.950		0.950			0.969	
Satd. Flow (perm)	0	1770	5085	1770	3539	0	1720	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			1388		888		288	
Travel Time (s)			21.0		13.5		7.9	
Confl. Peds. (#/hr)		1				1		
Confl. Bikes (#/hr)								
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	38	2375	15	1731	0	40	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.4%
	ICU Level of Service B
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh	4.1
------------------	-----

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	33	5	2351	15	1709	5	26	14
Future Vol, veh/h	33	5	2351	15	1709	5	26	14
Conflicting Peds, #/hr	0	1	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	99	99	99	99	99	99	99	99
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	33	5	2375	15	1726	5	26	14

Major/Minor	Major1			Major2			Minor2	
Conflicting Flow All	1278	1731	0	1734	-	0	2786	867
Stage 1	-	-	-	-	-	-	1759	-
Stage 2	-	-	-	-	-	-	1027	-
Critical Hdwy	6.44	4.14	-	5.64	-	-	6.29	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.04	-
Follow-up Hdwy	2.52	2.22	-	2.32	-	-	3.67	3.32
Pot Cap-1 Maneuver	220	360	-	170	-	-	~ 23	296
Stage 1	-	-	-	-	-	-	122	-
Stage 2	-	-	-	-	-	-	282	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	222	222	-	170	-	-	~ 23	296
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 23	-
Stage 1	-	-	-	-	-	-	122	-
Stage 2	-	-	-	-	-	-	282	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0.2	\$ 395
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	222	-	170	-	-	34
HCM Lane V/C Ratio	0.173	-	0.089	-	-	1.188
HCM Control Delay (s)	24.6	-	28.2	-	-	\$ 395
HCM Lane LOS	C	-	D	-	-	F
HCM 95th %tile Q(veh)	0.6	-	0.3	-	-	4.3

**Notes**  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↔	↕	↔	↔	↕			↕	↔			
Traffic Volume (vph)	0	0	0	47	1564	27	158	17	0	0	28	23			
Future Volume (vph)	0	0	0	47	1564	27	158	17	0	0	28	23			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.961							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						23						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							45%								
Lane Group Flow (vph)	0	0	0	51	1700	29	95	95	0	0	30	25			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				8.3	92.1	113.0	25.9	25.9			8.8	8.8			
Actuated g/C Ratio				0.06	0.66	0.81	0.18	0.18			0.06	0.06			
v/c Ratio				0.49	0.73	0.02	0.31	0.31			0.26	0.11			
Control Delay				78.9	20.3	1.3	15.3	15.2			67.8	1.0			
Queue Delay				0.0	0.0	0.0	1.4	1.4			0.0	0.0			
Total Delay				78.9	20.3	1.3	16.7	16.6			67.8	1.0			
LOS				E	C	A	B	B			E	A			
Approach Delay					21.7			16.6			37.4				
Approach LOS					C			B			D				
Queue Length 50th (ft)				46	521	1	18	18			27	0			
Queue Length 95th (ft)				90	766	7	27	27			61	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2317	1343	385	390			197	289			
Starvation Cap Reductn				0	0	0	167	170			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				0.20	0.73	0.02	0.44	0.43			0.15	0.09			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)

Intersection Signal Delay: 21.6

Intersection LOS: C

Intersection Capacity Utilization 122.9%

ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)







Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↗	↘					↑	↖	↗	↘	↙			
Traffic Volume (vph)	46	2100	214	0	0	0	0	104	62	57	32	0			
Future Volume (vph)	46	2100	214	0	0	0	0	104	62	57	32	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		275	0		0	0		0	0		0			
Storage Lanes	1		1	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	3504	1567	0	0	0	0	1816	1544	1706	1769	0			
Flt Permitted	0.950									0.950	0.985				
Satd. Flow (perm)	1752	3504	1567	0	0	0	0	1816	1544	1706	1769	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)			152						139						
Link Speed (mph)		45			30			25				25			
Link Distance (ft)		941			722			405				148			
Travel Time (s)		14.3			16.4			11.0				4.0			
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%				0%			
Shared Lane Traffic (%)										23%					
Lane Group Flow (vph)	47	2165	221	0	0	0	0	107	64	45	47	0			
Turn Type	Prot	NA	custom					NA	Perm	Split	NA				
Protected Phases	5!	2	3					3		14!	14!		1	4	6
Permitted Phases			2						3						
Detector Phase	5	2	3					3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0	7.0					7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0	14.0					14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0	25.0					25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%	17.9%					17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3	3.2					3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3	2.6					2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6	-0.8					-0.8	-0.8						
Total Lost Time (s)	5.0	5.0	5.0					5.0	5.0						
Lead/Lag	Lead	Lag	Lag					Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes					Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max	None					None	None				None	None	C-Max
Act Effect Green (s)	8.3	94.4	109.8					13.4	13.4	16.6	16.6				
Actuated g/C Ratio	0.06	0.67	0.78					0.10	0.10	0.12	0.12				
v/c Ratio	0.46	0.92	0.18					0.62	0.23	0.22	0.22				
Control Delay	93.4	17.4	0.2					75.6	2.0	8.1	8.3				
Queue Delay	0.0	0.0	0.0					0.0	0.0	0.2	0.2				
Total Delay	93.4	17.4	0.2					75.6	2.0	8.3	8.5				
LOS	F	B	A					E	A	A	A				
Approach Delay		17.3						48.1			8.4				
Approach LOS		B						D			A				
Queue Length 50th (ft)	45	927	0					96	0	4	5				
Queue Length 95th (ft)	m60	#1297	m1					154	0	8	8				
Internal Link Dist (ft)		861			642			325			68				
Turn Bay Length (ft)	150		275												
Base Capacity (vph)	187	2361	1304					259	339	344	357				
Starvation Cap Reductn	0	0	0					0	0	85	89				
Spillback Cap Reductn	0	0	0					0	0	0	0				
Storage Cap Reductn	0	0	0					0	0	0	0				
Reduced v/c Ratio	0.25	0.92	0.17					0.41	0.19	0.17	0.18				

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green  
 Natural Cycle: 120  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92

Intersection Signal Delay: 19.0 Intersection LOS: B

Intersection Capacity Utilization 122.9% ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

# 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: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (vph)	59	45	20	17	26	68	5	51	11	4	113	87	17
Future Volume (vph)	59	45	20	17	26	68	5	51	11	4	113	87	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%				0%	
Storage Length (ft)	0		0	0		0	0		0		0		0
Storage Lanes	0		0	0		0	0		0		0		0
Taper Length (ft)	25			25			25				25		
Satd. Flow (prot)	0	1780	0	0	1694	0	0	1769	0	0	0	1796	0
Flt Permitted		0.977			0.992			0.997				0.974	
Satd. Flow (perm)	0	1780	0	0	1694	0	0	1769	0	0	0	1796	0
Link Speed (mph)		25			25			25				25	
Link Distance (ft)		388			485			508				405	
Travel Time (s)		10.6			13.2			13.9				11.0	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%			0%			0%				0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	133	0	0	119	0	0	72	0	0	0	238	0
Sign Control		Stop			Stop			Free				Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 38.9%	ICU Level of Service A
Analysis Period (min)	15



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (veh/h)	59	45	20	17	26	68	5	51	11	4	113	87	17
Future Volume (Veh/h)	59	45	20	17	26	68	5	51	11	4	113	87	17
Sign Control		Stop			Stop			Free				Free	
Grade		0%			0%			5%				0%	
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
Hourly flow rate (vph)	63	48	22	18	28	73	5	55	12	0	122	94	18
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type													
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume													
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol													
IC, single (s)													
IC, 2 stage (s)													
IF (s)													
p0 queue free %													
cM capacity (veh/h)													
Direction, Lane #													
Volume Total													
Volume Left													
Volume Right													
cSH													
Volume to Capacity													
Queue Length 95th (ft)													
Control Delay (s)													
Lane LOS													
Approach Delay (s)													
Approach LOS													
Intersection Summary													
Average Delay													
Intersection Capacity Utilization													
Analysis Period (min)													
ICU Level of Service													



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	106	74	89	4	34	44	27	96	4	73	115	98
Future Volume (vph)	106	74	89	4	34	44	27	96	4	73	115	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			-2%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1745	0	0	1723	0	0	1853	0	0	1754	0
Flt Permitted		0.981			0.998			0.989			0.987	
Satd. Flow (perm)	0	1745	0	0	1723	0	0	1853	0	0	1754	0
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		518			573			488			160	
Travel Time (s)		10.1			13.0			9.5			3.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	295	0	0	89	0	0	139	0	0	314	0
Sign Control		Yield			Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	51.3%
ICU Level of Service	A
Analysis Period (min)	15

ROUNDBABOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name	Wide Waters Parkway								
Time Period	PM Peak Hour						Analysis Year	Background PM - 2020								
Peak Hour Factor	0.91						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	106	74	89	0	2	34	44	0	27	96	1	0	73	115	98	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	213			257			284			70						
Exiting Flow ( $V_{ex}$ ), pc/h	166			178			276			231						
Entry Flow ( $V_e$ ), pc/h		302			90			139			321					
Entry Volume veh/h		296			88			136			315					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		913			874			851			1053					
Capacity (c), veh/h		894			856			833			1031					
v/c Ratio (X)		0.33			0.10			0.16			0.31					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		7.7			5.2			6.0			6.5					
Lane LOS		A			A			A			A					
Lane 95% Queue		1.5			0.3			0.6			1.3					
Approach Delay, s/veh	7.66			5.20			5.98			6.54						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	6.71															
Intersection LOS	A															

**Appendix G:**  
**Synchro, SimTraffic, & HCS Output:**  
**Build-out (2020)**

1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1234	104	4	245	0	0	0
Future Volume (vph)	1234	104	4	245	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.187			
Satd. Flow (perm)	5060	1543	0	350	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		113					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)		1		1			
Confl. Bikes (#/hr)							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1341	113	0	270	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	118.1	118.1		130.0			
Actuated g/C Ratio	0.84	0.84		0.93			
v/c Ratio	0.31	0.09		0.61			
Control Delay	2.8	0.6		12.8			
Queue Delay	0.0	0.0		0.0			
Total Delay	2.8	0.6		12.8			
LOS	A	A		B			
Approach Delay	2.6						
Approach LOS	A						
Queue Length 50th (ft)	65	0		46			
Queue Length 95th (ft)	124	12		119			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4267	1318		694			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.31	0.09		0.39			

Intersection Summary

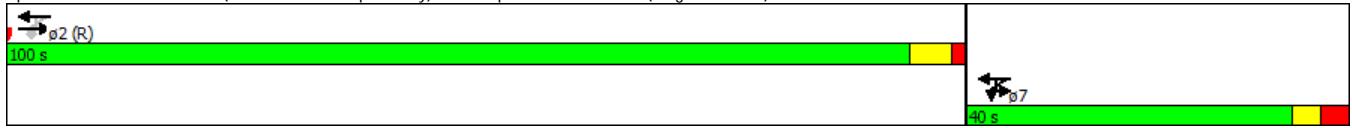
Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	25 (18%), Referenced to phase 2:EBWB and 6.; Start of Green
Natural Cycle:	40
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.61



Intersection Signal Delay: 4.2  
Intersection Capacity Utilization 55.4%  
Analysis Period (min) 15  
Description: 05-2153

Intersection LOS: A  
ICU Level of Service B

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





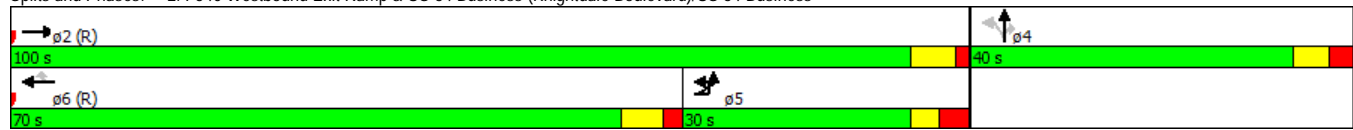
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑↑			↑↑↑	↑		↑	↑↑			
Traffic Volume (vph)	4	469	1144	0	0	1524	818	38	4	276	0	0	0
Future Volume (vph)	4	469	1144	0	0	1524	818	38	4	276	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	4963	1545	0	1714	2680	0	0	0
Flt Permitted		0.950							0.957				
Satd. Flow (perm)	0	3450	5111	0	0	4963	1545	0	1714	2680	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							637			178			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)				1	1								
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	503	1217	0	0	1621	870	0	44	294	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	118.0			88.0	88.0		12.0	12.0			
Actuated g/C Ratio		0.18	0.84			0.63	0.63		0.09	0.09			
v/c Ratio		0.82	0.28			0.52	0.72		0.30	0.75			
Control Delay		74.2	4.1			4.4	6.1		63.8	36.2			
Queue Delay		0.0	0.0			0.0	1.1		0.0	0.0			
Total Delay		74.2	4.1			4.4	7.1		63.8	36.2			
LOS		E	A			A	A		E	D			
Approach Delay			24.6			5.3			39.8				
Approach LOS			C			A			D				
Queue Length 50th (ft)		200	62			95	32		38	58			
Queue Length 95th (ft)		#313	190			85	146		76	110			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	4306			3118	1207		428	803			
Starvation Cap Reductn		0	0			0	143		0	0			
Spillback Cap Reductn		0	0			0	0		0	0			
Storage Cap Reductn		0	0			0	0		0	0			
Reduced v/c Ratio		0.82	0.28			0.52	0.82		0.10	0.37			

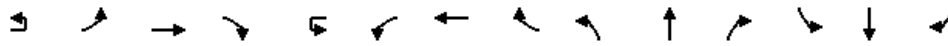
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 70 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.82

Intersection Signal Delay: 15.2	Intersection LOS: B
Intersection Capacity Utilization 82.5%	ICU Level of Service E
Analysis Period (min) 15	
Description: 05-2152	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business



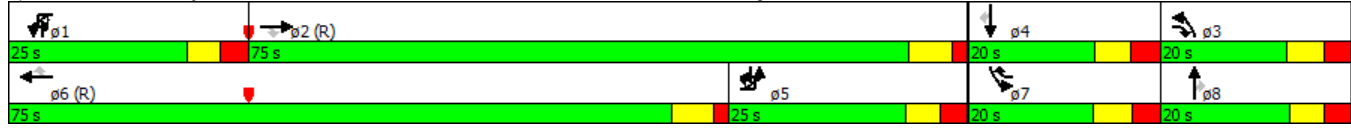


Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔	↔↔↔	↔	↔↔	↔	↔	↔↔	↔	↔
Traffic Volume (vph)	4	92	1232	51	4	18	2073	21	276	5	92	9	4	14
Future Volume (vph)	4	92	1232	51	4	18	2073	21	276	5	92	9	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3417	5061	1576	0	1761	5060	1575	3382	1835	1560	2943	1380	1289
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3416	5061	1576	0	1761	5060	1556	3382	1835	1560	2943	1380	1289
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				82				81			130			126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)		1						1						
Confl. Bikes (#/hr)														
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	19%	19%	19%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														39%
Lane Group Flow (vph)	0	104	1339	55	0	24	2253	23	300	5	100	10	10	9
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	95.9	117.6		8.6	84.5	97.5	17.8	11.1	13.8	13.1	8.9	22.8	
Actuated g/C Ratio	0.14	0.68	0.84		0.06	0.60	0.70	0.13	0.08	0.10	0.09	0.06	0.16	
v/c Ratio		0.21	0.39	0.04		0.22	0.74	0.02	0.70	0.03	0.37	0.04	0.11	0.03
Control Delay		51.4	7.1	0.3		92.1	6.0	0.0	67.4	56.4	6.7	57.7	44.1	0.1
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		51.4	7.1	0.3		92.1	6.0	0.0	67.4	56.4	6.7	57.7	44.1	0.1
LOS		D	A	A		F	A	A	E	E	A	E	D	A
Approach Delay			9.9				6.8			52.3			35.1	
Approach LOS			A				A			D			D	
Queue Length 50th (ft)		44	145	0		24	103	0	136	4	0	4	4	0
Queue Length 95th (ft)		74	276	2		m33	129	m0	183	18	25	14	24	0
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		488	3466	1340		251	3052	1147	436	211	387	349	153	315
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.21	0.39	0.04		0.10	0.74	0.02	0.69	0.02	0.26	0.03	0.07	0.03

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.74

Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 67.3%	ICU Level of Service C
Analysis Period (min) 15	
Description: 05-2152	
m Volume for 95th percentile queue is metered by upstream signal.	
! Phase conflict between lane groups.	

Splits and Phases: 3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	133	1105	104	34	131	1741	60	132	14	81	73	10	111
Future Volume (vph)	133	1105	104	34	131	1741	60	132	14	81	73	10	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			-2%			0%			
Storage Length (ft)	350		200		300		175	275		650	150		150
Storage Lanes	2		1		2		1	1		1	1		1
Taper Length (ft)	300				300			100			100		
Satd. Flow (prot)	3400	5036	1568	0	3433	5085	1583	3467	1641	0	3433	1547	1504
Flt Permitted	0.950				0.950			0.950			0.950		
Satd. Flow (perm)	3399	5036	1568	0	3433	5085	1563	3467	1641	0	3433	1547	1504
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)			120				87		93			59	141
Link Speed (mph)		45				45			35			35	
Link Distance (ft)		1286				1388			814			593	
Travel Time (s)		19.5				21.0			15.9			11.6	
Confl. Peds. (#/hr)	1						1						
Confl. Bikes (#/hr)													
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													46%
Lane Group Flow (vph)	153	1270	120	0	190	2001	69	152	109	0	84	70	69
Turn Type	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	1	6	7	3	8		7	4	5
Permitted Phases			2				6						4
Detector Phase	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase													
Minimum Initial (s)	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)	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	15.0	23.0
Total Split (s)	30.0	65.0	25.0	25.0	25.0	60.0	25.0	25.0	25.0		25.0	25.0	30.0
Total Split (%)	21.4%	46.4%	17.9%	17.9%	17.9%	42.9%	17.9%	17.9%	17.9%		17.9%	17.9%	21.4%
Yellow Time (s)	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.8	3.0
All-Red Time (s)	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	3.1	4.1
Lost Time Adjust (s)	-2.1	-2.1	-1.8		-2.4	-1.6	-2.1	-1.8	-2.1		-2.1	-1.9	-2.1
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	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
Recall Mode	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effect Green (s)	25.0	83.5	103.6		14.5	73.0	83.2	15.1	11.8		10.3	9.7	32.9
Actuated g/C Ratio	0.18	0.60	0.74		0.10	0.52	0.59	0.11	0.08		0.07	0.07	0.24
v/c Ratio	0.25	0.42	0.10		0.54	0.76	0.07	0.41	0.49		0.33	0.43	0.15
Control Delay	40.0	10.1	0.2		80.7	18.5	1.9	62.6	23.2		64.9	27.4	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	40.0	10.1	0.2		80.7	18.5	1.9	62.6	23.2		64.9	27.4	0.7
LOS	D	B	A		F	B	A	E	C		E	C	A
Approach Delay		12.3				23.3			46.1			33.3	
Approach LOS		B				C			D			C	
Queue Length 50th (ft)	63	101	0		89	202	0	69	14		38	10	0
Queue Length 95th (ft)	92	113	1		m115	354	m11	100	67		62	57	0
Internal Link Dist (ft)		1206				1308			734			513	
Turn Bay Length (ft)	350		200		300		175	275			150		150
Base Capacity (vph)	607	3002	1248		490	2650	1069	511	314		490	271	461
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	0.25	0.42	0.10		0.39	0.76	0.06	0.30	0.35		0.17	0.26	0.15

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 21.2

Intersection LOS: C

Intersection Capacity Utilization 62.4%

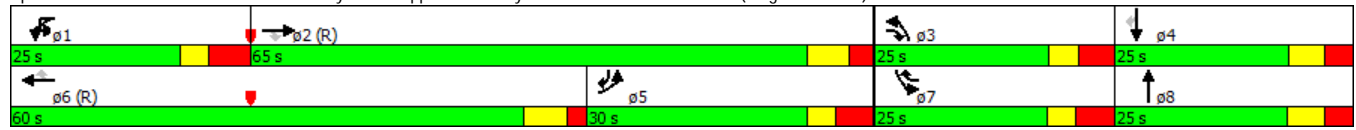
ICU Level of Service B

Analysis Period (min) 15

Description: 05-2148

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

Splits and Phases: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔↔↔	↔	↔	↔↔		↔	↔	↔		↔	↔
Traffic Volume (vph)	15	30	1083	87	89	1838	15	198	4	35	5	4	24
Future Volume (vph)	15	30	1083	87	89	1838	15	198	4	35	5	4	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%			0%			0%			0%	
Storage Length (ft)		250		100	300		0	250		100	0		75
Storage Lanes		1		1	1		0	1		1	0		1
Taper Length (ft)		100			100			100			25		
Satd. Flow (prot)	0	1752	5036	1583	1770	3536	0	1681	1688	1583	0	1225	850
Flt Permitted		0.950			0.950			0.950	0.954			0.973	
Satd. Flow (perm)	0	1752	5036	1583	1770	3536	0	1681	1688	1583	0	1225	850
Right Turn on Red				Yes			Yes			No			Yes
Satd. Flow (RTOR)				86		1							140
Link Speed (mph)			45			45			25			25	
Link Distance (ft)			1388			568			518			288	
Travel Time (s)			21.0			8.6			14.1			7.9	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.98	0.98	0.98	0.90	0.90	0.98	0.98	0.90	0.90	0.90	0.98	0.90	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	90%	2%	90%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)								49%					
Lane Group Flow (vph)	0	46	1105	97	99	1891	0	112	112	39	0	9	24
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA		Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	5!	5	2	3	1	6		3	3	1	4	4	5!
Permitted Phases				2						3			4
Detector Phase	5	5	2	3	1	6		3	3	1	4	4	5
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	20.0	14.0	14.0	20.0		14.0	14.0	14.0	20.0	20.0	14.0
Total Split (s)	20.0	20.0	75.0	25.0	20.0	75.0		25.0	25.0	20.0	20.0	20.0	20.0
Total Split (%)	14.3%	14.3%	53.6%	17.9%	14.3%	53.6%		17.9%	17.9%	14.3%	14.3%	14.3%	14.3%
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	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	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	1.0		-2.0	-2.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0		5.0	5.0	8.0		5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lead	Lag
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		None	None	None	None	None	None
Act Effect Green (s)	13.8	92.3	111.9	14.1	95.4	15.7		15.7	15.7	31.8		9.1	16.7
Actuated g/C Ratio	0.10	0.66	0.80	0.10	0.68	0.11		0.11	0.11	0.23		0.06	0.12
v/c Ratio		0.27	0.33	0.08	0.56	0.78		0.60	0.59	0.11		0.11	0.11
Control Delay		44.5	7.5	0.3	72.0	11.6		71.5	71.3	40.1		64.9	1.0
Queue Delay		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay		44.5	7.5	0.3	72.0	11.6		71.5	71.3	40.1		64.9	1.0
LOS		D	A	A	E	B		E	E	D		E	A
Approach Delay			8.3			14.6			66.8			18.4	
Approach LOS			A			B			E			B	
Queue Length 50th (ft)		40	82	0	82	238		104	104	28		8	0
Queue Length 95th (ft)		64	107	4	m88	#1120		166	166	55		27	0
Internal Link Dist (ft)			1308			488			438			208	
Turn Bay Length (ft)		250		100	300			250		100			75
Base Capacity (vph)		187	3318	1332	202	2409		243	244	381		131	231
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		0.25	0.33	0.07	0.49	0.78		0.46	0.46	0.10		0.07	0.10

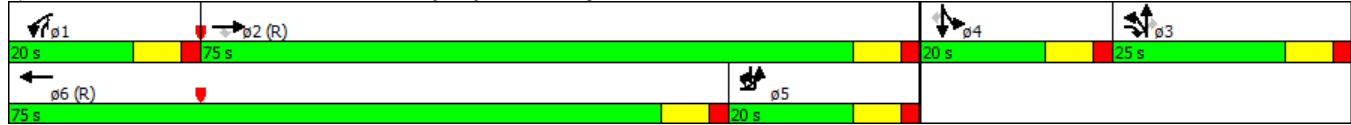
**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 68 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78



5: Site Drive/Wake Stone Rock Quarry Drwy. & US 64 (Knightdale Boulevard)

Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 85.5%	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.	
! Phase conflict between lane groups.	

Splits and Phases: 5: Site Drive/Wake Stone Rock Quarry Drwy. & US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	41	1993	28	96	18	0	0	4	5			
Future Volume (vph)	0	0	0	41	1993	28	96	18	0	0	4	5			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.967							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						22						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							41%								
Lane Group Flow (vph)	0	0	0	44	2143	30	61	61	0	0	4	5			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				7.9	96.3	116.1	25.0	25.0			8.2	8.2			
Actuated g/C Ratio				0.06	0.69	0.83	0.18	0.18			0.06	0.06			
v/c Ratio				0.44	0.88	0.02	0.21	0.20			0.04	0.02			
Control Delay				77.5	25.2	1.3	6.3	6.2			63.0	0.2			
Queue Delay				0.0	0.0	0.0	0.8	0.8			0.0	0.0			
Total Delay				77.5	25.2	1.3	7.1	7.1			63.0	0.2			
LOS				E	C	A	A	A			E	A			
Approach Delay					26.0			7.1			28.1				
Approach LOS					C			A			C				
Queue Length 50th (ft)				40	844	1	4	4			4	0			
Queue Length 95th (ft)				80	#1216	7	3	3			17	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2422	1385	382	388			197	289			
Starvation Cap Reductn				0	0	0	174	179			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				0.18	0.88	0.02	0.29	0.29			0.02	0.02			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 25.0 Intersection LOS: C

Intersection Capacity Utilization 99.2% ICU Level of Service F

Analysis Period (min) 15

Description: 05-0020

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

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↖↖↖						↖	↖	↖	↖				
Traffic Volume (vph)	32	1120	36	0	0	0	0	93	29	16	37	0			
Future Volume (vph)	32	1120	36	0	0	0	0	93	29	16	37	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		0	0		0	0		0	0		0			
Storage Lanes	1		0	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	5009	0	0	0	0	0	1816	1544	1706	1793	0			
Flt Permitted	0.950									0.950	0.998				
Satd. Flow (perm)	1752	5009	0	0	0	0	0	1816	1544	1706	1793	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		4							139						
Link Speed (mph)		45			30			25			25				
Link Distance (ft)		941			722			372			148				
Travel Time (s)		14.3			16.4			10.1			4.0				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	36	1284	0	0	0	0	0	103	32	16	43	0			
Turn Type	Prot	NA						NA	Perm	Split	NA				
Protected Phases	5!	2						3		14!	14!		1	4	6
Permitted Phases									3						
Detector Phase	5	2						3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0						7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0						14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0						25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%						17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3						3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3						2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6						-0.8	-0.8						
Total Lost Time (s)	5.0	5.0						5.0	5.0						
Lead/Lag	Lead	Lag						Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes						Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max						None	None				None	None	C-Max
Act Effect Green (s)	7.7	98.4						13.1	13.1	13.8	13.8				
Actuated g/C Ratio	0.06	0.70						0.09	0.09	0.10	0.10				
v/c Ratio	0.38	0.36						0.61	0.12	0.10	0.24				
Control Delay	79.8	13.3						75.4	0.9	10.0	12.9				
Queue Delay	0.0	0.0						0.0	0.0	0.1	0.2				
Total Delay	79.8	13.3						75.4	0.9	10.1	13.1				
LOS	E	B						E	A	B	B				
Approach Delay		15.1						57.7			12.3				
Approach LOS		B						E			B				
Queue Length 50th (ft)	32	291						92	0	2	6				
Queue Length 95th (ft)	64	387						150	0	6	11				
Internal Link Dist (ft)		861			642			292			68				
Turn Bay Length (ft)	150														
Base Capacity (vph)	187	3520						259	339	315	331				
Starvation Cap Reductn	0	0						0	0	98	84				
Spillback Cap Reductn	0	0						0	0	0	0				
Storage Cap Reductn	0	0						0	0	0	0				
Reduced v/c Ratio	0.19	0.36						0.40	0.09	0.07	0.17				

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88

Intersection Signal Delay: 18.8

Intersection LOS: B

Intersection Capacity Utilization 99.2%

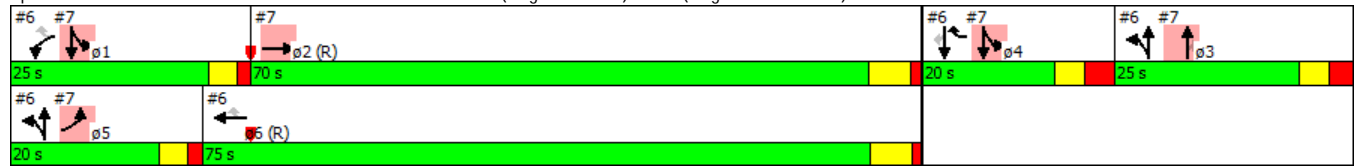
ICU Level of Service F

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	15	15	9	33	9	13	97	7	15	27	28
Future Volume (vph)	10	15	15	9	33	9	13	97	7	15	27	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1747	0	0	1800	0	0	1791	0	0	1745	0
Flt Permitted		0.987			0.991			0.994			0.990	
Satd. Flow (perm)	0	1747	0	0	1800	0	0	1791	0	0	1745	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		388			485			508			372	
Travel Time (s)		10.6			13.2			13.9			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	51	0	0	66	0	0	150	0	0	90	0
Sign Control		Stop			Stop			Free			Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 17.3%	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
Traffic Vol, veh/h	10	15	15	9	33	9	13	97	7	15	27	28
Future Vol, veh/h	10	15	15	9	33	9	13	97	7	15	27	28
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	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	19	19	12	42	12	17	124	9	19	35	36
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	280	258	53	272	271	129	71	0	0	133	0	0
Stage 1	91	91	-	162	162	-	-	-	-	-	-	-
Stage 2	189	167	-	110	109	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	672	646	1014	680	636	921	1529	-	-	1452	-	-
Stage 1	916	820	-	840	764	-	-	-	-	-	-	-
Stage 2	813	760	-	895	805	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	617	629	1014	639	620	921	1529	-	-	1452	-	-
Mov Cap-2 Maneuver	617	629	-	639	620	-	-	-	-	-	-	-
Stage 1	905	809	-	830	755	-	-	-	-	-	-	-
Stage 2	749	751	-	845	794	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.3			11			0.8			1.6		
HCM LOS	B			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1529	-	-	729	662	1452	-	-				
HCM Lane V/C Ratio	0.011	-	-	0.07	0.099	0.013	-	-				
HCM Control Delay (s)	7.4	0	-	10.3	11	7.5	0	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-				



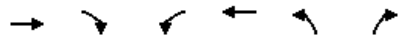
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕				↕			↕			↕	
Traffic Volume (vph)	17	36	18	4	14	82	77	83	81	13	24	18	55
Future Volume (vph)	17	36	18	4	14	82	77	83	81	13	24	18	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			-2%			0%	
Storage Length (ft)	0		0		0		0	0		0	0		0
Storage Lanes	0		0		0		0	0		0	0		0
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	1776	0	0	0	1744	0	0	1820	0	0	1701	0
Flt Permitted		0.988				0.995			0.977			0.988	
Satd. Flow (perm)	0	1776	0	0	0	1744	0	0	1820	0	0	1701	0
Link Speed (mph)		35				35			35			35	
Link Distance (ft)		518				573			488			217	
Travel Time (s)		10.1				11.2			9.5			4.2	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	85	0	0	0	214	0	0	214	0	0	117	0
Sign Control		Yield				Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	34.1%
ICU Level of Service	A
Analysis Period (min)	15



ROUNDBABOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name	Wide Waters Parkway								
Time Period	AM Peak Hour						Analysis Year	Build-out AM - 2020								
Peak Hour Factor	0.83						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	17	36	18	0	14	82	77	1	83	81	13	0	24	18	55	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	69			223			95			221						
Exiting Flow ( $V_{ex}$ ), pc/h	91			270			215			61						
Entry Flow ( $V_e$ ), pc/h		87			214			218			119					
Entry Volume veh/h		85			210			214			117					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		1054			905			1027			906					
Capacity (c), veh/h		1031			886			1005			887					
v/c Ratio (X)		0.08			0.24			0.21			0.13					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		4.2			6.5			5.6			5.3					
Lane LOS		A			A			A			A					
Lane 95% Queue		0.3			0.9			0.8			0.5					
Approach Delay, s/veh	4.22			6.50			5.61			5.33						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	5.67															
Intersection LOS	A															



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↑↑		↑
Traffic Volume (vph)	1047	77	0	1972	0	59
Future Volume (vph)	1047	77	0	1972	0	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		100	0		0	0
Storage Lanes		1	0		0	1
Taper Length (ft)			25		25	
Satd. Flow (prot)	5085	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	5085	1583	0	3539	0	1611
Link Speed (mph)	45			45	25	
Link Distance (ft)	568			320	360	
Travel Time (s)	8.6			4.8	9.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1163	86	0	2191	0	66
Sign Control	Free			Free	Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.8%
ICU Level of Service	B
Analysis Period (min)	15

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	1047	77	0	1972	0	59
Future Vol, veh/h	1047	77	0	1972	0	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1163	86	0	2191	0	66

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1163	0	2259	582
Stage 1	-	-	-	-	1163	-
Stage 2	-	-	-	-	1096	-
Critical Hdwy	-	-	5.34	-	6.29	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	3.12	-	3.67	3.92
Pot Cap-1 Maneuver	-	-	326	-	48	391
Stage 1	-	-	-	-	196	-
Stage 2	-	-	-	-	275	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	326	-	48	391
Mov Cap-2 Maneuver	-	-	-	-	48	-
Stage 1	-	-	-	-	196	-
Stage 2	-	-	-	-	275	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	391	-	-	326	-
HCM Lane V/C Ratio	0.168	-	-	-	-
HCM Control Delay (s)	16.1	-	-	0	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0	-

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10: RI/RO Site Drive & US 64 (Knightdale Boulevard) Performance by approach

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Approach	EB	WB	NB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Delay (hr)	0.5	1.5	0.1	2.1
Total Del/Veh (s)	1.6	2.6	5.4	2.3



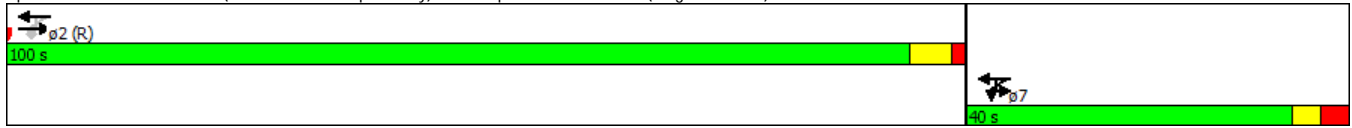
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1960	124	4	210	0	0	0
Future Volume (vph)	1960	124	4	210	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.084			
Satd. Flow (perm)	5060	1575	0	157	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		127					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	2000	127	0	218	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2 7		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2 7		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	114.1	114.1		130.0			
Actuated g/C Ratio	0.82	0.82		0.93			
v/c Ratio	0.49	0.10		0.66			
Control Delay	4.8	0.8		30.6			
Queue Delay	0.0	0.0		0.0			
Total Delay	4.8	0.8		30.6			
LOS	A	A		C			
Approach Delay	4.6						
Approach LOS	A						
Queue Length 50th (ft)	168	0		148			
Queue Length 95th (ft)	260	14		233			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4123	1307		556			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.49	0.10		0.39			

**Intersection Summary**

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 5 (4%), Referenced to phase 2:EBWB and 6:, Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.66

Intersection Signal Delay: 7.0	Intersection LOS: A
Intersection Capacity Utilization 107.6%	ICU Level of Service G
Analysis Period (min) 15	
Description: 05-2153	

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑↑			↑↑↑	↑		↑	↑↑			
Traffic Volume (vph)	5	320	2678	0	0	1507	557	64	4	607	0	0	0
Future Volume (vph)	5	320	2678	0	0	1507	557	64	4	607	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	5060	1575	0	1761	2759	0	0	0
Flt Permitted		0.950							0.955				
Satd. Flow (perm)	0	3450	5111	0	0	5060	1575	0	1761	2759	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							533			76			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	335	2761	0	0	1554	574	0	70	626	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	97.9			67.9	67.9		32.1	32.1			
Actuated g/C Ratio		0.18	0.70			0.48	0.48		0.23	0.23			
v/c Ratio		0.54	0.77			0.63	0.55		0.17	0.91			
Control Delay		64.0	19.4			12.7	2.4		43.4	63.6			
Queue Delay		0.0	0.5			0.0	0.0		0.0	0.0			
Total Delay		64.0	19.9			12.7	2.4		43.4	63.6			
LOS		E	B			B	A		D	E			
Approach Delay			24.7			9.9			61.6				
Approach LOS			C			A			E				
Queue Length 50th (ft)		157	684			318	6		51	278			
Queue Length 95th (ft)		205	739			133	12		93	#364			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	3574			2454	1038		440	746			
Starvation Cap Reductn		0	379			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		0.54	0.86			0.63	0.55		0.16	0.84			

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 35 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.91

Intersection Signal Delay: 23.7

Intersection LOS: C

Intersection Capacity Utilization 81.3%

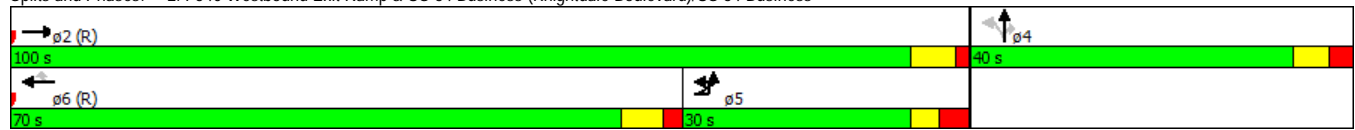
ICU Level of Service D

Analysis Period (min) 15

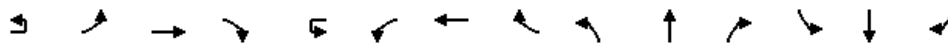
Description: 05-2152

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

Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business







Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔	↔↔↔	↔	↔↔	↔	↔	↔↔	↔	↔
Traffic Volume (vph)	17	451	2431	201	6	37	1660	65	183	39	60	123	25	90
Future Volume (vph)	17	451	2431	201	6	37	1660	65	183	39	60	123	25	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				89				81			130		35	126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														38%
Lane Group Flow (vph)	0	473	2456	203	0	43	1677	66	185	39	61	124	60	56
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	93.7	108.5	7.8	9.3	80.3	92.2	12.9	11.5	23.1	10.9	9.6	31.8	
Actuated g/C Ratio	0.14	0.67	0.78	0.07	0.07	0.57	0.66	0.09	0.08	0.16	0.08	0.07	0.23	
v/c Ratio	0.96	0.72	0.16	0.37	0.58	0.06	0.60	0.26	0.17	0.46	0.42	0.13		
Control Delay	71.6	9.7	1.4	78.9	13.0	1.4	68.8	63.7	1.0	67.2	39.8	0.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	71.6	9.7	1.4	78.9	13.0	1.4	68.8	63.7	1.0	67.2	39.8	0.6		
LOS		E	A	A		E	B	A	E	E	A	E	D	A
Approach Delay			18.5				14.2			53.6			44.8	
Approach LOS			B				B			D			D	
Queue Length 50th (ft)		226	243	7		41	224	3	85	34	0	56	23	0
Queue Length 95th (ft)		m#326	467	m16		m66	244	m7	122	71	0	89	73	0
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		492	3420	1267		251	2902	1096	369	196	475	367	204	439
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.96	0.72	0.16		0.17	0.58	0.06	0.50	0.20	0.13	0.34	0.29	0.13

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 50 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96

3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)

8/17/2016

Intersection Signal Delay: 20.1 Intersection LOS: C

Intersection Capacity Utilization 81.1% ICU Level of Service D

Analysis Period (min) 15

Description: 05-2152

# 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: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔↔	↔↔↔	↔	↔↔	↔			↔↔	↔	↔
Traffic Volume (vph)	7	207	1957	488	63	233	1256	172	329	89	143	4	373	87	159
Future Volume (vph)	7	207	1957	488	63	233	1256	172	329	89	143	4	373	87	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%			-2%				0%	
Storage Length (ft)		350		200		300		175	275		650		150		150
Storage Lanes		2		1		2		1	1		1		1		1
Taper Length (ft)		300				300			100				100		
Satd. Flow (prot)	0	3433	5085	1583	0	3433	5085	1583	3467	1708	0	0	3433	1681	1504
Flt Permitted		0.950				0.950			0.950				0.950		
Satd. Flow (perm)	0	3433	5085	1583	0	3433	5085	1583	3467	1708	0	0	3433	1681	1504
Right Turn on Red				Yes				Yes			Yes				Yes
Satd. Flow (RTOR)				292				180		48				15	141
Link Speed (mph)			45				45			35				35	
Link Distance (ft)			1286				1388			822				597	
Travel Time (s)			19.5				21.0			16.0				11.6	
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)															
Mid-Block Traffic (%)			0%				0%			0%					0%
Shared Lane Traffic (%)															27%
Lane Group Flow (vph)	0	227	2082	519	0	315	1336	183	350	247	0	0	401	139	123
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7!	3	8		7!	7	4	5!
Permitted Phases				2				6							4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	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	7.0
Minimum Split (s)	23.0	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	16.0	15.0	23.0
Total Split (s)	25.0	25.0	65.0	25.0	25.0	25.0	65.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0
Total Split (%)	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%		17.9%	17.9%	17.9%	17.9%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.0	3.8	3.0
All-Red Time (s)	4.1	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	4.1	3.1	4.1
Lost Time Adjust (s)		-2.1	-2.1	-1.8			-2.4	-1.6	-2.1	-1.8		-2.1	-1.9	-2.1	
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	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	62.7	86.4		18.4	61.1	80.7	18.7	19.3			19.6	20.2	40.2	
Actuated g/C Ratio	0.14	0.45	0.62		0.13	0.44	0.58	0.13	0.14			0.14	0.14	0.29	
v/c Ratio		0.46	0.91	0.48		0.70	0.60	0.19	0.76	0.89		0.84	0.55	0.23	
Control Delay		46.2	31.1	1.7		75.0	30.4	2.6	69.4	79.9		74.4	58.3	3.3	
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		46.2	31.1	1.7		75.0	30.4	2.6	69.4	79.9		74.4	58.3	3.3	
LOS		D	C	A		E	C	A	E	E		E	E	A	
Approach Delay			26.9				35.3			73.7				57.9	
Approach LOS			C				D			E				E	
Queue Length 50th (ft)		92	572	7		131	288	26	158	182		185	111	0	
Queue Length 95th (ft)		m128	#666	4		191	347	m40	213	#335		#258	188	25	
Internal Link Dist (ft)			1206				1308			742				517	
Turn Bay Length (ft)		350		200		300		175	275			150		150	
Base Capacity (vph)		490	2278	1100		490	2220	992	495	285		490	257	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		0.46	0.91	0.47		0.64	0.60	0.18	0.71	0.87		0.82	0.54	0.23	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 57 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.91

Intersection Signal Delay: 37.7 Intersection LOS: D

Intersection Capacity Utilization 87.1% ICU Level of Service E

Analysis Period (min) 15

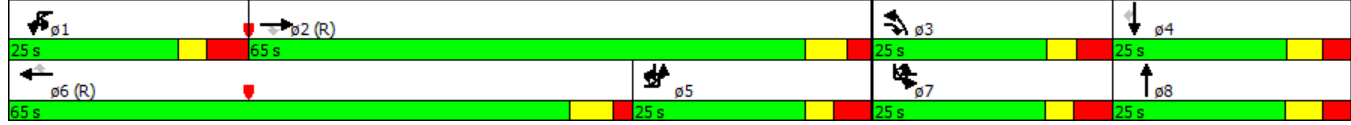
Description: 05-2148

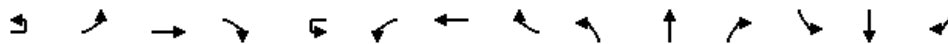
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

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

! Phase conflict between lane groups.

Splits and Phases: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





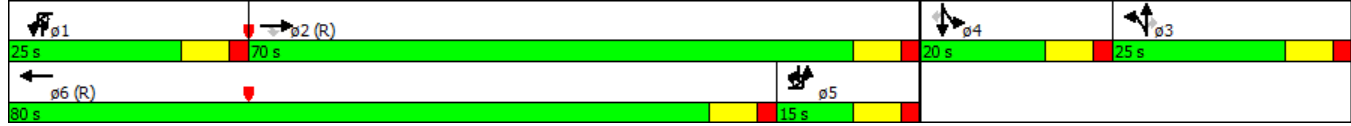
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔↔↔	↔		↔	↔↔		↔	↔	↔		↔	↔
Traffic Volume (vph)	33	5	2380	185	15	173	1585	5	331	4	84	26	4	14
Future Volume (vph)	33	5	2380	185	15	173	1585	5	331	4	84	26	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%			0%			0%	
Storage Length (ft)		250		100		300		0	250		100	0		75
Storage Lanes		1		1		1		0	1		1	0		1
Taper Length (ft)		100				100			100			25		
Satd. Flow (prot)	0	1770	5085	1583	0	1770	3539	0	1681	1686	1583	0	1785	1583
Flt Permitted		0.950				0.950			0.950	0.953			0.958	
Satd. Flow (perm)	0	1768	5085	1583	0	1770	3539	0	1681	1686	1583	0	1785	1583
Right Turn on Red				Yes				Yes			No			Yes
Satd. Flow (RTOR)				140										140
Link Speed (mph)			45			45				25			25	
Link Distance (ft)			1388			431				595			288	
Travel Time (s)			21.0			6.5				16.2			7.9	
Confl. Peds. (#/hr)		1						1						
Confl. Bikes (#/hr)														
Peak Hour Factor	0.99	0.99	0.99	0.90	0.99	0.90	0.99	0.99	0.90	0.90	0.90	0.99	0.90	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%			0%				0%			0%	
Shared Lane Traffic (%)									49%					
Lane Group Flow (vph)	0	38	2404	206	0	207	1606	0	188	184	93	0	30	14
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA		Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	5!	5	2		1!	1	6		3	3	1!	4	4	5!
Permitted Phases				2							3			4
Detector Phase	5	5	2	2	1	1	6		3	3	1	4	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	7.0	12.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	20.0	20.0	14.0	14.0	20.0		20.0	20.0	14.0	20.0	20.0	14.0
Total Split (s)	15.0	15.0	70.0	70.0	25.0	25.0	80.0		25.0	25.0	25.0	20.0	20.0	15.0
Total Split (%)	10.7%	10.7%	50.0%	50.0%	17.9%	17.9%	57.1%		17.9%	17.9%	17.9%	14.3%	14.3%	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	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	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	1.0		-2.0	-2.0
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0		5.0	5.0	8.0		5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead		Lag	Lag	Lead	Lead	Lead	Lag
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		None	None	None	None	None	None
Act Effect Green (s)		9.8	74.6	74.6		20.1	87.7		21.2	21.2	43.3		9.7	18.9
Actuated g/C Ratio		0.07	0.53	0.53		0.14	0.63		0.15	0.15	0.31		0.07	0.14
v/c Ratio		0.31	0.89	0.23		0.82	0.72		0.74	0.72	0.19		0.24	0.04
Control Delay		46.6	18.8	1.9		63.4	30.0		74.1	72.5	35.5		66.3	0.2
Queue Delay		0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay		46.6	18.8	1.9		63.4	30.0		74.1	72.5	35.5		66.3	0.2
LOS		D	B	A		E	C		E	E	D		E	A
Approach Delay			17.8				33.8			65.7			45.3	
Approach LOS			B				C			E			D	
Queue Length 50th (ft)		31	-845	9		183	763		172	168	59		26	0
Queue Length 95th (ft)		m33	#916	m10		m#268	840		262	256	107		60	0
Internal Link Dist (ft)			1308				351			515			208	
Turn Bay Length (ft)		250		100		300			250		100			75
Base Capacity (vph)		126	2708	908		262	2216		266	267	497		191	337
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		0.30	0.89	0.23		0.79	0.72		0.71	0.69	0.19		0.16	0.04

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 71 (51%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89

5: Site Drive/Wake Stone Rock Quarry Drwy. & US 64 (Knightdale Boulevard)

Intersection Signal Delay: 28.4	Intersection LOS: C
Intersection Capacity Utilization 87.2%	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: 5: Site Drive/Wake Stone Rock Quarry Drwy. & US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↕	↗	↖	↕	↗		↕	↗			
Traffic Volume (vph)	0	0	0	71	1659	27	158	17	0	0	28	23			
Future Volume (vph)	0	0	0	71	1659	27	158	17	0	0	28	23			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.961							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						22						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							45%								
Lane Group Flow (vph)	0	0	0	77	1803	29	95	95	0	0	30	25			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				10.1	92.1	116.0	25.9	25.9			8.8	8.8			
Actuated g/C Ratio				0.07	0.66	0.83	0.18	0.18			0.06	0.06			
v/c Ratio				0.61	0.78	0.02	0.31	0.31			0.26	0.11			
Control Delay				82.2	21.9	1.3	15.2	15.2			67.8	1.0			
Queue Delay				0.0	0.0	0.0	1.4	1.4			0.0	0.0			
Total Delay				82.2	21.9	1.3	16.7	16.6			67.8	1.0			
LOS				F	C	A	B	B			E	A			
Approach Delay					24.0			16.6			37.4				
Approach LOS					C			B			D				
Queue Length 50th (ft)				69	586	1	18	18			27	0			
Queue Length 95th (ft)				121	860	7	26	26			61	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2317	1373	385	390			197	289			
Starvation Cap Reductn				0	0	0	167	170			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				0.31	0.78	0.02	0.44	0.43			0.15	0.09			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 23.7

Intersection LOS: C

Intersection Capacity Utilization 115.1%

ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)







Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↖↖↖						↖	↖	↖	↖				
Traffic Volume (vph)	46	2216	214	0	0	0	0	104	62	57	56	0			
Future Volume (vph)	46	2216	214	0	0	0	0	104	62	57	56	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		0	0		0	0		0	0		0			
Storage Lanes	1		0	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	4969	0	0	0	0	0	1816	1544	1706	1787	0			
Flt Permitted	0.950									0.950	0.995				
Satd. Flow (perm)	1752	4969	0	0	0	0	0	1816	1544	1706	1787	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		15							139						
Link Speed (mph)		45			30			25			25				
Link Distance (ft)		941			722			405			148				
Travel Time (s)		14.3			16.4			11.0			4.0				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	47	2506	0	0	0	0	0	107	64	53	64	0			
Turn Type	Prot	NA						NA	Perm	Split	NA				
Protected Phases	5!	2						3		14!	14!		1	4	6
Permitted Phases									3						
Detector Phase	5	2						3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0						7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0						14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0						25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%						17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3						3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3						2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6						-0.8	-0.8						
Total Lost Time (s)	5.0	5.0						5.0	5.0						
Lead/Lag	Lead	Lag						Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes						Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max						None	None				None	None	C-Max
Act Effect Green (s)	8.3	90.3						13.4	13.4	18.4	18.4				
Actuated g/C Ratio	0.06	0.64						0.10	0.10	0.13	0.13				
v/c Ratio	0.46	0.78						0.62	0.23	0.24	0.27				
Control Delay	98.2	13.5						75.6	2.0	7.6	7.9				
Queue Delay	0.0	0.0						0.0	0.0	0.3	0.4				
Total Delay	98.2	13.5						75.6	2.0	7.9	8.3				
LOS	F	B						E	A	A	A				
Approach Delay		15.1						48.0			8.1				
Approach LOS		B						D			A				
Queue Length 50th (ft)	45	436						95	0	4	4				
Queue Length 95th (ft)	m54	914						m153	m0	7	8				
Internal Link Dist (ft)		861			642			325			68				
Turn Bay Length (ft)	150														
Base Capacity (vph)	187	3210						259	339	344	360				
Starvation Cap Reductn	0	0						0	0	101	102				
Spillback Cap Reductn	0	0						0	0	0	0				
Storage Cap Reductn	0	0						0	0	0	0				
Reduced v/c Ratio	0.25	0.78						0.41	0.19	0.22	0.25				

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78

Intersection Signal Delay: 16.8 Intersection LOS: B

Intersection Capacity Utilization 115.1% ICU Level of Service H

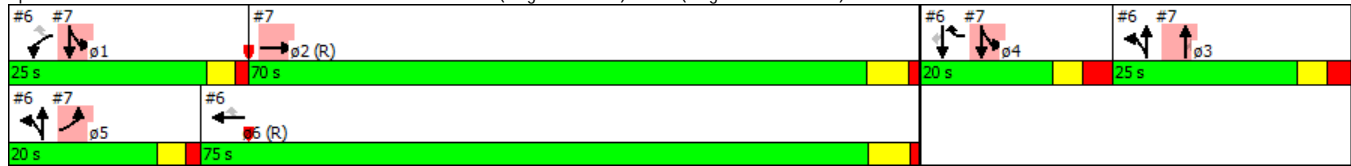
Analysis Period (min) 15

Description: 05-0020

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

! Phase conflict between lane groups.

Splits and Phases: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (vph)	59	68	43	17	50	68	29	51	11	4	113	87	41
Future Volume (vph)	59	68	43	17	50	68	29	51	11	4	113	87	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%				0%	
Storage Length (ft)	0		0	0		0	0		0		0		0
Storage Lanes	0		0	0		0	0		0		0		0
Taper Length (ft)	25			25			25				25		
Satd. Flow (prot)	0	1769	0	0	1726	0	0	1757	0	0	0	1778	0
Flt Permitted		0.983			0.994			0.984				0.977	
Satd. Flow (perm)	0	1769	0	0	1726	0	0	1757	0	0	0	1778	0
Link Speed (mph)		25			25			25				25	
Link Distance (ft)		388			485			508				405	
Travel Time (s)		10.6			13.2			13.9				11.0	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%			0%			0%				0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	182	0	0	145	0	0	98	0	0	0	264	0
Sign Control		Stop			Stop			Free				Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 43.0%	ICU Level of Service A
Analysis Period (min)	15



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (veh/h)	59	68	43	17	50	68	29	51	11	4	113	87	41
Future Volume (Veh/h)	59	68	43	17	50	68	29	51	11	4	113	87	41
Sign Control		Stop			Stop			Free				Free	
Grade		0%			0%			5%				0%	
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
Hourly flow rate (vph)	63	73	46	18	54	73	31	55	12	0	122	94	44
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type													
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume													
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol													
IC, single (s)													
IC, 2 stage (s)													
IF (s)													
p0 queue free %													
cM capacity (veh/h)													
Direction, Lane #													
Volume Total													
Volume Left													
Volume Right													
cSH													
Volume to Capacity													
Queue Length 95th (ft)													
Control Delay (s)													
Lane LOS													
Approach Delay (s)													
Approach LOS													
Intersection Summary													
Average Delay													
Intersection Capacity Utilization													
Analysis Period (min)													
ICU Level of Service													

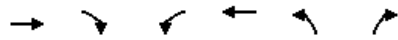


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	106	98	89	25	57	44	27	96	25	73	115	98
Future Volume (vph)	106	98	89	25	57	44	27	96	25	73	115	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			-2%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1754	0	0	1757	0	0	1822	0	0	1754	0
Flt Permitted		0.982			0.990			0.991			0.987	
Satd. Flow (perm)	0	1754	0	0	1757	0	0	1822	0	0	1754	0
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		518			573			488			206	
Travel Time (s)		10.1			13.0			9.5			4.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	322	0	0	138	0	0	162	0	0	314	0
Sign Control		Yield			Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	54.3%
ICU Level of Service	A
Analysis Period (min)	15

ROUNDBOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name	Wide Waters Parkway								
Time Period							Analysis Year	Build-out PM - 2020								
Peak Hour Factor	0.91						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	106	98	89	0	25	57	44	0	27	96	25	0	73	115	98	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	239			257			311			122						
Exiting Flow ( $V_{ex}$ ), pc/h	220			204			276			257						
Entry Flow ( $V_e$ ), pc/h		328			141			166			321					
Entry Volume veh/h		322			138			163			315					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		890			874			828			1000					
Capacity (c), veh/h		871			856			811			979					
v/c Ratio (X)		0.37			0.16			0.20			0.32					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		8.4			5.8			6.6			7.0					
Lane LOS		A			A			A			A					
Lane 95% Queue		1.7			0.6			0.7			1.4					
Approach Delay, s/veh	8.38			5.82			6.55			7.02						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	7.23															
Intersection LOS	A															



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↗		↑↑		↗
Traffic Volume (vph)	2315	193	0	1824	0	145
Future Volume (vph)	2315	193	0	1824	0	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		100	0		0	0
Storage Lanes		1	0		0	1
Taper Length (ft)			25		25	
Satd. Flow (prot)	5085	1583	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	5085	1583	0	3539	0	1611
Link Speed (mph)	45			45	25	
Link Distance (ft)	431			457	355	
Travel Time (s)	6.5			6.9	9.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2572	214	0	2027	0	161
Sign Control	Free			Free	Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	60.4%
	ICU Level of Service B
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh	6.8
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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	2315	193	0	1824	0	145
Future Vol, veh/h	2315	193	0	1824	0	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2572	214	0	2027	0	161

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	2572
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	5.34
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3.12
Pot Cap-1 Maneuver	-	-	64
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	64
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	210.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	133	-	-	64	-
HCM Lane V/C Ratio	1.211	-	-	-	-
HCM Control Delay (s)	210.1	-	-	0	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	9.7	-	-	0	-

**Notes**  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



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10: RI/RO Site Drive & US 64 (Knightdale Boulevard) Performance by approach

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Approach	EB	WB	NB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.2	0.0
Total Delay (hr)	3.6	2.9	0.9	7.5
Total Del/Veh (s)	5.2	5.7	24.4	6.0

**Appendix H:**  
**Synchro, SimTraffic, & HCS Output:**  
**Background (2029)**

1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1524	135	4	282	0	0	0
Future Volume (vph)	1524	135	4	282	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.125			
Satd. Flow (perm)	5060	1543	0	234	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		147					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)		1		1			
Confl. Bikes (#/hr)							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1657	147	0	311	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2 7		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2 7		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	110.8	110.8		130.0			
Actuated g/C Ratio	0.79	0.79		0.93			
v/c Ratio	0.41	0.12		0.73			
Control Delay	5.4	1.0		22.7			
Queue Delay	0.0	0.0		0.0			
Total Delay	5.4	1.0		22.7			
LOS	A	A		C			
Approach Delay	5.0						
Approach LOS	A						
Queue Length 50th (ft)	146	0		140			
Queue Length 95th (ft)	228	18		255			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4005	1251		611			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.41	0.12		0.51			

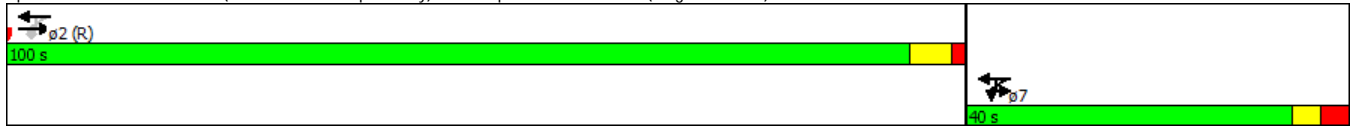
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 25 (18%), Referenced to phase 2:EBWB and 6.; Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73

Intersection Signal Delay: 7.6  
Intersection Capacity Utilization 66.5%  
Analysis Period (min) 15  
Description: 05-2153

Intersection LOS: A  
ICU Level of Service C

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





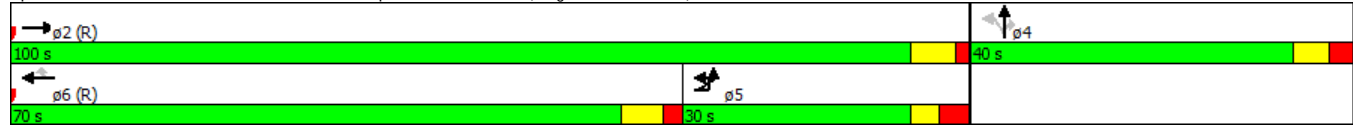
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔			↔↔↔	↔		↔	↔↔			
Traffic Volume (vph)	4	612	1373	0	0	1858	1029	50	4	326	0	0	0
Future Volume (vph)	4	612	1373	0	0	1858	1029	50	4	326	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	4963	1545	0	1713	2680	0	0	0
Flt Permitted		0.950							0.956				
Satd. Flow (perm)	0	3450	5111	0	0	4963	1545	0	1713	2680	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							630			108			
Link Speed (mph)			45			45			35				30
Link Distance (ft)			763			1128			821				417
Travel Time (s)			11.6			17.1			16.0				9.5
Confl. Peds. (#/hr)				1	1								
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	655	1461	0	0	1977	1095	0	57	347	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	112.0			82.0	82.0		18.0	18.0			
Actuated g/C Ratio		0.18	0.80			0.59	0.59		0.13	0.13			
v/c Ratio		1.06	0.36			0.68	0.94		0.26	0.79			
Control Delay		118.3	8.5			5.8	16.4		56.1	53.6			
Queue Delay		0.0	0.0			0.0	20.3		0.0	0.0			
Total Delay		118.3	8.5			5.8	36.7		56.1	53.6			
LOS		F	A			A	D		E	D			
Approach Delay			42.5			16.8			53.9				
Approach LOS			D			B			D				
Queue Length 50th (ft)		-345	227			124	165		47	122			
Queue Length 95th (ft)		#471	299			m136	m229		88	175			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	4090			2908	1166		428	751			
Starvation Cap Reductn		0	0			0	111		0	0			
Spillback Cap Reductn		0	0			0	0		0	0			
Storage Cap Reductn		0	0			0	0		0	0			
Reduced v/c Ratio		1.06	0.36			0.68	1.04		0.13	0.46			

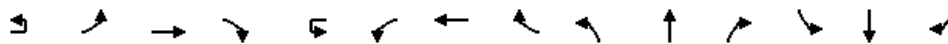
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 70 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.06

Intersection Signal Delay: 29.2	Intersection LOS: C
Intersection Capacity Utilization 99.6%	ICU Level of Service F
Analysis Period (min) 15	
Description: 05-2152	
- 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: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑↑	↑		↓	↓↓↓	↓	↓↓	↑	↓	↓↓	↓	↑
Traffic Volume (vph)	4	120	1452	66	4	23	2538	28	360	6	120	12	4	18
Future Volume (vph)	4	120	1452	66	4	23	2538	28	360	6	120	12	4	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3417	5061	1576	0	1761	5060	1575	3382	1835	1560	2943	1365	1289
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3416	5061	1576	0	1761	5060	1556	3382	1835	1560	2943	1365	1289
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				82				81			130			126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)		1						1						
Confl. Bikes (#/hr)														
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	19%	19%	19%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														42%
Lane Group Flow (vph)	0	134	1578	72	0	29	2759	30	391	7	130	13	12	12
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)		20.0	87.3	113.7			8.7	76.0	93.3	23.5	11.1	13.9	17.4	8.9
Actuated g/C Ratio		0.14	0.62	0.81			0.06	0.54	0.67	0.17	0.08	0.10	0.12	0.06
v/c Ratio		0.27	0.50	0.06			0.27	1.01	0.03	0.69	0.05	0.48	0.04	0.13
Control Delay		47.7	7.8	0.5			93.9	24.0	0.1	62.4	57.0	13.5	52.8	41.4
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		47.7	7.8	0.5			93.9	24.0	0.1	62.4	57.0	13.5	52.8	41.4
LOS		D	A	A			F	C	A	E	E	B	D	A
Approach Delay			10.5				24.5			50.3			32.0	
Approach LOS			B				C			D			C	
Queue Length 50th (ft)		58	120	1			28	143	0	173	6	0	5	4
Queue Length 95th (ft)		92	143	5			m34	#1094	m0	237	21	52	17	27
Internal Link Dist (ft)			1048					1206			396			328
Turn Bay Length (ft)		300		125			200		200	200		100	325	150
Base Capacity (vph)		488	3154	1295			251	2745	1104	567	211	387	439	153
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		0.27	0.50	0.06			0.12	1.01	0.03	0.69	0.03	0.34	0.03	0.08

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.01

3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)

8/17/2016

Intersection Signal Delay: 22.3 Intersection LOS: C

Intersection Capacity Utilization 81.7% ICU Level of Service D

Analysis Period (min) 15

Description: 05-2152

# 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: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)







Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	173	1286	135	44	170	2104	78	172	18	106	95	13	145
Future Volume (vph)	173	1286	135	44	170	2104	78	172	18	106	95	13	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			-2%			0%			
Storage Length (ft)	350		200		300		175	275		650	150		150
Storage Lanes	2		1		2		1	1		1	1		1
Taper Length (ft)	300				300			100			100		
Satd. Flow (prot)	3400	5036	1568	0	3433	5085	1583	3467	1641	0	3433	1547	1504
Flt Permitted	0.950				0.950			0.950			0.950		
Satd. Flow (perm)	3399	5036	1568	0	3433	5085	1563	3467	1641	0	3433	1547	1504
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)			155				87		122			77	141
Link Speed (mph)		45				45			35			35	
Link Distance (ft)		1286				1388			847			593	
Travel Time (s)		19.5				21.0			16.5			11.6	
Confl. Peds. (#/hr)	1						1						
Confl. Bikes (#/hr)													
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													46%
Lane Group Flow (vph)	173	1478	155	0	246	2418	90	198	143	0	109	92	90
Turn Type	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	1	6	7	3	8		7	4	5
Permitted Phases			2			6							4
Detector Phase	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase													
Minimum Initial (s)	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)	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	15.0	23.0
Total Split (s)	30.0	65.0	25.0	25.0	25.0	60.0	25.0	25.0	25.0		25.0	25.0	30.0
Total Split (%)	21.4%	46.4%	17.9%	17.9%	17.9%	42.9%	17.9%	17.9%	17.9%		17.9%	17.9%	21.4%
Yellow Time (s)	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.8	3.0
All-Red Time (s)	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	3.1	4.1
Lost Time Adjust (s)	-2.1	-2.1	-1.8		-2.4	-1.6	-2.1	-1.8	-2.1		-2.1	-1.9	-2.1
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	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
Recall Mode	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effect Green (s)	25.0	79.0	98.1		16.8	70.7	81.9	14.2	13.1		11.1	10.1	35.1
Actuated g/C Ratio	0.18	0.56	0.70		0.12	0.50	0.58	0.10	0.09		0.08	0.07	0.25
v/c Ratio	0.29	0.52	0.14		0.60	0.94	0.09	0.57	0.54		0.40	0.50	0.19
Control Delay	35.0	10.9	0.2		73.3	24.6	2.3	66.1	21.8		65.3	27.2	1.4
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	35.0	10.9	0.2		73.3	24.6	2.3	66.1	21.8		65.3	27.2	1.4
LOS	D	B	A		E	C	A	E	C		E	C	A
Approach Delay		12.3				28.2			47.5			33.5	
Approach LOS		B				C			D			C	
Queue Length 50th (ft)	72	113	0		108	527	5	90	18		49	13	0
Queue Length 95th (ft)	90	131	0		m92	m425	m6	123	77		77	67	3
Internal Link Dist (ft)		1206				1308			767			513	
Turn Bay Length (ft)	350		200		300		175	275			150		150
Base Capacity (vph)	607	2840	1204		494	2569	1046	495	339		490	287	482
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	0.29	0.52	0.13		0.50	0.94	0.09	0.40	0.42		0.22	0.32	0.19

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 24.2

Intersection LOS: C

Intersection Capacity Utilization 76.5%

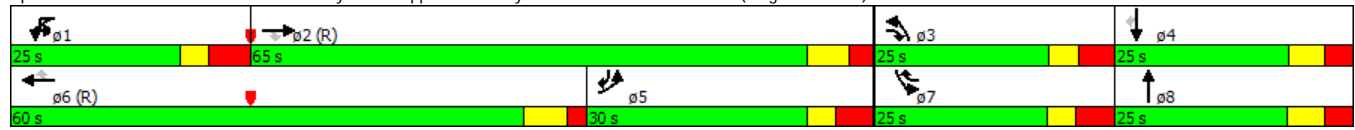
ICU Level of Service D

Analysis Period (min) 15

Description: 05-2148

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

Splits and Phases: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	19	30	1372	0	2482	15	5	24
Future Volume (vph)	19	30	1372	0	2482	15	5	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1752	5036	1863	3536	0	880	0
Flt Permitted		0.950					0.991	
Satd. Flow (perm)	0	1752	5036	1863	3536	0	880	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			1388		888		288	
Travel Time (s)			21.0		13.5		7.9	
Confl. Peds. (#/hr)								
Confl. Bikes (#/hr)								
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	90%	90%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	50	1400	0	2548	0	29	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 79.1%	ICU Level of Service D
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh	8.1
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Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	19	30	1372	0	2482	15	5	24
Future Vol, veh/h	19	30	1372	0	2482	15	5	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98
Heavy Vehicles, %	3	3	3	2	2	2	90	90
Mvmt Flow	19	31	1400	0	2533	15	5	24

Major/Minor	Major1		Major2			Minor2		
Conflicting Flow All	1884	2548	0	1022	-	0	3200	1274
Stage 1	-	-	-	-	-	-	2540	-
Stage 2	-	-	-	-	-	-	660	-
Critical Hdwy	6.46	4.16	-	5.64	-	-	8.05	8.7
Critical Hdwy Stg 1	-	-	-	-	-	-	7.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.8	-
Follow-up Hdwy	2.53	2.23	-	2.32	-	-	4.55	4.2
Pot Cap-1 Maneuver	87	169	-	427	-	-	-3	76
Stage 1	-	-	-	-	-	-	12	-
Stage 2	-	-	-	-	-	-	279	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	99	99	-	427	-	-	-3	76
Mov Cap-2 Maneuver	-	-	-	-	-	-	-3	-
Stage 1	-	-	-	-	-	-	12	-
Stage 2	-	-	-	-	-	-	279	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	\$ 974.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	99	-	427	-	-	15
HCM Lane V/C Ratio	0.505	-	-	-	-	1.973
HCM Control Delay (s)	73.6	-	0	-	-	\$ 974.7
HCM Lane LOS	F	-	A	-	-	F
HCM 95th %tile Q(veh)	2.2	-	0	-	-	4.4

**Notes**  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	37	2532	37	125	23	0	0	4	6			
Future Volume (vph)	0	0	0	37	2532	37	125	23	0	0	4	6			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.967							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1686	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						22						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							41%								
Lane Group Flow (vph)	0	0	0	40	2723	40	79	80	0	0	4	6			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				7.7	90.6	110.2	28.0	28.0			8.2	8.2			
Actuated g/C Ratio				0.06	0.65	0.79	0.20	0.20			0.06	0.06			
v/c Ratio				0.42	1.19	0.03	0.24	0.24			0.04	0.03			
Control Delay				76.6	117.7	1.9	5.6	5.6			63.0	0.2			
Queue Delay				0.0	0.0	0.0	1.1	1.1			0.0	0.0			
Total Delay				76.6	117.7	1.9	6.7	6.6			63.0	0.2			
LOS				E	F	A	A	A			E	A			
Approach Delay					115.5			6.7			25.3				
Approach LOS					F			A			C				
Queue Length 50th (ft)				36	-1601	2	4	4			4	0			
Queue Length 95th (ft)				76	#1834	11	3	3			17	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2279	1319	411	419			197	289			
Starvation Cap Reductn				0	0	0	193	197			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				0.16	1.19	0.03	0.36	0.36			0.02	0.02			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.19

6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)

Intersection Signal Delay: 109.3 Intersection LOS: F

Intersection Capacity Utilization 130.1% ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

- 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.

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↗	↘					↖	↗	↘	↘	↖			
Traffic Volume (vph)	41	1369	47	0	0	0	0	122	38	21	31	0			
Future Volume (vph)	41	1369	47	0	0	0	0	122	38	21	31	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%				-3%			
Storage Length (ft)	150		275	0		0	0		0	0		0			
Storage Lanes	1		1	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	3504	1567	0	0	0	0	1816	1544	1706	1791	0			
Flt Permitted	0.950									0.950	0.997				
Satd. Flow (perm)	1752	3504	1567	0	0	0	0	1816	1544	1706	1791	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)			95						139						
Link Speed (mph)		45			30			25				25			
Link Distance (ft)		941			722			372				148			
Travel Time (s)		14.3			16.4			10.1				4.0			
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%				0%			
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	46	1521	52	0	0	0	0	136	42	21	36	0			
Turn Type	Prot	NA	custom					NA	Perm	Split	NA				
Protected Phases	5!	2	3					3		14!	14!		1	4	6
Permitted Phases			2						3						
Detector Phase	5	2	3					3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0	7.0					7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0	14.0					14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0	25.0					25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%	17.9%					17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3	3.2					3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3	2.6					2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6	-0.8					-0.8	-0.8						
Total Lost Time (s)	5.0	5.0	5.0					5.0	5.0						
Lead/Lag	Lead	Lag	Lag					Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes					Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max	None					None	None				None	None	C-Max
Act Effect Green (s)	8.2	93.5	111.1					15.6	15.6	15.3	15.3				
Actuated g/C Ratio	0.06	0.67	0.79					0.11	0.11	0.11	0.11				
v/c Ratio	0.45	0.65	0.04					0.67	0.14	0.11	0.18				
Control Delay	88.7	14.2	0.7					75.5	1.0	11.3	11.9				
Queue Delay	0.0	0.0	0.0					0.0	0.0	0.1	0.2				
Total Delay	88.7	14.2	0.7					75.5	1.0	11.4	12.1				
LOS	F	B	A					E	A	B	B				
Approach Delay		15.9						57.9			11.8				
Approach LOS		B						E			B				
Queue Length 50th (ft)	39	607	1					121	0	4	6				
Queue Length 95th (ft)	m72	769	m6					186	0	8	12				
Internal Link Dist (ft)		861			642			292			68				
Turn Bay Length (ft)	150		275												
Base Capacity (vph)	187	2339	1290					262	342	337	353				
Starvation Cap Reductn	0	0	0					0	0	91	89				
Spillback Cap Reductn	0	0	0					0	0	0	0				
Storage Cap Reductn	0	0	0					0	0	0	0				
Reduced v/c Ratio	0.25	0.65	0.04					0.52	0.12	0.09	0.14				

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green  
 Natural Cycle: 150  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.19

Intersection Signal Delay: 19.8 Intersection LOS: B

Intersection Capacity Utilization 130.1% ICU Level of Service H

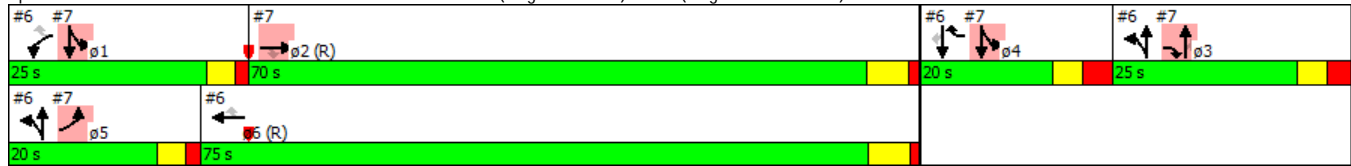
Analysis Period (min) 15

Description: 05-0020

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

! Phase conflict between lane groups.

Splits and Phases: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)







Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	13	4	4	12	26	12	4	126	9	19	35	19
Future Volume (vph)	13	4	4	12	26	12	4	126	9	19	35	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1760	0	0	1781	0	0	1798	0	0	1774	0
Flt Permitted		0.969			0.988			0.999			0.987	
Satd. Flow (perm)	0	1760	0	0	1781	0	0	1798	0	0	1774	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		388			485			508			372	
Travel Time (s)		10.6			13.2			13.9			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	63	0	0	179	0	0	93	0
Sign Control		Stop			Stop			Free			Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.2%
	ICU Level of Service A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	3.4											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	13	4	4	12	26	12	4	126	9	19	35	19
Future Vol, veh/h	13	4	4	12	26	12	4	126	9	19	35	19
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	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	5	5	15	33	15	5	162	12	24	45	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	308	289	57	289	296	167	69	0	0	173	0	0
Stage 1	106	106	-	178	178	-	-	-	-	-	-	-
Stage 2	202	183	-	111	118	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	644	621	1009	663	616	877	1532	-	-	1404	-	-
Stage 1	900	807	-	824	752	-	-	-	-	-	-	-
Stage 2	800	748	-	894	798	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	596	607	1009	644	602	877	1532	-	-	1404	-	-
Mov Cap-2 Maneuver	596	607	-	644	602	-	-	-	-	-	-	-
Stage 1	896	792	-	821	749	-	-	-	-	-	-	-
Stage 2	748	745	-	868	784	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.8	11	0.2	2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1532	-	-	649	662	1404	-	-
HCM Lane V/C Ratio	0.003	-	-	0.041	0.097	0.017	-	-
HCM Control Delay (s)	7.4	0	-	10.8	11	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0.1	-	-



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕				↕			↕			↕	
Traffic Volume (vph)	22	29	23	4	4	88	100	109	106	4	31	23	72
Future Volume (vph)	22	29	23	4	4	88	100	109	106	4	31	23	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			-2%			0%	
Storage Length (ft)	0		0		0		0	0		0	0		0
Storage Lanes	0		0		0		0	0		0	0		0
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	1758	0	0	0	1731	0	0	1831	0	0	1699	0
Flt Permitted		0.985				0.998			0.976			0.988	
Satd. Flow (perm)	0	1758	0	0	0	1731	0	0	1831	0	0	1699	0
Link Speed (mph)		35				35			35			35	
Link Distance (ft)		518				573			488			191	
Travel Time (s)		10.1				11.2			9.5			3.7	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	90	0	0	0	236	0	0	264	0	0	152	0
Sign Control		Yield				Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	38.5%
ICU Level of Service	A
Analysis Period (min)	15

ROUNDBABOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name	Wide Waters Parkway								
Time Period	PM Peak Hour						Analysis Year	Background AM - 2029								
Peak Hour Factor	0.83						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	22	29	23	0	0	88	100	1	109	106	0	0	31	23	72	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	67			291			102			243						
Exiting Flow ( $V_{ex}$ ), pc/h	75			331			280			57						
Entry Flow ( $V_e$ ), pc/h		91			232			264			155					
Entry Volume veh/h		89			227			259			152					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		1056			844			1020			886					
Capacity (c), veh/h		1034			827			999			867					
v/c Ratio (X)		0.09			0.28			0.26			0.18					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		4.2			7.4			6.2			5.9					
Lane LOS		A			A			A			A					
Lane 95% Queue		0.3			1.1			1.0			0.6					
Approach Delay, s/veh	4.24			7.37			6.15			5.91						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	6.25															
Intersection LOS	A															

1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)



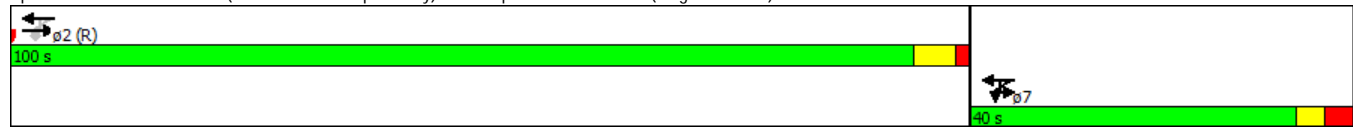
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	2403	162	4	214	0	0	0
Future Volume (vph)	2403	162	4	214	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.045			
Satd. Flow (perm)	5060	1575	0	84	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		162					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	2452	165	0	222	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	111.1	111.1		130.0			
Actuated g/C Ratio	0.79	0.79		0.93			
v/c Ratio	0.61	0.13		0.73			
Control Delay	7.1	0.9		36.1			
Queue Delay	0.1	0.0		0.0			
Total Delay	7.2	0.9		36.1			
LOS	A	A		D			
Approach Delay	6.8						
Approach LOS	A						
Queue Length 50th (ft)	277	1		173			
Queue Length 95th (ft)	408	19		m239			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	4016	1283		504			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	395	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.68	0.13		0.44			

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 5 (4%), Referenced to phase 2:EBWB and 6:, Start of Green  
 Natural Cycle: 45  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73

Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 131.4%	ICU Level of Service H
Analysis Period (min) 15	
Description: 05-2153	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





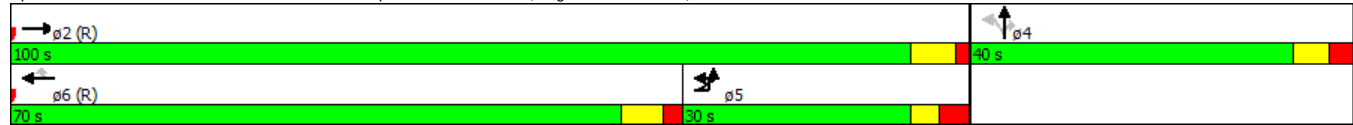
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔			↔↔↔	↔		↔	↔↔			
Traffic Volume (vph)	6	417	3278	0	0	1755	667	84	4	730	0	0	0
Future Volume (vph)	6	417	3278	0	0	1755	667	84	4	730	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	5060	1575	0	1759	2759	0	0	0
Flt Permitted		0.950							0.954				
Satd. Flow (perm)	0	3450	5111	0	0	5060	1575	0	1759	2759	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							548			76			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	436	3379	0	0	1809	688	0	91	753	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	95.0			65.0	65.0		35.0	35.0			
Actuated g/C Ratio		0.18	0.68			0.46	0.46		0.25	0.25			
v/c Ratio		0.71	0.97			0.77	0.67		0.21	1.01			
Control Delay		65.2	36.0			14.9	3.5		43.1	81.7			
Queue Delay		0.0	35.0			0.0	0.0		0.0	0.0			
Total Delay		65.2	71.0			14.9	3.5		43.1	81.7			
LOS		E	E			B	A		D	F			
Approach Delay			70.4			11.7			77.6				
Approach LOS			E			B			E				
Queue Length 50th (ft)		210	1169			370	17		66	-365			
Queue Length 95th (ft)		268	#1219			218	24		116	#518			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	3468			2349	1024		439	746			
Starvation Cap Reductn		0	347			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	1.08			0.77	0.67		0.21	1.01			

Intersection Summary

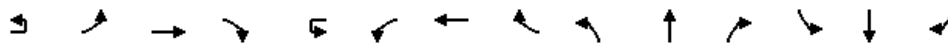
Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 35 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.01

Intersection Signal Delay: 50.8	Intersection LOS: D
Intersection Capacity Utilization 97.2%	ICU Level of Service F
Analysis Period (min) 15	
Description: 05-2152	
- 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: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business







Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔	↔↔↔	↔	↔↔	↔	↔	↔↔	↔	↔
Traffic Volume (vph)	22	589	2893	263	7	48	1893	85	239	51	78	160	32	117
Future Volume (vph)	22	589	2893	263	7	48	1893	85	239	51	78	160	32	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				98				81			130		40	126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														38%
Lane Group Flow (vph)	0	617	2922	266	0	55	1912	86	241	52	79	162	77	73
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)		20.0	85.3	99.8		10.0	75.2	91.5	14.6	12.3	24.5	15.2	10.2	35.2
Actuated g/C Ratio		0.14	0.61	0.71		0.07	0.54	0.65	0.10	0.09	0.18	0.11	0.07	0.25
v/c Ratio		1.25	0.94	0.23		0.44	0.70	0.08	0.69	0.33	0.21	0.43	0.50	0.15
Control Delay		162.4	22.6	2.3		78.7	15.0	2.1	70.8	64.7	2.0	63.3	43.7	1.0
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		162.4	22.6	2.3		78.7	15.0	2.1	70.8	64.7	2.0	63.3	43.7	1.0
LOS		F	C	A		E	B	A	E	E	A	E	D	A
Approach Delay			43.9				16.2			55.3			43.9	
Approach LOS			D				B			E			D	
Queue Length 50th (ft)		-360	625	25		51	266	5	110	45	0	74	34	0
Queue Length 95th (ft)		m#372	m#1085	m34		m74	316	m11	155	88	6	110	89	3
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		492	3112	1174		251	2718	1075	378	196	482	416	208	472
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.25	0.94	0.23		0.22	0.70	0.08	0.64	0.27	0.16	0.39	0.37	0.15

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 50 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.25

Intersection Signal Delay: 35.8 Intersection LOS: D

Intersection Capacity Utilization 90.1% ICU Level of Service E

Analysis Period (min) 15

Description: 05-2152

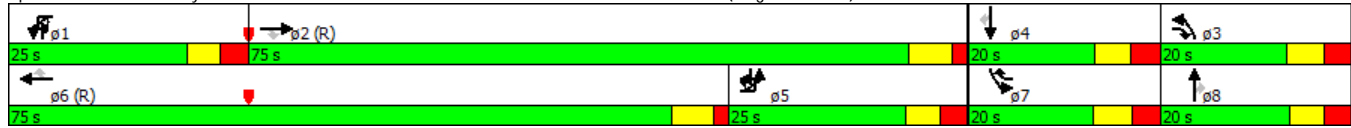
- Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

# 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: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔↔	↔↔↔	↔	↔↔	↔			↔↔	↔	↔
Traffic Volume (vph)	9	270	2275	637	82	304	1366	225	429	116	187	4	486	113	207
Future Volume (vph)	9	270	2275	637	82	304	1366	225	429	116	187	4	486	113	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%			-2%				0%	
Storage Length (ft)		350		200		300		175	275		650		150		150
Storage Lanes		2		1		2		1	1		1		1		1
Taper Length (ft)		300				300			100				100		
Satd. Flow (prot)	0	3433	5085	1583	0	3433	5085	1583	3467	1706	0	0	3433	1683	1504
Flt Permitted		0.950				0.950			0.950				0.950		
Satd. Flow (perm)	0	3433	5085	1583	0	3433	5085	1583	3467	1706	0	0	3433	1683	1504
Right Turn on Red				Yes				Yes			Yes				Yes
Satd. Flow (RTOR)				211				216		49				15	141
Link Speed (mph)			45				45			35				35	
Link Distance (ft)			1286				1388			850				597	
Travel Time (s)			19.5				21.0			16.6				11.6	
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)															
Mid-Block Traffic (%)			0%				0%			0%				0%	
Shared Lane Traffic (%)															27%
Lane Group Flow (vph)	0	297	2420	678	0	410	1453	239	456	322	0	0	521	179	161
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7!	3	8		7!	7	4	5!
Permitted Phases				2				6							4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	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	7.0
Minimum Split (s)	23.0	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	16.0	15.0	23.0
Total Split (s)	25.0	25.0	65.0	25.0	25.0	25.0	65.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0
Total Split (%)	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%		17.9%	17.9%	17.9%	17.9%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.0	3.8	3.0
All-Red Time (s)	4.1	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	4.1	3.1	4.1
Lost Time Adjust (s)		-2.1	-2.1	-1.8			-2.4	-1.6	-2.1	-1.8			-2.1	-1.9	-2.1
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	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	60.3	85.3		19.7	60.0	80.0	20.0	20.0			20.0	20.0	40.0	
Actuated g/C Ratio	0.14	0.43	0.61		0.14	0.43	0.57	0.14	0.14			0.14	0.14	0.29	
v/c Ratio		0.61	1.11	0.65		0.85	0.67	0.24	0.92	1.13			1.06	0.71	0.30
Control Delay		49.4	81.0	2.5		70.9	21.5	1.4	84.0	137.6			114.5	68.3	6.3
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		49.4	81.0	2.5		70.9	21.5	1.4	84.0	137.6			114.5	68.3	6.3
LOS		D	F	A		E	C	A	F	F			F	E	A
Approach Delay			62.5				28.9			106.2					84.7
Approach LOS			E				C			F					F
Queue Length 50th (ft)		122	-911	2		181	284	8	214	-299			-268	152	9
Queue Length 95th (ft)		m134	#995	m11		m184	m212	m14	#314	#496			#384	#256	49
Internal Link Dist (ft)			1206				1308			770				517	
Turn Bay Length (ft)		350		200		300		175	275				150		150
Base Capacity (vph)		490	2189	1047		490	2179	997	495	285			490	253	530
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		0.61	1.11	0.65		0.84	0.67	0.24	0.92	1.13			1.06	0.71	0.30

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 57 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.13

Intersection Signal Delay: 60.0 Intersection LOS: E

Intersection Capacity Utilization 103.2% ICU Level of Service G

Analysis Period (min) 15

Description: 05-2148

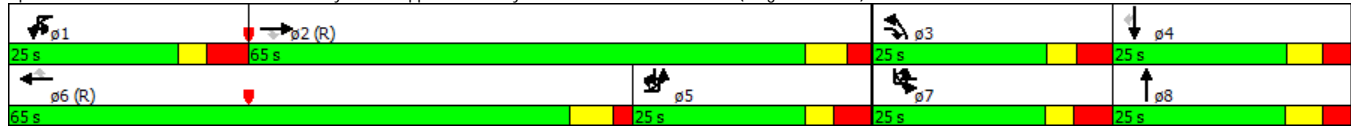
- Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

# 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: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	43	5	3068	19	2229	5	26	14
Future Volume (vph)	43	5	3068	19	2229	5	26	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1770	5085	1770	3539	0	1720	0
Flt Permitted		0.950		0.950			0.969	
Satd. Flow (perm)	0	1770	5085	1770	3539	0	1720	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			1388		888		288	
Travel Time (s)			21.0		13.5		7.9	
Confl. Peds. (#/hr)		1				1		
Confl. Bikes (#/hr)								
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	48	3099	19	2257	0	40	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 71.8%	ICU Level of Service C
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh	14.6
------------------	------

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	43	5	3068	19	2229	5	26	14
Future Vol, veh/h	43	5	3068	19	2229	5	26	14
Conflicting Peds, #/hr	0	1	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	99	99	99	99	99	99	99	99
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	43	5	3099	19	2252	5	26	14

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1661	2257	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	6.44	4.14	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.52	2.22	-
Pot Cap-1 Maneuver	124	224	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	121	121	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0.5	\$ 1883.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	121	-	85	-	-	11
HCM Lane V/C Ratio	0.401	-	0.226	-	-	3.673
HCM Control Delay (s)	53.3	-	59.3	-	-	\$ 1883.8
HCM Lane LOS	F	-	F	-	-	F
HCM 95th %tile Q(veh)	1.7	-	0.8	-	-	6.1

**Notes**  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↗	↖	↖	↖			↗	↗			
Traffic Volume (vph)	0	0	0	62	2041	35	206	22	0	0	37	29			
Future Volume (vph)	0	0	0	62	2041	35	206	22	0	0	37	29			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.961							
Satd. Flow (perm)	0	0	0	1761	3522	1575	1656	1675	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						23						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							45%								
Lane Group Flow (vph)	0	0	0	67	2218	38	123	125	0	0	40	32			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				9.4	88.2	112.0	29.3	29.3			9.3	9.3			
Actuated g/C Ratio				0.07	0.63	0.80	0.21	0.21			0.07	0.07			
v/c Ratio				0.57	1.00	0.03	0.36	0.36			0.33	0.14			
Control Delay				81.0	45.9	1.8	14.2	14.2			69.1	1.2			
Queue Delay				0.0	0.0	0.0	2.1	2.0			0.0	0.0			
Total Delay				81.0	45.9	1.8	16.3	16.2			69.1	1.2			
LOS				F	D	A	B	B			E	A			
Approach Delay					46.2			16.3			38.9				
Approach LOS					D			B			D				
Queue Length 50th (ft)				60	-1121	2	23	24			36	0			
Queue Length 95th (ft)				110	#1415	11	30	30			75	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	2219	1327	414	419			197	289			
Starvation Cap Reductn				0	0	0	183	184			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				0.27	1.00	0.03	0.53	0.53			0.20	0.11			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.28

6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)

Intersection Signal Delay: 43.2 Intersection LOS: D

Intersection Capacity Utilization 155.1% ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

- 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.

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)







Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations															
Traffic Volume (vph)	60	2740	279	0	0	0	0	135	81	75	41	0			
Future Volume (vph)	60	2740	279	0	0	0	0	135	81	75	41	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%				-3%			
Storage Length (ft)	150		275	0		0	0		0	0		0			
Storage Lanes	1		1	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	3504	1567	0	0	0	0	1816	1544	1706	1769	0			
Flt Permitted	0.950									0.950	0.985				
Satd. Flow (perm)	1752	3504	1567	0	0	0	0	1816	1544	1706	1769	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)			152						139						
Link Speed (mph)		45			30			25				25			
Link Distance (ft)		941			722			405				148			
Travel Time (s)		14.3			16.4			11.0				4.0			
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%				0%			
Shared Lane Traffic (%)										24%					
Lane Group Flow (vph)	62	2825	288	0	0	0	0	139	84	59	60	0			
Turn Type	Prot	NA	custom					NA	Perm	Split	NA				
Protected Phases	5!	2	3					3		14!	14!		1	4	6
Permitted Phases			2						3						
Detector Phase	5	2	3					3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0	7.0					7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0	14.0					14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0	25.0					25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%	17.9%					17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3	3.2					3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3	2.6					2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6	-0.8					-0.8	-0.8						
Total Lost Time (s)	5.0	5.0	5.0					5.0	5.0						
Lead/Lag	Lead	Lag	Lag					Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes					Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max	None					None	None				None	None	C-Max
Act Effect Green (s)	9.3	88.1	104.9					15.8	15.8	18.2	18.2				
Actuated g/C Ratio	0.07	0.63	0.75					0.11	0.11	0.13	0.13				
v/c Ratio	0.53	1.28	0.24					0.68	0.28	0.27	0.26				
Control Delay	86.5	145.8	0.4					75.8	3.0	8.4	8.1				
Queue Delay	0.0	0.0	0.0					0.0	0.0	0.3	0.3				
Total Delay	86.5	145.8	0.4					75.8	3.0	8.7	8.4				
LOS	F	F	A					E	A	A	A				
Approach Delay		131.4						48.3			8.6				
Approach LOS		F						D			A				
Queue Length 50th (ft)	59	~1738	1					123	0	5	5				
Queue Length 95th (ft)	m57	m#1696	m13					188	4	7	7				
Internal Link Dist (ft)		861			642			325			68				
Turn Bay Length (ft)	150		275												
Base Capacity (vph)	187	2204	1257					263	342	350	363				
Starvation Cap Reductn	0	0	0					0	0	93	100				
Spillback Cap Reductn	0	0	0					0	0	0	0				
Storage Cap Reductn	0	0	0					0	0	0	0				
Reduced v/c Ratio	0.33	1.28	0.23					0.53	0.25	0.23	0.23				

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.28

Intersection Signal Delay: 122.0 Intersection LOS: F

Intersection Capacity Utilization 155.1% ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

- 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: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (vph)	76	59	26	22	34	88	6	66	15	4	147	113	22
Future Volume (vph)	76	59	26	22	34	88	6	66	15	4	147	113	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%				0%	
Storage Length (ft)	0		0	0		0	0		0		0		0
Storage Lanes	0		0	0		0	0		0		0		0
Taper Length (ft)	25			25			25				25		
Satd. Flow (prot)	0	1780	0	0	1696	0	0	1769	0	0	0	1794	0
Flt Permitted		0.977			0.992			0.997				0.974	
Satd. Flow (perm)	0	1780	0	0	1696	0	0	1769	0	0	0	1794	0
Link Speed (mph)		25			25			25				25	
Link Distance (ft)		388			485			508				405	
Travel Time (s)		10.6			13.2			13.9				11.0	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%			0%			0%				0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	173	0	0	156	0	0	93	0	0	0	308	0
Sign Control		Stop			Stop			Free				Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 49.6%	ICU Level of Service A
Analysis Period (min)	15



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕				↕		
Traffic Volume (veh/h)	76	59	26	22	34	88	6	66	15	4	147	113	22	
Future Volume (Veh/h)	76	59	26	22	34	88	6	66	15	4	147	113	22	
Sign Control		Stop			Stop			Free				Free		
Grade		0%			0%			5%				0%		
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	
Hourly flow rate (vph)	82	63	28	24	37	95	6	71	16	0	158	122	24	
Pedestrians														
Lane Width (ft)														
Walking Speed (ft/s)														
Percent Blockage														
Right turn flare (veh)														
Median type														
Median storage (veh)														
Upstream signal (ft)														
pX, platoon unblocked														
vC, conflicting volume														
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol														
IC, single (s)														
IC, 2 stage (s)														
IF (s)														
p0 queue free %														
cM capacity (veh/h)														
<b>Direction, Lane #</b>														
	EB 1	WB 1	NB 1	SB 1										
Volume Total	173	156	93	304										
Volume Left	82	24	6	158										
Volume Right	28	95	16	24										
cSH	368	588	1436	1509										
Volume to Capacity	0.47	0.27	0.00	0.10										
Queue Length 95th (ft)	61	27	0	9										
Control Delay (s)	23.2	13.3	0.5	4.4										
Lane LOS	C	B	A	A										
Approach Delay (s)	23.2	13.3	0.5	4.4										
Approach LOS	C	B												
<b>Intersection Summary</b>														
Average Delay	10.3													
Intersection Capacity Utilization	49.6%			ICU Level of Service	A									
Analysis Period (min)	15													



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	138	97	116	4	44	57	35	125	4	95	150	128
Future Volume (vph)	138	97	116	4	44	57	35	125	4	95	150	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			-2%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1747	0	0	1721	0	0	1855	0	0	1754	0
Flt Permitted		0.981			0.998			0.989			0.987	
Satd. Flow (perm)	0	1747	0	0	1721	0	0	1855	0	0	1754	0
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		518			573			488			160	
Travel Time (s)		10.1			13.0			9.5			3.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	386	0	0	115	0	0	179	0	0	410	0
Sign Control		Yield			Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	63.1%
ICU Level of Service	B
Analysis Period (min)	15

ROUNDBABOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name	Wide Waters Parkway								
Time Period	PM Peak Hour						Analysis Year	Background PM - 2029								
Peak Hour Factor	0.91						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	138	97	116	0	3	44	57	0	35	125	1	0	95	150	128	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	277			334			370			91						
Exiting Flow ( $V_{ex}$ ), pc/h	216			232			359			302						
Entry Flow ( $V_e$ ), pc/h		393			117			180			418					
Entry Volume veh/h		385			115			176			410					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		856			809			781			1031					
Capacity (c), veh/h		838			792			764			1009					
v/c Ratio (X)		0.46			0.14			0.23			0.41					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		10.2			6.0			7.3			8.0					
Lane LOS		B			A			A			A					
Lane 95% Queue		2.4			0.5			0.9			2.0					
Approach Delay, s/veh	10.20			6.04			7.28			8.02						
Approach LOS, s/veh	B			A			A			A						
Intersection Delay, s/veh	8.46															
Intersection LOS	A															



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	173	1286	135	44	170	2104	78	172	18	106	95	13	145
Future Volume (vph)	173	1286	135	44	170	2104	78	172	18	106	95	13	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			-2%			0%			
Storage Length (ft)	350		200		300		175	275		650	150		150
Storage Lanes	2		2		2		1	1		1	1		1
Taper Length (ft)	300				300			100			100		
Satd. Flow (prot)	3400	6346	1568	0	3433	5085	1583	3467	1641	0	3433	1547	1504
Flt Permitted	0.950				0.950			0.950			0.950		
Satd. Flow (perm)	3399	6346	1568	0	3433	5085	1563	3467	1641	0	3433	1547	1504
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)			155				87		122			77	141
Link Speed (mph)		45				45			35			35	
Link Distance (ft)		1286				841			847			593	
Travel Time (s)		19.5				12.7			16.5			11.6	
Confl. Peds. (#/hr)	1						1						
Confl. Bikes (#/hr)													
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													46%
Lane Group Flow (vph)	173	1478	155	0	246	2418	90	198	143	0	109	92	90
Turn Type	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	1	6	7	3	8		7	4	5
Permitted Phases			2				6						4
Detector Phase	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase													
Minimum Initial (s)	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)	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	15.0	23.0
Total Split (s)	30.0	65.0	25.0	25.0	25.0	60.0	25.0	25.0	25.0		25.0	25.0	30.0
Total Split (%)	21.4%	46.4%	17.9%	17.9%	17.9%	42.9%	17.9%	17.9%	17.9%		17.9%	17.9%	21.4%
Yellow Time (s)	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.8	3.0
All-Red Time (s)	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	3.1	4.1
Lost Time Adjust (s)	-2.1	-2.1	-1.8		-2.4	-1.6	-2.1	-1.8	-2.1		-2.1	-1.9	-2.1
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	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
Recall Mode	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effect Green (s)	25.0	79.0	98.1		16.8	70.7	81.9	14.2	13.1		11.1	10.1	35.1
Actuated g/C Ratio	0.18	0.56	0.70		0.12	0.50	0.58	0.10	0.09		0.08	0.07	0.25
v/c Ratio	0.29	0.41	0.14		0.60	0.94	0.09	0.57	0.54		0.40	0.50	0.19
Control Delay	35.0	10.4	0.2		76.8	27.1	1.9	66.1	21.8		65.3	27.2	1.4
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	35.0	10.4	0.2		76.8	27.1	1.9	66.1	21.8		65.3	27.2	1.4
LOS	D	B	A		E	C	A	E	C		E	C	A
Approach Delay		11.8				30.7			47.5			33.5	
Approach LOS		B				C			D			C	
Queue Length 50th (ft)	72	89	0		106	385	0	90	18		49	13	0
Queue Length 95th (ft)	90	103	0		m125	#889	m12	123	77		77	67	3
Internal Link Dist (ft)		1206				761			767			513	
Turn Bay Length (ft)	350		200		300		175	275			150		150
Base Capacity (vph)	607	3579	1204		494	2569	1046	495	339		490	287	482
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	0.29	0.41	0.13		0.50	0.94	0.09	0.40	0.42		0.22	0.32	0.19

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.94

Intersection Signal Delay: 25.4 Intersection LOS: C

Intersection Capacity Utilization 76.5% ICU Level of Service D

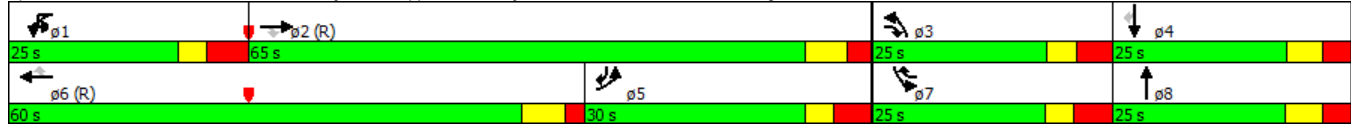
Analysis Period (min) 15

Description: 05-2148

# 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: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)







Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	19	30	1372	0	2482	15	5	24
Future Volume (vph)	19	30	1372	0	2482	15	5	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1752	5036	1863	5080	0	880	0
Flt Permitted		0.950					0.991	
Satd. Flow (perm)	0	1752	5036	1863	5080	0	880	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			547		888		288	
Travel Time (s)			8.3		13.5		7.9	
Confl. Peds. (#/hr)								
Confl. Bikes (#/hr)								
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	90%	90%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	50	1400	0	2548	0	29	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	58.3%
ICU Level of Service	B
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh 4.7

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	19	30	1372	0	2482	15	5	24
Future Vol, veh/h	19	30	1372	0	2482	15	5	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98
Heavy Vehicles, %	3	3	3	2	2	2	90	90
Mvmt Flow	19	31	1400	0	2533	15	5	24

Major/Minor	Major1		Major2			Minor2		
Conflicting Flow All	1884	2548	0	1022	-	0	3200	1274
Stage 1	-	-	-	-	-	-	2540	-
Stage 2	-	-	-	-	-	-	660	-
Critical Hdwy	5.66	5.36	-	5.64	-	-	7.5	8.9
Critical Hdwy Stg 1	-	-	-	-	-	-	8.4	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.8	-
Follow-up Hdwy	2.33	3.13	-	2.32	-	-	4.7	4.8
Pot Cap-1 Maneuver	138	64	-	427	-	-	-4	67
Stage 1	-	-	-	-	-	-	7	-
Stage 2	-	-	-	-	-	-	273	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	72	72	-	427	-	-	-4	67
Mov Cap-2 Maneuver	-	-	-	-	-	-	7	-
Stage 1	-	-	-	-	-	-	7	-
Stage 2	-	-	-	-	-	-	273	-

Approach	EB	WB	SB
HCM Control Delay, s	4.5	0	\$ 417.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	72	-	427	-	-	27
HCM Lane V/C Ratio	0.694	-	-	-	-	1.096
HCM Control Delay (s)	129.5	-	0	-	-	\$ 417.3
HCM Lane LOS	F	-	A	-	-	F
HCM 95th %tile Q(veh)	3.2	-	0	-	-	3.5

**Notes**  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	37	2532	37	125	23	0	0	4	6			
Future Volume (vph)	0	0	0	37	2532	37	125	23	0	0	4	6			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	5060	1575	1656	1686	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.967							
Satd. Flow (perm)	0	0	0	1761	5060	1575	1656	1686	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						29						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							41%								
Lane Group Flow (vph)	0	0	0	40	2723	40	79	80	0	0	4	6			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				7.7	90.6	110.2	28.0	28.0			8.2	8.2			
Actuated g/C Ratio				0.06	0.65	0.79	0.20	0.20			0.06	0.06			
v/c Ratio				0.42	0.83	0.03	0.24	0.24			0.04	0.03			
Control Delay				76.6	23.6	1.6	5.5	5.4			63.0	0.2			
Queue Delay				0.0	0.0	0.0	1.1	1.1			0.0	0.0			
Total Delay				76.6	23.6	1.6	6.5	6.5			63.0	0.2			
LOS				E	C	A	A	A			E	A			
Approach Delay					24.1			6.5			25.3				
Approach LOS					C			A			C				
Queue Length 50th (ft)				36	683	2	3	3			4	0			
Queue Length 95th (ft)				76	902	10	3	3			17	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	3274	1320	411	419			197	289			
Starvation Cap Reductn				0	0	0	193	197			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				0.16	0.83	0.03	0.36	0.36			0.02	0.02			

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83

6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)

Intersection Signal Delay: 23.1

Intersection LOS: C

Intersection Capacity Utilization 98.7%

ICU Level of Service F

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↖↗						↖	↖↗	↖	↖				
Traffic Volume (vph)	41	1369	47	0	0	0	0	122	38	21	31	0			
Future Volume (vph)	41	1369	47	0	0	0	0	122	38	21	31	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		275	0		0	0		0	0		0			
Storage Lanes	1		0	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	5009	0	0	0	0	0	1816	1544	1706	1791	0			
Flt Permitted	0.950									0.950	0.997				
Satd. Flow (perm)	1752	5009	0	0	0	0	0	1816	1544	1706	1791	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		5							139						
Link Speed (mph)		45			30			25			25				
Link Distance (ft)		942			722			372			148				
Travel Time (s)		14.3			16.4			10.1			4.0				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	46	1573	0	0	0	0	0	136	42	21	36	0			
Turn Type	Prot	NA						NA	Perm	Split	NA				
Protected Phases	5!	2						3		1 4!	1 4!		1	4	6
Permitted Phases									3						
Detector Phase	5	2						3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0						7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0						14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0						25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%						17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3						3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3						2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6						-0.8	-0.8						
Total Lost Time (s)	5.0	5.0						5.0	5.0						
Lead/Lag	Lead	Lag						Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes						Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max						None	None				None	None	C-Max
Act Effect Green (s)	8.2	93.5						15.6	15.6	15.3	15.3				
Actuated g/C Ratio	0.06	0.67						0.11	0.11	0.11	0.11				
v/c Ratio	0.45	0.47						0.67	0.14	0.11	0.18				
Control Delay	88.4	8.4						75.5	1.0	11.3	11.9				
Queue Delay	0.0	0.0						0.0	0.0	0.1	0.2				
Total Delay	88.4	8.4						75.5	1.0	11.4	12.1				
LOS	F	A						E	A	B	B				
Approach Delay		10.7						57.9			11.8				
Approach LOS		B						E			B				
Queue Length 50th (ft)	40	242						121	0	4	6				
Queue Length 95th (ft)	m75	333						186	0	8	12				
Internal Link Dist (ft)		862			642			292			68				
Turn Bay Length (ft)	150														
Base Capacity (vph)	187	3345						262	342	337	353				
Starvation Cap Reductn	0	0						0	0	91	89				
Spillback Cap Reductn	0	0						0	0	0	0				
Storage Cap Reductn	0	0						0	0	0	0				
Reduced v/c Ratio	0.25	0.47						0.52	0.12	0.09	0.14				

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83

Intersection Signal Delay: 15.2

Intersection LOS: B

Intersection Capacity Utilization 98.7%

ICU Level of Service F

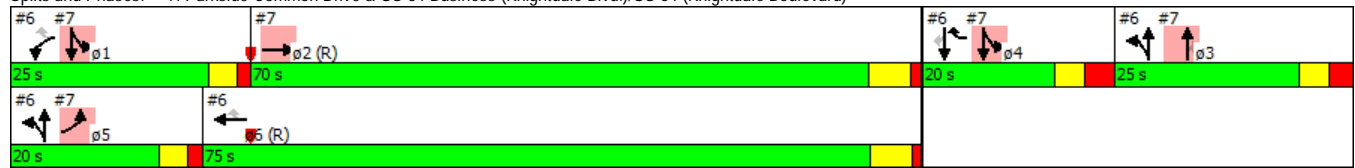
Analysis Period (min) 15

Description: 05-0020

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

! Phase conflict between lane groups.

Splits and Phases: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Lane Configurations																
Traffic Volume (vph)	9	270	2275	637	82	304	1366	225	429	116	187	4	486	113	207	
Future Volume (vph)	9	270	2275	637	82	304	1366	225	429	116	187	4	486	113	207	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
Grade (%)			0%								-2%				0%	
Storage Length (ft)		350		200		300		175	275			650		150		150
Storage Lanes		2		2		2		1	1			1		1		1
Taper Length (ft)		300				300			100				100			
Satd. Flow (prot)	0	3433	6408	1583	0	3433	5085	1583	3467	1706	0	0	3433	1683	1504	
Flt Permitted		0.950				0.950			0.950				0.950			
Satd. Flow (perm)	0	3433	6408	1583	0	3433	5085	1583	3467	1706	0	0	3433	1683	1504	
Right Turn on Red				Yes				Yes			Yes				Yes	
Satd. Flow (RTOR)				211				216		49				15	141	
Link Speed (mph)			45			45				35				35		
Link Distance (ft)			1286			841				850				597		
Travel Time (s)			19.5			12.7				16.6				11.6		
Confl. Peds. (#/hr)																
Confl. Bikes (#/hr)																
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	0.94	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)																
Mid-Block Traffic (%)			0%			0%				0%				0%		
Shared Lane Traffic (%)															27%	
Lane Group Flow (vph)	0	297	2420	678	0	410	1453	239	456	322	0	0	521	179	161	
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	Prot	NA	pm+ov	
Protected Phases	5!	5	2	3	1	1	6	7!	3	8		7!	7	4	5!	
Permitted Phases				2				6							4	
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	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	7.0	
Minimum Split (s)	23.0	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	16.0	15.0	23.0	
Total Split (s)	25.0	25.0	65.0	25.0	25.0	25.0	65.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0	
Total Split (%)	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%		17.9%	17.9%	17.9%	17.9%	
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.0	3.8	3.0	
All-Red Time (s)	4.1	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	4.1	3.1	4.1	
Lost Time Adjust (s)		-2.1	-2.1	-1.8			-2.4	-1.6	-2.1	-1.8			-2.1	-1.9	-2.1	
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	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	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	None	
Act Effect Green (s)	20.0	60.3	85.3		19.7	60.0	80.0	20.0	20.0			20.0	20.0	40.0		
Actuated g/C Ratio	0.14	0.43	0.61		0.14	0.43	0.57	0.14	0.14			0.14	0.14	0.29		
v/c Ratio		0.61	0.88	0.65		0.85	0.67	0.24	0.92	1.13			1.06	0.71	0.30	
Control Delay		49.4	29.1	2.5		71.0	21.0	1.4	84.0	137.6			114.5	68.3	6.3	
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		49.4	29.1	2.5		71.0	21.0	1.4	84.0	137.6			114.5	68.3	6.3	
LOS		D	C	A		E	C	A	F	F			F	E	A	
Approach Delay			25.5				28.5			106.2					84.7	
Approach LOS			C				C			F					F	
Queue Length 50th (ft)		122	432	2		169	361	14	214	-299			-268	152	9	
Queue Length 95th (ft)		m134	464	m11		m#263	213	m19	#314	#496			#384	#256	49	
Internal Link Dist (ft)			1206				761			770				517		
Turn Bay Length (ft)		350		200		300		175	275				150		150	
Base Capacity (vph)		490	2759	1047		490	2179	997	495	285			490	253	530	
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		0.61	0.88	0.65		0.84	0.67	0.24	0.92	1.13			1.06	0.71	0.30	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 57 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.13

Intersection Signal Delay: 42.3 Intersection LOS: D

Intersection Capacity Utilization 92.2% ICU Level of Service F

Analysis Period (min) 15

Description: 05-2148

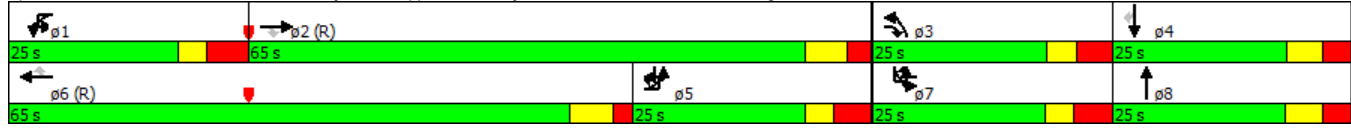
- Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

# 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: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)







Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	43	5	3068	19	2229	5	26	14
Future Volume (vph)	43	5	3068	19	2229	5	26	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12
Grade (%)			0%		0%		0%	
Storage Length (ft)		250		125		0	0	0
Storage Lanes		1		1		0	1	0
Taper Length (ft)		100		100			25	
Satd. Flow (prot)	0	1770	5085	1770	5085	0	1720	0
Flt Permitted		0.950		0.950			0.969	
Satd. Flow (perm)	0	1770	5085	1770	5085	0	1720	0
Link Speed (mph)			45		45		25	
Link Distance (ft)			547		888		288	
Travel Time (s)			8.3		13.5		7.9	
Confl. Peds. (#/hr)		1				1		
Confl. Bikes (#/hr)								
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	48	3099	19	2257	0	40	0
Sign Control			Free		Free		Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 69.3%	ICU Level of Service C
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh	9.3
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Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	43	5	3068	19	2229	5	26	14
Future Vol, veh/h	43	5	3068	19	2229	5	26	14
Conflicting Peds, #/hr	0	1	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	250	-	125	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	99	99	99	99	99	99	99	99
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	43	5	3099	19	2252	5	26	14

Major/Minor	Major1			Major2			Minor2	
Conflicting Flow All	1661	2257	0	2262	-	0	3629	1129
Stage 1	-	-	-	-	-	-	2292	-
Stage 2	-	-	-	-	-	-	1337	-
Critical Hdwy	5.64	5.34	-	5.64	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.04	-
Follow-up Hdwy	2.32	3.12	-	2.32	-	-	3.82	3.92
Pot Cap-1 Maneuver	187	92	-	85	-	-	~ 11	170
Stage 1	-	-	-	-	-	-	37	-
Stage 2	-	-	-	-	-	-	187	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	158	158	-	85	-	-	~ 11	170
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 11	-
Stage 1	-	-	-	-	-	-	37	-
Stage 2	-	-	-	-	-	-	187	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0.5	\$ 1184.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	158	-	85	-	-	16
HCM Lane V/C Ratio	0.307	-	0.226	-	-	2.525
HCM Control Delay (s)	37.6	-	59.3	-	-	\$ 1184.3
HCM Lane LOS	E	-	F	-	-	F
HCM 95th %tile Q(veh)	1.2	-	0.8	-	-	5.7

**Notes**  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	62	2041	35	206	22	0	0	37	29			
Future Volume (vph)	0	0	0	62	2041	35	206	22	0	0	37	29			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	5060	1575	1656	1675	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.961							
Satd. Flow (perm)	0	0	0	1761	5060	1575	1656	1675	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						34						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							45%								
Lane Group Flow (vph)	0	0	0	67	2218	38	123	125	0	0	40	32			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				9.4	88.2	112.0	29.3	29.3			9.3	9.3			
Actuated g/C Ratio				0.07	0.63	0.80	0.21	0.21			0.07	0.07			
v/c Ratio				0.57	0.70	0.03	0.36	0.36			0.33	0.14			
Control Delay				81.0	20.6	1.3	14.2	14.2			69.1	1.2			
Queue Delay				0.0	0.0	0.0	2.1	2.0			0.0	0.0			
Total Delay				81.0	20.6	1.3	16.3	16.2			69.1	1.2			
LOS				F	C	A	B	B			E	A			
Approach Delay					22.0			16.2			38.9				
Approach LOS					C			B			D				
Queue Length 50th (ft)				60	475	1	23	24			36	0			
Queue Length 95th (ft)				110	673	8	30	30			75	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	3188	1328	414	419			197	289			
Starvation Cap Reductn				0	0	0	183	184			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				0.27	0.70	0.03	0.53	0.53			0.20	0.11			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)

Intersection Signal Delay: 21.9

Intersection LOS: C

Intersection Capacity Utilization 121.5%

ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↖↗						↖	↖↗	↖	↖				
Traffic Volume (vph)	60	2740	279	0	0	0	0	135	81	75	41	0			
Future Volume (vph)	60	2740	279	0	0	0	0	135	81	75	41	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		0	0		0	0		0	0		0			
Storage Lanes	1		0	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	4964	0	0	0	0	0	1816	1544	1706	1769	0			
Flt Permitted	0.950									0.950	0.985				
Satd. Flow (perm)	1752	4964	0	0	0	0	0	1816	1544	1706	1769	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		16							139						
Link Speed (mph)		45			30			25			25				
Link Distance (ft)		944			722			405			148				
Travel Time (s)		14.3			16.4			11.0			4.0				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)										24%					
Lane Group Flow (vph)	62	3113	0	0	0	0	0	139	84	59	60	0			
Turn Type	Prot	NA						NA	Perm	Split	NA				
Protected Phases	5!	2						3		14!	14!		1	4	6
Permitted Phases									3						
Detector Phase	5	2						3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0						7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0						14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0						25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%						17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3						3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3						2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6						-0.8	-0.8						
Total Lost Time (s)	5.0	5.0						5.0	5.0						
Lead/Lag	Lead	Lag						Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes						Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max						None	None				None	None	C-Max
Act Effect Green (s)	9.3	88.1						15.8	15.8	18.2	18.2				
Actuated g/C Ratio	0.07	0.63						0.11	0.11	0.13	0.13				
v/c Ratio	0.53	0.99						0.68	0.28	0.27	0.26				
Control Delay	92.2	26.3						75.6	2.9	8.4	8.1				
Queue Delay	0.0	0.0						0.0	0.0	0.3	0.3				
Total Delay	92.2	26.3						75.6	2.9	8.7	8.4				
LOS	F	C						E	A	A	A				
Approach Delay		27.5						48.2			8.6				
Approach LOS		C						D			A				
Queue Length 50th (ft)	59	~1011						124	0	5	5				
Queue Length 95th (ft)	m66	m#1278						m188	m3	7	7				
Internal Link Dist (ft)		864			642			325			68				
Turn Bay Length (ft)	150														
Base Capacity (vph)	187	3129						263	342	350	363				
Starvation Cap Reductn	0	0						0	0	93	100				
Spillback Cap Reductn	0	0						0	0	0	0				
Storage Cap Reductn	0	0						0	0	0	0				
Reduced v/c Ratio	0.33	0.99						0.53	0.25	0.23	0.23				

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 28.2	Intersection LOS: C
Intersection Capacity Utilization 121.5%	ICU Level of Service H
Analysis Period (min) 15	
Description: 05-0020	
- 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: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)



**Appendix I:**  
**Synchro, SimTraffic, & HCS Output:**  
**Build-out (2029)**



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	1590	135	4	311	0	0	0
Future Volume (vph)	1590	135	4	311	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.112			
Satd. Flow (perm)	5060	1543	0	210	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		147					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)		1		1			
Confl. Bikes (#/hr)							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1728	147	0	342	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2 7		
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2 7		
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	107.4	107.4		130.0			
Actuated g/C Ratio	0.77	0.77		0.93			
v/c Ratio	0.45	0.12		0.76			
Control Delay	6.8	1.1		25.9			
Queue Delay	0.0	0.0		0.0			
Total Delay	6.8	1.1		25.9			
LOS	A	A		C			
Approach Delay	6.3						
Approach LOS	A						
Queue Length 50th (ft)	178	0		180			
Queue Length 95th (ft)	269	20		307			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	3881	1217		593			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	0	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.45	0.12		0.58			

**Intersection Summary**

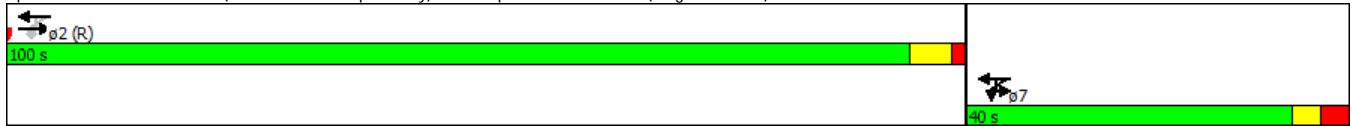
Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 25 (18%), Referenced to phase 2:EBWB and 6.; Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76



Intersection Signal Delay: 9.3  
Intersection Capacity Utilization 69.4%  
Analysis Period (min) 15  
Description: 05-2153

Intersection LOS: A  
ICU Level of Service C

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





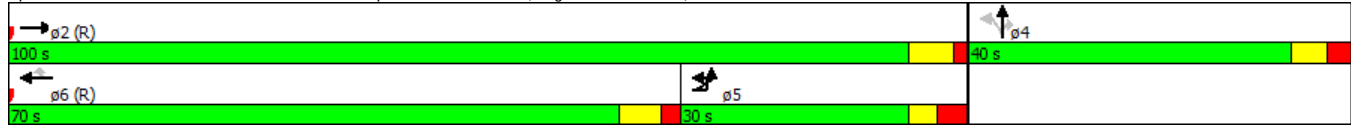
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔			↔↔↔	↔		↔	↔↔↔			
Traffic Volume (vph)	4	612	1465	0	0	1958	1058	50	4	352	0	0	0
Future Volume (vph)	4	612	1465	0	0	1958	1058	50	4	352	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		3	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	4963	1545	0	1713	3472	0	0	0
Flt Permitted		0.950							0.956				
Satd. Flow (perm)	0	3450	5111	0	0	4963	1545	0	1713	3472	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							630			114			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)				1	1								
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	655	1559	0	0	2083	1126	0	57	374	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	114.2			84.2	84.2		15.8	15.8			
Actuated g/C Ratio		0.18	0.82			0.60	0.60		0.11	0.11			
v/c Ratio		1.06	0.37			0.70	0.95		0.30	0.76			
Control Delay		122.8	6.8			5.1	14.0		59.6	51.7			
Queue Delay		0.0	0.0			0.0	28.7		0.0	0.0			
Total Delay		122.8	6.8			5.1	42.7		59.6	51.7			
LOS		F	A			A	D		E	D			
Approach Delay			41.1			18.3			52.7				
Approach LOS			D			B			D				
Queue Length 50th (ft)		-348	221			139	825		48	102			
Queue Length 95th (ft)		#474	284			m112	m220		90	144			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	4170			2986	1180		428	953			
Starvation Cap Reductn		0	0			0	122		0	0			
Spillback Cap Reductn		0	0			0	0		0	0			
Storage Cap Reductn		0	0			0	0		0	0			
Reduced v/c Ratio		1.06	0.37			0.70	1.06		0.13	0.39			

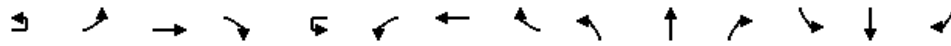
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 70 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.06

Intersection Signal Delay: 29.5	Intersection LOS: C
Intersection Capacity Utilization 101.4%	ICU Level of Service G
Analysis Period (min) 15	
Description: 05-2152	
- 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: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔	↔↔↔	↔	↔↔	↔	↔	↔↔	↔	↔
Traffic Volume (vph)	4	120	1571	66	4	23	2666	28	360	6	120	12	4	18
Future Volume (vph)	4	120	1571	66	4	23	2666	28	360	6	120	12	4	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3417	5061	1576	0	1761	5060	1575	3382	1835	1560	2943	1365	1289
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3416	5061	1576	0	1761	5060	1556	3382	1835	1560	2943	1365	1289
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				82				81			130			126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)		1						1						
Confl. Bikes (#/hr)														
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	19%	19%	19%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														42%
Lane Group Flow (vph)	0	134	1708	72	0	29	2898	30	391	7	130	13	12	12
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	87.3	113.7		8.7	76.0	93.3	23.5	11.1	13.9	17.4		8.9	25.6
Actuated g/C Ratio	0.14	0.62	0.81		0.06	0.54	0.67	0.17	0.08	0.10	0.12		0.06	0.18
v/c Ratio	0.27	0.54	0.06		0.27	1.06	0.03	0.69	0.05	0.48	0.04		0.13	0.04
Control Delay	49.4	9.6	0.6		93.4	40.2	0.1	62.4	57.0	13.5	52.8		41.4	0.2
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	49.4	9.6	0.6		93.4	40.2	0.1	62.4	57.0	13.5	52.8		41.4	0.2
LOS		D	A	A		F	D	A	E	E	B		D	A
Approach Delay			12.0				40.3			50.3			32.0	
Approach LOS			B				D			D			C	
Queue Length 50th (ft)		58	144	1		28	162	0	173	6	0	5	4	0
Queue Length 95th (ft)		92	349	5		m32	m#1120	m0	237	21	52	17	27	0
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		488	3154	1295		251	2745	1104	567	211	387	439	153	338
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.27	0.54	0.06		0.12	1.06	0.03	0.69	0.03	0.34	0.03	0.08	0.04

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.06

3: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)

8/17/2016

Intersection Signal Delay: 31.3 Intersection LOS: C

Intersection Capacity Utilization 81.7% ICU Level of Service D

Analysis Period (min) 15

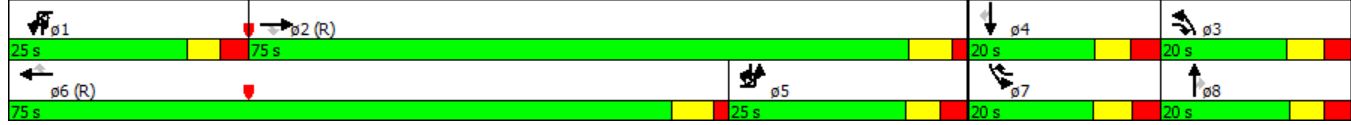
Description: 05-2152

# 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: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	173	1405	135	44	170	2232	78	172	18	106	95	13	145
Future Volume (vph)	173	1405	135	44	170	2232	78	172	18	106	95	13	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			-2%			0%			
Storage Length (ft)	350		200		300		175	275		650	150		150
Storage Lanes	2		2		2		1	1		1	1		1
Taper Length (ft)	300				300			100			100		
Satd. Flow (prot)	3400	6346	1568	0	3433	5085	1583	3467	1641	0	3433	1547	1504
Flt Permitted	0.950				0.950			0.950			0.950		
Satd. Flow (perm)	3399	6346	1568	0	3433	5085	1563	3467	1641	0	3433	1547	1504
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)			155				87		122			77	141
Link Speed (mph)		45				45			35			35	
Link Distance (ft)		1286				1388			814			593	
Travel Time (s)		19.5				21.0			15.9			11.6	
Confl. Peds. (#/hr)	1						1						
Confl. Bikes (#/hr)													
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													46%
Lane Group Flow (vph)	173	1615	155	0	246	2566	90	198	143	0	109	92	90
Turn Type	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	1	6	7	3	8		7	4	5
Permitted Phases			2			6							4
Detector Phase	5	2	3	1	1	6	7	3	8		7	4	5
Switch Phase													
Minimum Initial (s)	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)	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	15.0	23.0
Total Split (s)	30.0	65.0	25.0	25.0	25.0	60.0	25.0	25.0	25.0		25.0	25.0	30.0
Total Split (%)	21.4%	46.4%	17.9%	17.9%	17.9%	42.9%	17.9%	17.9%	17.9%		17.9%	17.9%	21.4%
Yellow Time (s)	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.8	3.0
All-Red Time (s)	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	3.1	4.1
Lost Time Adjust (s)	-2.1	-2.1	-1.8		-2.4	-1.6	-2.1	-1.8	-2.1		-2.1	-1.9	-2.1
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	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
Recall Mode	None	C-Max	None	None	None	C-Max	None	None	None		None	None	None
Act Effect Green (s)	25.0	79.0	98.1		16.8	70.7	81.9	14.2	13.1		11.1	10.1	35.1
Actuated g/C Ratio	0.18	0.56	0.70		0.12	0.50	0.58	0.10	0.09		0.08	0.07	0.25
v/c Ratio	0.29	0.45	0.14		0.60	1.00	0.09	0.57	0.54		0.40	0.50	0.19
Control Delay	34.4	10.4	0.2		81.0	38.2	2.4	66.1	21.8		65.3	27.2	1.4
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	34.4	10.4	0.2		81.0	38.2	2.4	66.1	21.8		65.3	27.2	1.4
LOS	C	B	A		F	D	A	E	C		E	C	A
Approach Delay		11.7				40.7			47.5			33.5	
Approach LOS		B				D			D			C	
Queue Length 50th (ft)	73	97	0		108	653	0	90	18		49	13	0
Queue Length 95th (ft)	84	111	0		159	#986	m24	123	77		77	67	3
Internal Link Dist (ft)		1206				1308			734			513	
Turn Bay Length (ft)	350		200		300		175	275			150		150
Base Capacity (vph)	607	3579	1204		494	2569	1046	495	339		490	287	482
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	0.29	0.45	0.13		0.50	1.00	0.09	0.40	0.42		0.22	0.32	0.19

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 79 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 30.5 Intersection LOS: C

Intersection Capacity Utilization 78.9% ICU Level of Service D

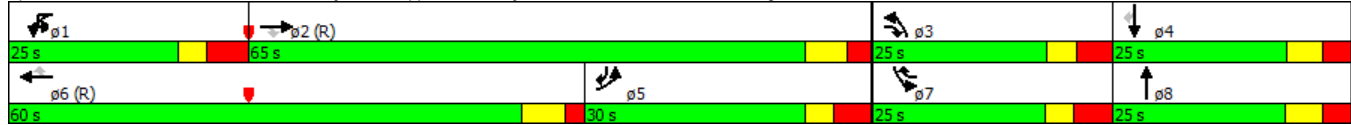
Analysis Period (min) 15

Description: 05-2148

# 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: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





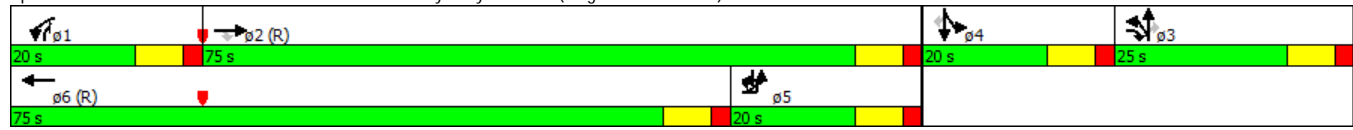
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔↔↔	↔	↔	↔↔↔		↔	↔	↔		↔	↔
Traffic Volume (vph)	19	30	1404	87	89	2418	15	198	4	35	5	4	24
Future Volume (vph)	19	30	1404	87	89	2418	15	198	4	35	5	4	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%			0%			0%			0%	
Storage Length (ft)		250		0	300		0	250		100	0		75
Storage Lanes		1		1	1		0	1		1	0		1
Taper Length (ft)		100			100			100			25		
Satd. Flow (prot)	0	1752	5036	1583	1770	5080	0	1681	1688	1583	0	1225	850
Flt Permitted		0.950			0.950			0.950	0.954			0.973	
Satd. Flow (perm)	0	1752	5036	1583	1770	5080	0	1681	1688	1583	0	1225	850
Right Turn on Red				Yes			Yes			No			Yes
Satd. Flow (RTOR)				97		1							140
Link Speed (mph)			45			45			25			25	
Link Distance (ft)			1388			568			518			288	
Travel Time (s)			21.0			8.6			14.1			7.9	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.98	0.98	0.98	0.90	0.90	0.98	0.98	0.90	0.90	0.90	0.98	0.90	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	90%	2%	90%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)								49%					
Lane Group Flow (vph)	0	50	1433	97	99	2482	0	112	112	39	0	9	24
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA		Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	5!	5	2	3	1	6		3	3	1	4	4	5!
Permitted Phases				2						3			4
Detector Phase	5	5	2	3	1	6		3	3	1	4	4	5
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	20.0	14.0	14.0	20.0		14.0	14.0	14.0	20.0	20.0	14.0
Total Split (s)	20.0	20.0	75.0	25.0	20.0	75.0		25.0	25.0	20.0	20.0	20.0	20.0
Total Split (%)	14.3%	14.3%	53.6%	17.9%	14.3%	53.6%		17.9%	17.9%	14.3%	14.3%	14.3%	14.3%
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	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	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	1.0		-2.0	-2.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0		5.0	5.0	8.0		5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lead	Lag
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		None	None	None	None	None	None
Act Effect Green (s)	13.8	92.3	111.9	14.1	95.4	15.7		15.7	15.7	31.8		9.1	16.7
Actuated g/C Ratio	0.10	0.66	0.80	0.10	0.68	0.11		0.11	0.11	0.23		0.06	0.12
v/c Ratio		0.29	0.43	0.08	0.56	0.72		0.60	0.59	0.11		0.11	0.11
Control Delay		47.6	10.4	0.8	76.8	6.7		71.5	71.3	40.1		64.9	1.0
Queue Delay		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay		47.6	10.4	0.8	76.8	6.7		71.5	71.3	40.1		64.9	1.0
LOS		D	B	A	E	A		E	E	D		E	A
Approach Delay			11.0			9.4			66.8			18.4	
Approach LOS			B			A			E			B	
Queue Length 50th (ft)		40	103	0	80	41		104	104	28		8	0
Queue Length 95th (ft)		74	204	22	m90	905		166	166	55		27	0
Internal Link Dist (ft)			1308			488			438			208	
Turn Bay Length (ft)		250			300			250		100			75
Base Capacity (vph)		187	3318	1333	202	3461		243	244	381		131	231
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		0.27	0.43	0.07	0.49	0.72		0.46	0.46	0.10		0.07	0.10

**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: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.72



Intersection Signal Delay: 13.4	Intersection LOS: B
Intersection Capacity Utilization 81.2%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	
! Phase conflict between lane groups.	

Splits and Phases: 5: Site Drive/Wake Stone Rock Quarry Drwy. & US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	50	2585	37	125	23	0	0	4	6			
Future Volume (vph)	0	0	0	50	2585	37	125	23	0	0	4	6			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	5060	1575	1656	1686	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.967							
Satd. Flow (perm)	0	0	0	1761	5060	1575	1656	1686	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						28						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							41%								
Lane Group Flow (vph)	0	0	0	54	2780	40	79	80	0	0	4	6			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				8.5	90.6	111.0	28.0	28.0			8.2	8.2			
Actuated g/C Ratio				0.06	0.65	0.79	0.20	0.20			0.06	0.06			
v/c Ratio				0.50	0.85	0.03	0.24	0.24			0.04	0.03			
Control Delay				79.4	24.4	1.6	5.5	5.5			63.0	0.2			
Queue Delay				0.0	0.0	0.0	1.1	1.1			0.0	0.0			
Total Delay				79.4	24.4	1.6	6.6	6.5			63.0	0.2			
LOS				E	C	A	A	A			E	A			
Approach Delay					25.1			6.6			25.3				
Approach LOS					C			A			C				
Queue Length 50th (ft)				49	714	2	4	4			4	0			
Queue Length 95th (ft)				94	#969	10	4	4			17	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	3274	1330	411	419			197	289			
Starvation Cap Reductn				0	0	0	193	197			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				0.22	0.85	0.03	0.36	0.36			0.02	0.02			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 24.2 Intersection LOS: C

Intersection Capacity Utilization 101.1% ICU Level of Service G

Analysis Period (min) 15

Description: 05-0020

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

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↖↗						↑	↖	↖	↖				
Traffic Volume (vph)	41	1440	47	0	0	0	0	122	38	21	44	0			
Future Volume (vph)	41	1440	47	0	0	0	0	122	38	21	44	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		100	0		0	0		0	0		0			
Storage Lanes	1		0	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	5009	0	0	0	0	0	1816	1544	1706	1793	0			
Flt Permitted	0.950									0.950	0.998				
Satd. Flow (perm)	1752	5009	0	0	0	0	0	1816	1544	1706	1793	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		5							139						
Link Speed (mph)		45			30			25			25				
Link Distance (ft)		941			722			372			148				
Travel Time (s)		14.3			16.4			10.1			4.0				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	46	1652	0	0	0	0	0	136	42	21	51	0			
Turn Type	Prot	NA						NA	Perm	Split	NA				
Protected Phases	5!	2						3		14!	14!		1	4	6
Permitted Phases									3						
Detector Phase	5	2						3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0						7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0						14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0						25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%						17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3						3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3						2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6						-0.8	-0.8						
Total Lost Time (s)	5.0	5.0						5.0	5.0						
Lead/Lag	Lead	Lag						Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes						Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max						None	None				None	None	C-Max
Act Effect Green (s)	8.2	92.6						15.6	15.6	16.2	16.2				
Actuated g/C Ratio	0.06	0.66						0.11	0.11	0.12	0.12				
v/c Ratio	0.45	0.50						0.67	0.14	0.11	0.25				
Control Delay	77.3	18.8						75.5	1.0	9.7	11.7				
Queue Delay	0.0	0.0						0.0	0.0	0.1	0.2				
Total Delay	77.3	18.8						75.5	1.0	9.8	11.9				
LOS	E	B						E	A	A	B				
Approach Delay		20.4						57.9			11.3				
Approach LOS		C						E			B				
Queue Length 50th (ft)	40	453						121	0	3	7				
Queue Length 95th (ft)	75	594						186	0	7	13				
Internal Link Dist (ft)		861			642			292			68				
Turn Bay Length (ft)	150														
Base Capacity (vph)	187	3314						262	342	337	353				
Starvation Cap Reductn	0	0						0	0	103	88				
Spillback Cap Reductn	0	0						0	0	0	0				
Storage Cap Reductn	0	0						0	0	0	0				
Reduced v/c Ratio	0.25	0.50						0.52	0.12	0.09	0.19				

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 10 (7%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 23.5

Intersection LOS: C

Intersection Capacity Utilization 101.1%

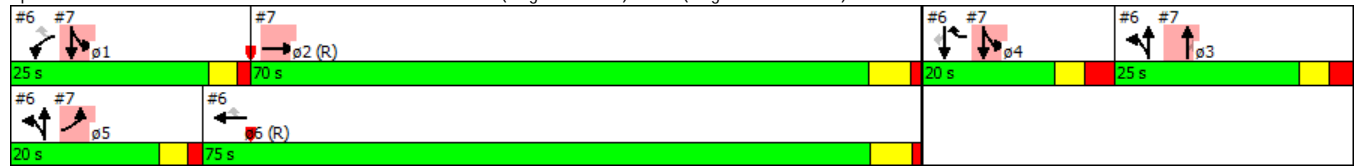
ICU Level of Service G

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	13	15	15	12	39	12	13	126	9	19	35	32
Future Volume (vph)	13	15	15	12	39	12	13	126	9	19	35	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1749	0	0	1800	0	0	1794	0	0	1750	0
Flt Permitted		0.985			0.991			0.996			0.989	
Satd. Flow (perm)	0	1749	0	0	1800	0	0	1794	0	0	1750	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		388			485			508			372	
Travel Time (s)		10.6			13.2			13.9			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	55	0	0	80	0	0	191	0	0	110	0
Sign Control		Stop			Stop			Free			Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.0%
	ICU Level of Service A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	4.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	13	15	15	12	39	12	13	126	9	19	35	32
Future Vol, veh/h	13	15	15	12	39	12	13	126	9	19	35	32
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	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	5	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	19	19	15	50	15	17	162	12	24	45	41
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	347	320	65	334	336	167	86	0	0	173	0	0
Stage 1	114	114	-	201	201	-	-	-	-	-	-	-
Stage 2	233	206	-	133	135	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	607	597	999	620	585	877	1510	-	-	1404	-	-
Stage 1	891	801	-	801	735	-	-	-	-	-	-	-
Stage 2	770	731	-	870	785	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	544	579	999	579	568	877	1510	-	-	1404	-	-
Mov Cap-2 Maneuver	544	579	-	579	568	-	-	-	-	-	-	-
Stage 1	880	787	-	791	726	-	-	-	-	-	-	-
Stage 2	696	722	-	817	771	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.9			11.8			0.7			1.7		
HCM LOS	B			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1510	-	-	663	611	1404	-	-				
HCM Lane V/C Ratio	0.011	-	-	0.083	0.132	0.017	-	-				
HCM Control Delay (s)	7.4	0	-	10.9	11.8	7.6	0	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.3	0.5	0.1	-	-				



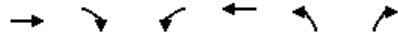
Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕				↕			↕			↕	
Traffic Volume (vph)	22	42	23	4	14	102	100	109	106	13	31	23	72
Future Volume (vph)	22	42	23	4	14	102	100	109	106	13	31	23	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%				0%			-2%			0%	
Storage Length (ft)	0		0		0		0	0		0	0		0
Storage Lanes	0		0		0		0	0		0	0		0
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	1772	0	0	0	1742	0	0	1823	0	0	1699	0
Flt Permitted		0.987				0.996			0.977			0.988	
Satd. Flow (perm)	0	1772	0	0	0	1742	0	0	1823	0	0	1699	0
Link Speed (mph)		35				35			35			35	
Link Distance (ft)		518				573			488			217	
Travel Time (s)		10.1				11.2			9.5			4.2	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%				0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	106	0	0	0	265	0	0	275	0	0	152	0
Sign Control		Yield				Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	39.2%
ICU Level of Service	A
Analysis Period (min)	15



ROUNDBABOUT REPORT																
<b>General Information</b>								<b>Site Information</b>								
Analyst	Kimley-Horn							Intersection	Wide Waters at Village Park							
Agency or Co.								E/W Street Name	Village Park Drive							
Date Performed	4/26/2016							N/S Street Name								
Time Period	AM Peak Hour							Analysis Year	Build-out AM - 2029							
Peak Hour Factor	0.83							Project ID	017254000							
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	22	42	23	0	14	102	100	1	109	106	13	0	31	23	72	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	84			291			118			277						
Exiting Flow ( $V_{ex}$ ), pc/h	107			348			280			74						
Entry Flow ( $V_e$ ), pc/h		107			267			280			155					
Entry Volume veh/h		105			262			275			152					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		1038			844			1004			856					
Capacity (c), veh/h		1016			827			983			838					
v/c Ratio (X)		0.10			0.32			0.28			0.18					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		4.5			7.9			6.5			6.2					
Lane LOS		A			A			A			A					
Lane 95% Queue		0.3			1.4			1.1			0.7					
Approach Delay, s/veh	4.47			7.94			6.47			6.15						
Approach LOS, s/veh	A			A			A			A						
Intersection Delay, s/veh	6.63															
Intersection LOS	A															



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↑↑↑		↑
Traffic Volume (vph)	1369	77	0	2557	0	59
Future Volume (vph)	1369	77	0	2557	0	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		100	0		0	0
Storage Lanes		1	0		0	1
Taper Length (ft)			25		25	
Satd. Flow (prot)	5085	1583	0	5085	0	1611
Flt Permitted						
Satd. Flow (perm)	5085	1583	0	5085	0	1611
Link Speed (mph)	45			45	25	
Link Distance (ft)	568			320	360	
Travel Time (s)	8.6			4.8	9.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1521	86	0	2841	0	66
Sign Control	Free			Free	Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 52.7%	ICU Level of Service A
Analysis Period (min)	15

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	1369	77	0	2557	0	59
Future Vol, veh/h	1369	77	0	2557	0	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1521	86	0	2841	0	66

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1521	0	2657	761
Stage 1	-	-	-	-	1521	-
Stage 2	-	-	-	-	1136	-
Critical Hdwy	-	-	5.34	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	-	-	3.12	-	3.82	3.92
Pot Cap-1 Maneuver	-	-	218	-	41	299
Stage 1	-	-	-	-	115	-
Stage 2	-	-	-	-	241	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	218	-	41	299
Mov Cap-2 Maneuver	-	-	-	-	41	-
Stage 1	-	-	-	-	115	-
Stage 2	-	-	-	-	241	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	299	-	-	218	-
HCM Lane V/C Ratio	0.219	-	-	-	-
HCM Control Delay (s)	20.4	-	-	0	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0	-

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10: RI/RO Site Drive & US 64 (Knightdale Boulevard) Performance by approach

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Approach	EB	WB	NB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Delay (hr)	0.9	3.7	0.1	4.8
Total Del/Veh (s)	2.2	5.3	9.1	4.2



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑		↓	↑↑		
Traffic Volume (vph)	2522	162	4	260	0	0	0
Future Volume (vph)	2522	162	4	260	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)	1%				-1%	0%	
Storage Length (ft)		0		0		0	0
Storage Lanes		1		1		0	0
Taper Length (ft)				25		25	
Satd. Flow (prot)	5060	1575	0	1778	3557	0	0
Flt Permitted				0.037			
Satd. Flow (perm)	5060	1575	0	69	3557	0	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)		154					
Link Speed (mph)	45				45	30	
Link Distance (ft)	480				302	601	
Travel Time (s)	7.3				4.6	13.7	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)	0%				0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	2573	165	0	269	0	0	0
Turn Type	NA	Perm	D.P+P	D.P+P			
Protected Phases	2		7	7	2	7	
Permitted Phases		2	2	2			
Detector Phase	2	2	7	7	2	7	
Switch Phase							
Minimum Initial (s)	12.0	12.0	7.0	7.0			
Minimum Split (s)	19.0	19.0	15.0	15.0			
Total Split (s)	100.0	100.0	40.0	40.0			
Total Split (%)	71.4%	71.4%	28.6%	28.6%			
Yellow Time (s)	4.4	4.4	3.0	3.0			
All-Red Time (s)	1.6	1.6	3.1	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	None			
Act Effect Green (s)	107.4	107.4		130.0			
Actuated g/C Ratio	0.77	0.77		0.93			
v/c Ratio	0.66	0.13		0.79			
Control Delay	9.5	1.3		41.0			
Queue Delay	0.2	0.0		0.0			
Total Delay	9.7	1.3		41.0			
LOS	A	A		D			
Approach Delay	9.2						
Approach LOS	A						
Queue Length 50th (ft)	354	2		226			
Queue Length 95th (ft)	512	23		m287			
Internal Link Dist (ft)	400				222	521	
Turn Bay Length (ft)							
Base Capacity (vph)	3883	1244		493			
Starvation Cap Reductn	0	0		0			
Spillback Cap Reductn	485	0		0			
Storage Cap Reductn	0	0		0			
Reduced v/c Ratio	0.76	0.13		0.55			

**Intersection Summary**

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 5 (4%), Referenced to phase 2:EBWB and 6:, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.79

Intersection Signal Delay: 12.0

Intersection LOS: B

Intersection Capacity Utilization 136.7%

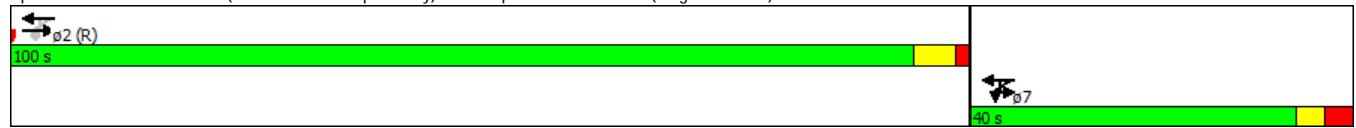
ICU Level of Service H

Analysis Period (min) 15

Description: 05-2153

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

Splits and Phases: 1: I-540 (Northern Wake Expressway) EB Ramp & US 64 Business (Knightdale Blvd)





Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑↑			↑↑↑	↑		↑	↑↑↑			
Traffic Volume (vph)	6	417	3444	0	0	1917	713	84	4	778	0	0	0
Future Volume (vph)	6	417	3444	0	0	1917	713	84	4	778	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		3	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	5060	1575	0	1759	3574	0	0	0
Flt Permitted		0.950							0.954				
Satd. Flow (perm)	0	3450	5111	0	0	5060	1575	0	1759	3574	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							536			76			
Link Speed (mph)			45			45			35				30
Link Distance (ft)			763			1128			821				417
Travel Time (s)			11.6			17.1			16.0				9.5
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	436	3551	0	0	1976	735	0	91	802	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	97.5			67.5	67.5		32.5	32.5			
Actuated g/C Ratio		0.18	0.70			0.48	0.48		0.23	0.23			
v/c Ratio		0.71	1.00			0.81	0.71		0.22	0.90			
Control Delay		64.0	37.7			15.3	4.0		44.3	61.4			
Queue Delay		0.0	39.1			0.0	0.0		0.0	0.0			
Total Delay		64.0	76.8			15.3	4.0		44.3	61.4			
LOS		E	E			B	A		D	E			
Approach Delay			75.4			12.3			59.6				
Approach LOS			E			B			E				
Queue Length 50th (ft)		211	1214			313	17		67	283			
Queue Length 95th (ft)		258	#1261			348	61		116	348			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	3560			2440	1037		439	950			
Starvation Cap Reductn		0	347			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	1.11			0.81	0.71		0.21	0.84			

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 35 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 51.0

Intersection LOS: D

Intersection Capacity Utilization 93.0%

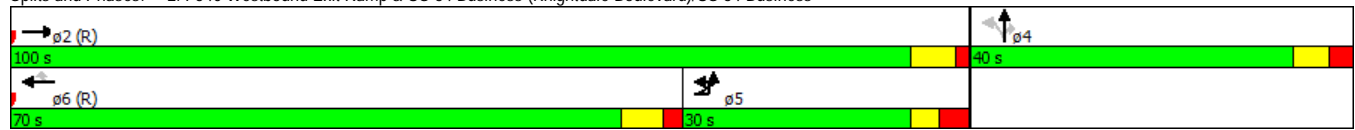
ICU Level of Service F

Analysis Period (min) 15

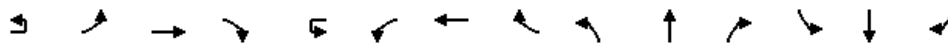
Description: 05-2152

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

Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business







Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔	↔		↔	↔↔↔	↔	↔↔	↔	↔	↔↔	↔	↔
Traffic Volume (vph)	22	589	3107	263	7	48	2102	85	239	51	78	160	32	117
Future Volume (vph)	22	589	3107	263	7	48	2102	85	239	51	78	160	32	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%				1%			3%			0%	
Storage Length (ft)		300		125		200		200	200		100	325		150
Storage Lanes		2		1		1		1	2		1	1		1
Taper Length (ft)		250				250			100			100		
Satd. Flow (prot)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Flt Permitted		0.950				0.950			0.950			0.950		
Satd. Flow (perm)	0	3450	5111	1591	0	1761	5060	1575	3382	1835	1560	3433	1614	1504
Right Turn on Red				Yes				Yes			Yes			Yes
Satd. Flow (RTOR)				91				81			130		40	126
Link Speed (mph)			45				45			35			35	
Link Distance (ft)			1128				1286			476			408	
Travel Time (s)			17.1				19.5			9.3			7.9	
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%				0%			0%			0%	
Shared Lane Traffic (%)														38%
Lane Group Flow (vph)	0	617	3138	266	0	55	2123	86	241	52	79	162	77	73
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1!	1	6	7	3	8	1!	7	4	5!
Permitted Phases				2				6			8			4
Detector Phase	5	5	2	3	1	1	6	7	3	8	1	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	7.0
Minimum Split (s)	16.0	16.0	19.7	15.0	15.0	15.0	19.4	15.0	15.0	20.0	15.0	15.0	19.0	16.0
Total Split (s)	25.0	25.0	75.0	20.0	25.0	25.0	75.0	20.0	20.0	20.0	25.0	20.0	20.0	25.0
Total Split (%)	17.9%	17.9%	53.6%	14.3%	17.9%	17.9%	53.6%	14.3%	14.3%	14.3%	17.9%	14.3%	14.3%	17.9%
Yellow Time (s)	3.6	3.6	4.6	3.8	3.4	3.4	4.4	4.1	3.8	3.6	3.4	4.1	3.8	3.6
All-Red Time (s)	3.0	3.0	1.7	3.0	3.0	3.0	1.6	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Lost Time Adjust (s)		-1.6	-1.3	-1.8			-1.4	-1.0	-2.1	-1.8	-1.6	-1.4	-2.1	-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	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)		20.0	85.3	99.8		10.0	75.2	91.5	14.6	12.3	24.5	15.2	10.2	35.2
Actuated g/C Ratio		0.14	0.61	0.71		0.07	0.54	0.65	0.10	0.09	0.18	0.11	0.07	0.25
v/c Ratio		1.25	1.01	0.23		0.44	0.78	0.08	0.69	0.33	0.21	0.43	0.50	0.15
Control Delay		163.2	32.9	2.5		77.9	18.4	2.3	70.8	64.7	2.0	63.3	43.7	1.0
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		163.2	32.9	2.5		77.9	18.4	2.3	70.8	64.7	2.0	63.3	43.7	1.0
LOS		F	C	A		E	B	A	E	E	A	E	D	A
Approach Delay			50.9				19.2			55.3			43.9	
Approach LOS			D				B			E			D	
Queue Length 50th (ft)		-361	865	24		51	322	4	110	45	0	74	34	0
Queue Length 95th (ft)		m#383	m#1215	m36		m68	336	m8	155	88	6	110	89	3
Internal Link Dist (ft)			1048				1206			396			328	
Turn Bay Length (ft)		300		125		200		200	200		100	325		150
Base Capacity (vph)		492	3112	1172		251	2718	1075	378	196	482	416	208	472
Starvation Cap Reductn		0	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	0
Storage Cap Reductn		0	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.25	1.01	0.23		0.22	0.78	0.08	0.64	0.27	0.16	0.39	0.37	0.15

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 50 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.25

Intersection Signal Delay: 40.5 Intersection LOS: D

Intersection Capacity Utilization 94.2% ICU Level of Service F

Analysis Period (min) 15

Description: 05-2152

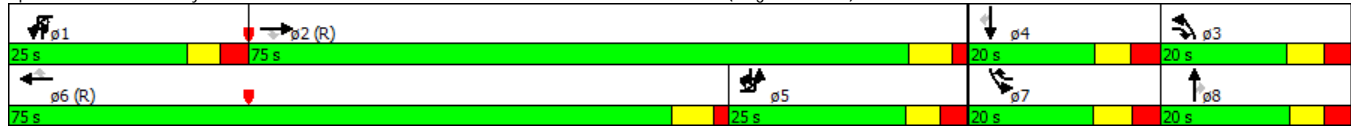
- Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

# 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: Lynwood Road/Hinton Oaks Boulevard & US 64 Business /US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations															
Traffic Volume (vph)	9	270	2489	637	82	304	1575	225	429	116	187	4	486	113	207
Future Volume (vph)	9	270	2489	637	82	304	1575	225	429	116	187	4	486	113	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%			-2%				0%	
Storage Length (ft)		350		200		300		175	275		650		150		150
Storage Lanes		2		2		2		1	1		1		1		1
Taper Length (ft)		300				300			100				100		
Satd. Flow (prot)	0	3433	6408	1583	0	3433	5085	1583	3467	1706	0	0	3433	1683	1504
Flt Permitted		0.950				0.950			0.950				0.950		
Satd. Flow (perm)	0	3433	6408	1583	0	3433	5085	1583	3467	1706	0	0	3433	1683	1504
Right Turn on Red				Yes				Yes			Yes				Yes
Satd. Flow (RTOR)				211				187			49			15	141
Link Speed (mph)			45				45				35			35	
Link Distance (ft)			1286				1388				822			597	
Travel Time (s)			19.5				21.0				16.0			11.6	
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
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	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)															
Mid-Block Traffic (%)			0%				0%				0%				0%
Shared Lane Traffic (%)															27%
Lane Group Flow (vph)	0	297	2648	678	0	410	1676	239	456	322	0	0	521	179	161
Turn Type	Prot	Prot	NA	pm+ov	Prot	Prot	NA	pm+ov	Prot	NA		Prot	Prot	NA	pm+ov
Protected Phases	5!	5	2	3	1	1	6	7!	3	8		7!	7	4	5!
Permitted Phases				2				6							4
Detector Phase	5	5	2	3	1	1	6	7	3	8		7	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	7.0
Minimum Split (s)	23.0	23.0	20.0	15.0	16.0	16.0	20.0	16.0	15.0	15.0		16.0	16.0	15.0	23.0
Total Split (s)	25.0	25.0	65.0	25.0	25.0	25.0	65.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0
Total Split (%)	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%	46.4%	17.9%	17.9%	17.9%		17.9%	17.9%	17.9%	17.9%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0	3.0	4.5	3.0	3.0	4.0		3.0	3.0	3.8	3.0
All-Red Time (s)	4.1	4.1	2.6	3.8	4.4	4.4	2.1	4.1	3.8	3.1		4.1	4.1	3.1	4.1
Lost Time Adjust (s)		-2.1	-2.1	-1.8			-2.4	-1.6	-2.1	-1.8			-2.1	-1.9	-2.1
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	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	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	None
Act Effect Green (s)	20.0	60.3	85.3				19.7	60.0	80.0	20.0			20.0	20.0	40.0
Actuated g/C Ratio	0.14	0.43	0.61				0.14	0.43	0.57	0.14			0.14	0.14	0.29
v/c Ratio		0.61	0.96	0.65			0.85	0.77	0.24	0.92			1.06	0.71	0.30
Control Delay		48.9	33.8	2.0			88.7	39.9	4.9	84.0			114.5	68.3	6.3
Queue Delay		0.0	0.0	0.0			0.0	0.0	0.0	0.0			0.0	0.0	0.0
Total Delay		48.9	33.8	2.0			88.7	39.9	4.9	84.0			114.5	68.3	6.3
LOS		D	C	A			F	D	A	F			F	E	A
Approach Delay			29.1				44.9			106.2				84.7	
Approach LOS			C				D			F				F	
Queue Length 50th (ft)		123	577	2			203	353	59	214			-299	152	9
Queue Length 95th (ft)		m126	m517	m9			m#274	443	m89	#314			#384	#256	49
Internal Link Dist (ft)			1206					1308						517	
Turn Bay Length (ft)		350		200			300		175	275			150		150
Base Capacity (vph)		490	2759	1047			490	2179	984	495			490	253	530
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		0.61	0.96	0.65			0.84	0.77	0.24	0.92			1.06	0.71	0.30

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 57 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 120  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.13

Intersection Signal Delay: 48.2 Intersection LOS: D

Intersection Capacity Utilization 95.3% ICU Level of Service F

Analysis Period (min) 15

Description: 05-2148

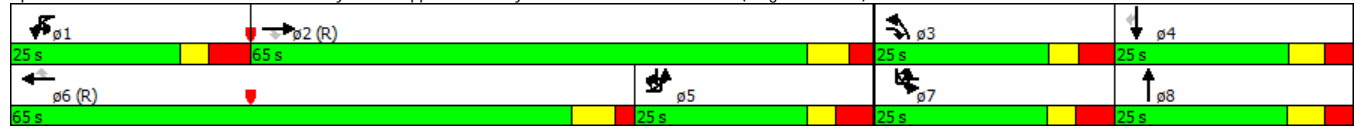
- Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

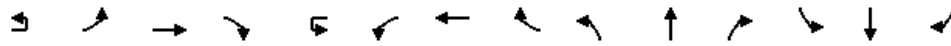
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

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

! Phase conflict between lane groups.

Splits and Phases: 4: Wide Waters Parkway/The Shoppes at Midway Plantation & US 64 Business (Knightdale Blvd.)





Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔↔	↔		↔	↔↔		↔	↔	↔		↔	↔
Traffic Volume (vph)	43	5	3097	185	19	173	2105	5	331	4	84	26	4	14
Future Volume (vph)	43	5	3097	185	19	173	2105	5	331	4	84	26	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			0%				0%			0%			0%	
Storage Length (ft)		250		0		300		0	250		100	0		75
Storage Lanes		1		1		1		0	1		1	0		1
Taper Length (ft)		100				100			100			25		
Satd. Flow (prot)	0	1770	5085	1583	0	1770	5085	0	1681	1686	1583	0	1785	1583
Flt Permitted		0.950				0.950			0.950	0.953			0.958	
Satd. Flow (perm)	0	1769	5085	1583	0	1770	5085	0	1681	1686	1583	0	1785	1583
Right Turn on Red				Yes				Yes			No			Yes
Satd. Flow (RTOR)				140										140
Link Speed (mph)			45			45				25			25	
Link Distance (ft)			1388			431				595			288	
Travel Time (s)			21.0			6.5				16.2			7.9	
Confl. Peds. (#/hr)		1						1						
Confl. Bikes (#/hr)														
Peak Hour Factor	0.99	0.99	0.99	0.90	0.99	0.90	0.99	0.99	0.90	0.90	0.90	0.99	0.90	0.99
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)														
Mid-Block Traffic (%)			0%			0%				0%			0%	
Shared Lane Traffic (%)									49%					
Lane Group Flow (vph)	0	48	3128	206	0	211	2131	0	188	184	93	0	30	14
Turn Type	Prot	Prot	NA	Perm	Prot	Prot	NA		Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	5!	5	2		1!	1	6		3	3	1!	4	4	5!
Permitted Phases				2							3			4
Detector Phase	5	5	2	2	1	1	6		3	3	1	4	4	5
Switch Phase														
Minimum Initial (s)	7.0	7.0	12.0	12.0	7.0	7.0	12.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	20.0	20.0	14.0	14.0	20.0		20.0	20.0	14.0	20.0	20.0	14.0
Total Split (s)	15.0	15.0	85.0	85.0	20.0	20.0	90.0		20.0	20.0	20.0	15.0	15.0	15.0
Total Split (%)	10.7%	10.7%	60.7%	60.7%	14.3%	14.3%	64.3%		14.3%	14.3%	14.3%	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	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	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	1.0		-2.0	-2.0
Total Lost Time (s)		5.0	5.0	5.0		5.0	5.0		5.0	5.0	8.0		5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead		Lag	Lag	Lead	Lead	Lead	Lag
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		None	None	None	None	None	None
Act Effect Green (s)		9.8	80.0	80.0		17.1	90.1		19.1	19.1	38.2		9.4	18.6
Actuated g/C Ratio		0.07	0.57	0.57		0.12	0.64		0.14	0.14	0.27		0.07	0.13
v/c Ratio		0.39	1.08	0.21		0.98	0.65		0.82	0.80	0.22		0.25	0.04
Control Delay		49.7	53.1	0.7		97.3	31.4		85.7	83.5	43.5		67.3	0.2
Queue Delay		0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay		49.7	53.1	0.7		97.3	31.4		85.7	83.5	43.5		67.3	0.2
LOS		D	D	A		F	C		F	F	D		E	A
Approach Delay			49.9				37.3			76.4			46.0	
Approach LOS			D				D			E			D	
Queue Length 50th (ft)		44	-1160	3		-222	689		183	177	69		26	0
Queue Length 95th (ft)		m44	m#1186	m4		m#371	749		#362	#351	123		61	0
Internal Link Dist (ft)			1308				351			515			208	
Turn Bay Length (ft)		250				300			250		100			75
Base Capacity (vph)		126	2905	964		215	3271		230	230	432		127	333
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		0.38	1.08	0.21		0.98	0.65		0.82	0.80	0.22		0.24	0.04

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 71 (51%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 47.1	Intersection LOS: D
Intersection Capacity Utilization 101.3%	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: 5: Site Drive/Wake Stone Rock Quarry Drwy. & US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø3	ø5
Lane Configurations				↖	↖↖	↖	↖	↖			↖	↖			
Traffic Volume (vph)	0	0	0	86	2136	35	206	22	0	0	37	29			
Future Volume (vph)	0	0	0	86	2136	35	206	22	0	0	37	29			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		0%			1%			3%			2%				
Storage Length (ft)	0		0	125		125	0		0	0		100			
Storage Lanes	0		0	1		1	1		0	0		1			
Taper Length (ft)	25			175			25			25					
Satd. Flow (prot)	0	0	0	1761	5060	1575	1656	1675	0	0	1844	1567			
Flt Permitted				0.950			0.950	0.961							
Satd. Flow (perm)	0	0	0	1761	5060	1575	1656	1675	0	0	1844	1567			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)						32						136			
Link Speed (mph)		45			45			25			25				
Link Distance (ft)		957			752			148			455				
Travel Time (s)		14.5			11.4			4.0			12.4				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)							45%								
Lane Group Flow (vph)	0	0	0	93	2322	38	123	125	0	0	40	32			
Turn Type				Prot	NA	custom	Split	NA			NA	Perm			
Protected Phases				1!	6	4	3 5!	3 5!			4		2	3	5
Permitted Phases						1 6						4			
Detector Phase				1	6	4	5	5			4	4			
Switch Phase															
Minimum Initial (s)				7.0	12.0	7.0					7.0	7.0	12.0	7.0	7.0
Minimum Split (s)				13.0	19.0	15.0					15.0	15.0	19.0	14.0	13.0
Total Split (s)				25.0	75.0	20.0					20.0	20.0	70.0	25.0	20.0
Total Split (%)				17.9%	53.6%	14.3%					14.3%	14.3%	50%	18%	14%
Yellow Time (s)				3.0	4.4	3.1					3.1	3.1	4.3	3.2	3.0
All-Red Time (s)				1.4	1.1	3.1					3.1	3.1	1.3	2.6	1.6
Lost Time Adjust (s)				0.6	-0.5	-1.2					-1.2	-1.2			
Total Lost Time (s)				5.0	5.0	5.0					5.0	5.0			
Lead/Lag				Lead	Lag	Lead					Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?				Yes	Yes	Yes					Yes	Yes	Yes	Yes	Yes
Recall Mode				None	C-Max	None					None	None	C-Max	None	None
Act Effect Green (s)				11.2	88.2	113.7	29.3	29.3			9.3	9.3			
Actuated g/C Ratio				0.08	0.63	0.81	0.21	0.21			0.07	0.07			
v/c Ratio				0.66	0.73	0.03	0.36	0.36			0.33	0.14			
Control Delay				83.7	21.6	1.3	14.2	14.2			69.1	1.2			
Queue Delay				0.0	0.0	0.0	2.1	2.0			0.0	0.0			
Total Delay				83.7	21.6	1.3	16.3	16.3			69.1	1.2			
LOS				F	C	A	B	B			E	A			
Approach Delay					23.6			16.3			38.9				
Approach LOS					C			B			D				
Queue Length 50th (ft)				84	516	1	23	24			36	0			
Queue Length 95th (ft)				140	730	9	30	30			75	0			
Internal Link Dist (ft)		877			672			68			375				
Turn Bay Length (ft)				125		125						100			
Base Capacity (vph)				251	3188	1348	414	419			197	289			
Starvation Cap Reductn				0	0	0	183	184			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				0.37	0.73	0.03	0.53	0.53			0.20	0.11			

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 23.4

Intersection LOS: C

Intersection Capacity Utilization 125.6%

ICU Level of Service H

Analysis Period (min) 15

Description: 05-0020

! Phase conflict between lane groups.

Splits and Phases: 6: Parkside Common Drive/Bozeman Drive & US 64 Business (Knightdale Blvd.)







Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø1	ø4	ø6
Lane Configurations	↖	↖↗						↖	↖↗	↖	↖↗				
Traffic Volume (vph)	60	2856	279	0	0	0	0	135	81	75	65	0			
Future Volume (vph)	60	2856	279	0	0	0	0	135	81	75	65	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)		2%			0%			5%			-3%				
Storage Length (ft)	150		100	0		0	0		0	0		0			
Storage Lanes	1		0	0		0	0		1	1		0			
Taper Length (ft)	150			25			25			25					
Satd. Flow (prot)	1752	4969	0	0	0	0	0	1816	1544	1706	1787	0			
Flt Permitted	0.950									0.950	0.995				
Satd. Flow (perm)	1752	4969	0	0	0	0	0	1816	1544	1706	1787	0			
Right Turn on Red			Yes			Yes			Yes			Yes			
Satd. Flow (RTOR)		15							139						
Link Speed (mph)		45			30			25			25				
Link Distance (ft)		941			722			405			148				
Travel Time (s)		14.3			16.4			11.0			4.0				
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)															
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)															
Mid-Block Traffic (%)		0%			0%			0%			0%				
Shared Lane Traffic (%)										10%					
Lane Group Flow (vph)	62	3232	0	0	0	0	0	139	84	69	75	0			
Turn Type	Prot	NA						NA	Perm	Split	NA				
Protected Phases	5!	2						3		14!	14!		1	4	6
Permitted Phases									3						
Detector Phase	5	2						3	3	1	1				
Switch Phase															
Minimum Initial (s)	7.0	12.0						7.0	7.0				7.0	7.0	12.0
Minimum Split (s)	13.0	19.0						14.0	14.0				13.0	15.0	19.0
Total Split (s)	20.0	70.0						25.0	25.0				25.0	20.0	75.0
Total Split (%)	14.3%	50.0%						17.9%	17.9%				18%	14%	54%
Yellow Time (s)	3.0	4.3						3.2	3.2				3.0	3.1	4.4
All-Red Time (s)	1.6	1.3						2.6	2.6				1.4	3.1	1.1
Lost Time Adjust (s)	0.4	-0.6						-0.8	-0.8						
Total Lost Time (s)	5.0	5.0						5.0	5.0						
Lead/Lag	Lead	Lag						Lag	Lag				Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes						Yes	Yes				Yes	Yes	Yes
Recall Mode	None	C-Max						None	None				None	None	C-Max
Act Effect Green (s)	9.3	86.3						15.8	15.8	20.0	20.0				
Actuated g/C Ratio	0.07	0.62						0.11	0.11	0.14	0.14				
v/c Ratio	0.53	1.05						0.68	0.28	0.28	0.29				
Control Delay	89.7	44.4						75.5	2.9	7.6	7.7				
Queue Delay	0.0	0.0						0.0	0.0	0.5	0.5				
Total Delay	89.7	44.4						75.5	2.9	8.1	8.2				
LOS	F	D						E	A	A	A				
Approach Delay		45.3						48.2			8.1				
Approach LOS		D						D			A				
Queue Length 50th (ft)	60	-1227						124	0	4	5				
Queue Length 95th (ft)	m57	m#1277						m187	m3	7	7				
Internal Link Dist (ft)		861			642			325			68				
Turn Bay Length (ft)	150														
Base Capacity (vph)	187	3068						263	342	350	366				
Starvation Cap Reductn	0	0						0	0	107	113				
Spillback Cap Reductn	0	0						0	0	0	0				
Storage Cap Reductn	0	0						0	0	0	0				
Reduced v/c Ratio	0.33	1.05						0.53	0.25	0.28	0.30				

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 125 (89%), Referenced to phase 2:EBT and 6:, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 44.0	Intersection LOS: D
Intersection Capacity Utilization 125.6%	ICU Level of Service H
Analysis Period (min) 15	
Description: 05-0020	
- 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: 7: Parkside Common Drive & US 64 Business (Knightdale Blvd.)/US 64 (Knightdale Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (vph)	76	82	49	22	58	88	30	66	15	4	147	113	46
Future Volume (vph)	76	82	49	22	58	88	30	66	15	4	147	113	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			5%				0%	
Storage Length (ft)	0		0	0		0	0		0		0		0
Storage Lanes	0		0	0		0	0		0		0		0
Taper Length (ft)	25			25			25				25		
Satd. Flow (prot)	0	1771	0	0	1718	0	0	1760	0	0	0	1782	0
Flt Permitted		0.982			0.993			0.987				0.976	
Satd. Flow (perm)	0	1771	0	0	1718	0	0	1760	0	0	0	1782	0
Link Speed (mph)		25			25			25				25	
Link Distance (ft)		388			485			508				405	
Travel Time (s)		10.6			13.2			13.9				11.0	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)		0%			0%			0%				0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	223	0	0	181	0	0	119	0	0	0	333	0
Sign Control		Stop			Stop			Free				Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 54.9%	ICU Level of Service A
Analysis Period (min)	15



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕	
Traffic Volume (veh/h)	76	82	49	22	58	88	30	66	15	4	147	113	46
Future Volume (Veh/h)	76	82	49	22	58	88	30	66	15	4	147	113	46
Sign Control		Stop			Stop			Free				Free	
Grade		0%			0%			5%				0%	
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
Hourly flow rate (vph)	82	88	53	24	62	95	32	71	16	0	158	122	49
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type													
Median storage (veh)													
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume													
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol													
IC, single (s)													
IC, 2 stage (s)													
IF (s)													
p0 queue free %													
cM capacity (veh/h)													
Direction, Lane #													
Volume Total													
Volume Left													
Volume Right													
cSH													
Volume to Capacity													
Queue Length 95th (ft)													
Control Delay (s)													
Lane LOS													
Approach Delay (s)													
Approach LOS													
Intersection Summary													
Average Delay													
Intersection Capacity Utilization													
Analysis Period (min)													
ICU Level of Service													

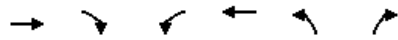


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	138	121	116	26	67	57	35	125	25	95	150	128
Future Volume (vph)	138	121	116	26	67	57	35	125	25	95	150	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			-2%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1752	0	0	1752	0	0	1831	0	0	1754	0
Flt Permitted		0.982			0.991			0.991			0.987	
Satd. Flow (perm)	0	1752	0	0	1752	0	0	1831	0	0	1754	0
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		518			573			488			206	
Travel Time (s)		10.1			13.0			9.5			4.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	412	0	0	166	0	0	202	0	0	410	0
Sign Control		Yield			Yield			Yield			Yield	

**Intersection Summary**

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	71.0%
	ICU Level of Service C
Analysis Period (min)	15

ROUNDBABOUT REPORT																
<b>General Information</b>							<b>Site Information</b>									
Analyst	Kimley-Horn						Intersection	Wide Waters at Village Park								
Agency or Co.							E/W Street Name	Village Park Drive								
Date Performed	4/26/2016						N/S Street Name									
Time Period	PM Peak Hour						Analysis Year	Build-out PM - 2029								
Peak Hour Factor	0.91						Project ID	017254000								
Project Description:																
<b>Volume Adjustment and Site Characteristics</b>																
	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes (N)	0	1	0		0	1	0		0	1	0		0	1	0	
Lane Assignment	LTR				LTR				LTR				LTR			
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Volume (V), veh/h	138	121	116	0	26	67	57	0	35	125	25	0	95	150	128	0
Heavy Veh. Adj. ( $f_{HV}$ ), %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pedestrians Crossing	10				10				10				10			
<b>Critical and Follow-Up Headway Adjustment</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929				
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858				
<b>Flow Computations</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Circulating Flow ( $V_c$ ), pc/h	303			334			397			143						
Exiting Flow ( $V_{ex}$ ), pc/h	270			258			359			327						
Entry Flow ( $V_e$ ), pc/h		420			168			207			418					
Entry Volume veh/h		412			165			203			410					
<b>Capacity and v/c Ratios</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Capacity ( $c_{PCE}$ ), pc/h		834			809			760			979					
Capacity (c), veh/h		817			792			744			958					
v/c Ratio (X)		0.50			0.21			0.27			0.43					
<b>Delay and Level of Service</b>																
	EB			WB			NB			SB						
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass				
Lane Control Delay (d), s/veh		11.3			6.8			8.0			8.7					
Lane LOS		B			A			A			A					
Lane 95% Queue		2.9			0.8			1.1			2.2					
Approach Delay, s/veh	11.32			6.77			8.01			8.68						
Approach LOS, s/veh	B			A			A			A						
Intersection Delay, s/veh	9.21															
Intersection LOS	A															



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↗		↑↑↑		↗
Traffic Volume (vph)	3045	193	0	2350	0	145
Future Volume (vph)	3045	193	0	2350	0	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		100	0		0	0
Storage Lanes		1	0		0	1
Taper Length (ft)			25		25	
Satd. Flow (prot)	5085	1583	0	5085	0	1611
Flt Permitted						
Satd. Flow (perm)	5085	1583	0	5085	0	1611
Link Speed (mph)	45			45	25	
Link Distance (ft)	431			457	355	
Travel Time (s)	6.5			6.9	9.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	3383	214	0	2611	0	161
Sign Control	Free			Free	Stop	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	74.5%
	ICU Level of Service D
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh	18.3
------------------	------

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	3045	193	0	2350	0	145
Future Vol, veh/h	3045	193	0	2350	0	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3383	214	0	2611	0	161

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	3383
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	5.34
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3.12
Pot Cap-1 Maneuver	-	-	24
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	24
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	\$ 722.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	70	-	-	24	-
HCM Lane V/C Ratio	2.302	-	-	-	-
HCM Control Delay (s)	\$ 722.2	-	-	0	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	15.3	-	-	0	-

**Notes**  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



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10: RI/RO Site Drive & US 64 (Knightdale Boulevard) Performance by approach

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Approach	EB	WB	NB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.2	0.0
Total Delay (hr)	4.1	15.3	1.3	20.7
Total Del/Veh (s)	5.3	23.6	30.8	14.2



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔			↔↔↔	↔		↔	↔↔			
Traffic Volume (vph)	4	612	1465	0	0	1958	1058	50	4	352	0	0	0
Future Volume (vph)	4	612	1465	0	0	1958	1058	50	4	352	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	4963	1545	0	1713	2680	0	0	0
Flt Permitted		0.950							0.956				
Satd. Flow (perm)	0	3450	5111	0	0	4963	1545	0	1713	2680	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							630			88			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)				1	1								
Confl. Bikes (#/hr)													
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	655	1559	0	0	2083	1126	0	57	374	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	109.6			79.6	79.6		20.4	20.4			
Actuated g/C Ratio		0.18	0.78			0.57	0.57		0.15	0.15			
v/c Ratio		1.06	0.39			0.74	0.98		0.23	0.80			
Control Delay		122.8	9.2			6.6	15.6		53.2	57.2			
Queue Delay		0.0	0.0			0.0	28.5		0.0	0.0			
Total Delay		122.8	9.2			6.6	44.2		53.2	57.2			
LOS		F	A			A	D		D	E			
Approach Delay			42.8			19.7			56.7				
Approach LOS			D			B			E				
Queue Length 50th (ft)		-348	247			139	825		47	146			
Queue Length 95th (ft)		#474	324			m141	m220		86	200			
Internal Link Dist (ft)			683			1048			741			337	
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	4001			2822	1150		428	736			
Starvation Cap Reductn		0	0			0	100		0	0			
Spillback Cap Reductn		0	0			0	0		0	0			
Storage Cap Reductn		0	0			0	0		0	0			
Reduced v/c Ratio		1.06	0.39			0.74	1.07		0.13	0.51			

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 70 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green

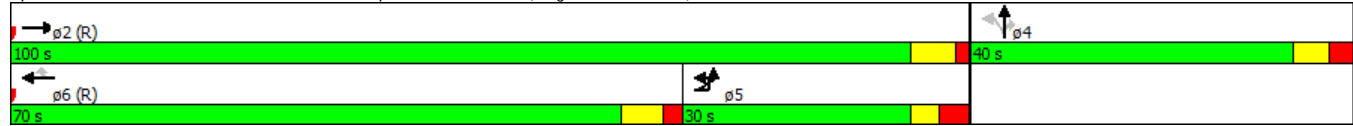
Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 31.2	Intersection LOS: C
Intersection Capacity Utilization 101.4%	ICU Level of Service G
Analysis Period (min) 15	
Description: 05-2152	
- 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: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business





Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↔↔↔			↔↔↔	↔		↔	↔↔			
Traffic Volume (vph)	6	417	3444	0	0	1917	713	84	4	778	0	0	0
Future Volume (vph)	6	417	3444	0	0	1917	713	84	4	778	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)			-1%			1%			2%			0%	
Storage Length (ft)		500		0	0		0	0		400	0	0	0
Storage Lanes		1		0	0		1	0		2	0	0	0
Taper Length (ft)		200			25			25			25		
Satd. Flow (prot)	0	3450	5111	0	0	5060	1575	0	1759	2759	0	0	0
Flt Permitted		0.950							0.954				
Satd. Flow (perm)	0	3450	5111	0	0	5060	1575	0	1759	2759	0	0	0
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							536			76			
Link Speed (mph)			45			45			35			30	
Link Distance (ft)			763			1128			821			417	
Travel Time (s)			11.6			17.1			16.0			9.5	
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)													
Mid-Block Traffic (%)			0%			0%			0%			0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	436	3551	0	0	1976	735	0	91	802	0	0	0
Turn Type	Prot	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5	2			6			4				
Permitted Phases							6	4		4			
Detector Phase	5	5	2			6	6	4	4	4			
Switch Phase													
Minimum Initial (s)	7.0	7.0	12.0			12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)	15.0	15.0	20.0			20.0	20.0	15.0	15.0	15.0			
Total Split (s)	30.0	30.0	100.0			70.0	70.0	40.0	40.0	40.0			
Total Split (%)	21.4%	21.4%	71.4%			50.0%	50.0%	28.6%	28.6%	28.6%			
Yellow Time (s)	3.0	3.0	4.6			4.4	4.4	3.7	3.7	3.7			
All-Red Time (s)	3.3	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	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes	Yes				Yes	Yes						
Recall Mode	None	None	C-Max			C-Max	C-Max	None	None	None			
Act Effect Green (s)		25.0	95.0			65.0	65.0		35.0	35.0			
Actuated g/C Ratio		0.18	0.68			0.46	0.46		0.25	0.25			
v/c Ratio		0.71	1.02			0.84	0.72		0.21	1.08			
Control Delay		64.0	46.5			18.4	4.4		43.1	99.5			
Queue Delay		0.0	31.4			0.0	0.0		0.0	0.0			
Total Delay		64.0	77.9			18.4	4.4		43.1	99.5			
LOS		E	E			B	A		D	F			
Approach Delay			76.4			14.6			93.7				
Approach LOS			E			B			F				
Queue Length 50th (ft)		211	-1239			402	17		66	-429			
Queue Length 95th (ft)		258	#1261			378	72		116	#573			
Internal Link Dist (ft)			683			1048			741		337		
Turn Bay Length (ft)		500								400			
Base Capacity (vph)		616	3468			2349	1018		439	746			
Starvation Cap Reductn		0	330			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	1.13			0.84	0.72		0.21	1.08			

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 35 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08

Intersection Signal Delay: 56.4 Intersection LOS: E

Intersection Capacity Utilization 102.1% ICU Level of Service G

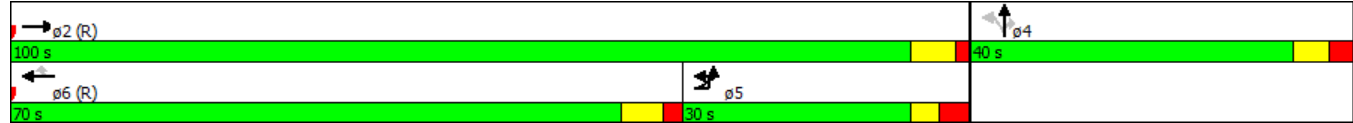
Analysis Period (min) 15

Description: 05-2152

- 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.

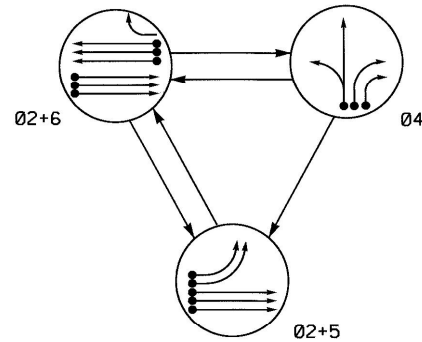
Splits and Phases: 2: I-540 Westbound Exit Ramp & US 64 Business (Knightdale Boulevard)/US 64 Business



**Appendix J:**  
**Signal Plans and Timings**



**PHASING DIAGRAM**



**PHASING DIAGRAM DETECTION LEGEND**

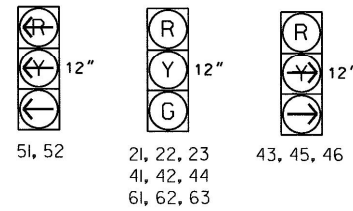
- ←●→ DETECTED MOVEMENT
- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- ←---→ UNSIGNALIZED MOVEMENT
- ←- - -> PEDESTRIAN MOVEMENT

**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	→	R
51, 52	←	←	←	←
61, 62, 63	R	G	R	Y

**SIGNAL FACE I.D.**

All Heads L.E.D.



**OASIS 2070L LOOP & DETECTOR INSTALLATION CHART**

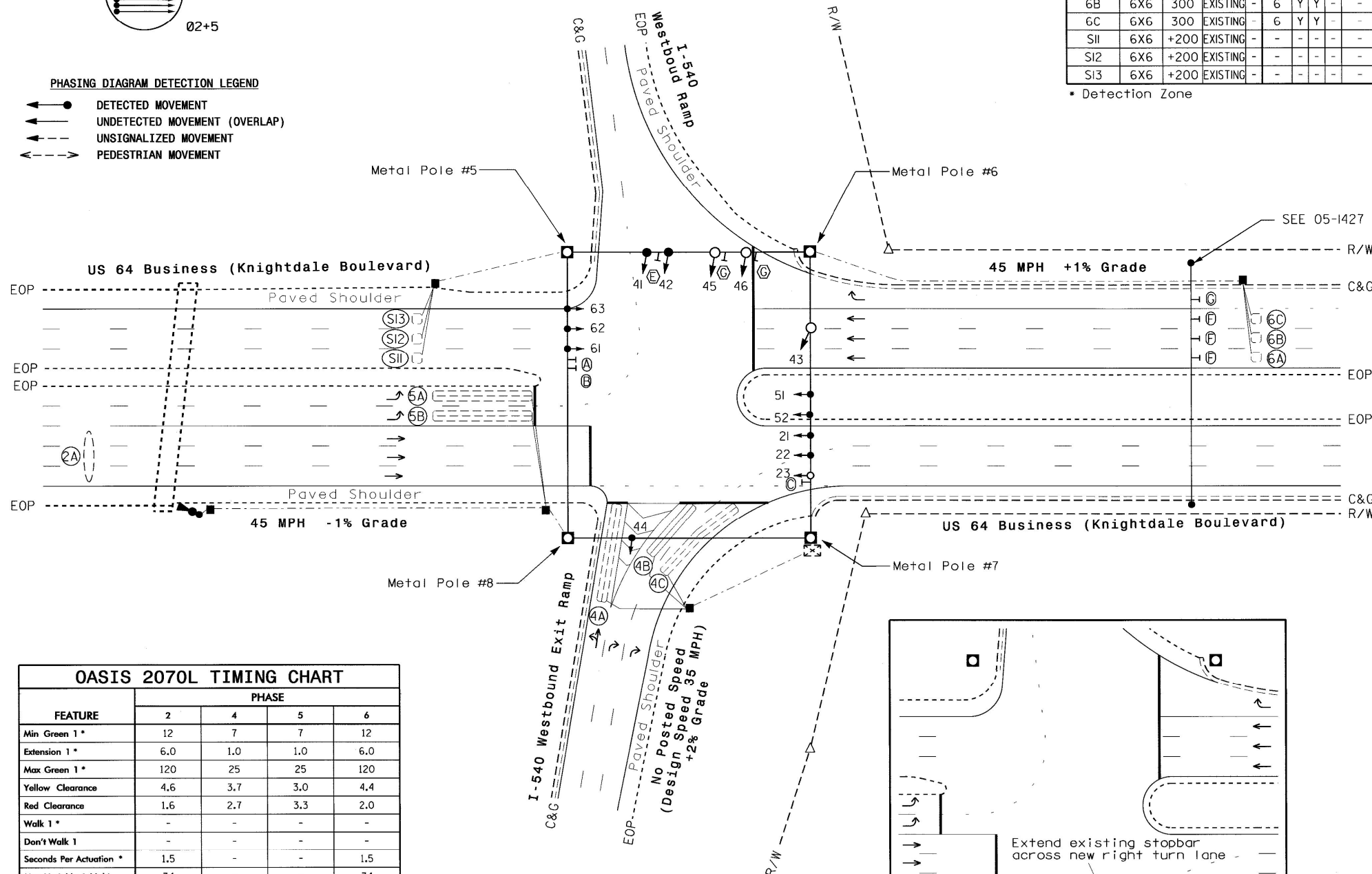
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
				NEW LOOP	PHASE	CALLING	EXTENSION		
*2A	6X30	300	N/A	-	2	Y	Y	-	-
4A	6X60	0	2-4-2	-	4	Y	Y	-	-
4B	6X40	0	2-4-2	Y	4	Y	Y	-	15
4C	6X60	0	2-4-2	-	4	Y	Y	-	15
5A	6X60	0	2-4-2	-	5	Y	Y	-	-
5B	6X60	0	2-4-2	-	5	Y	Y	-	-
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.



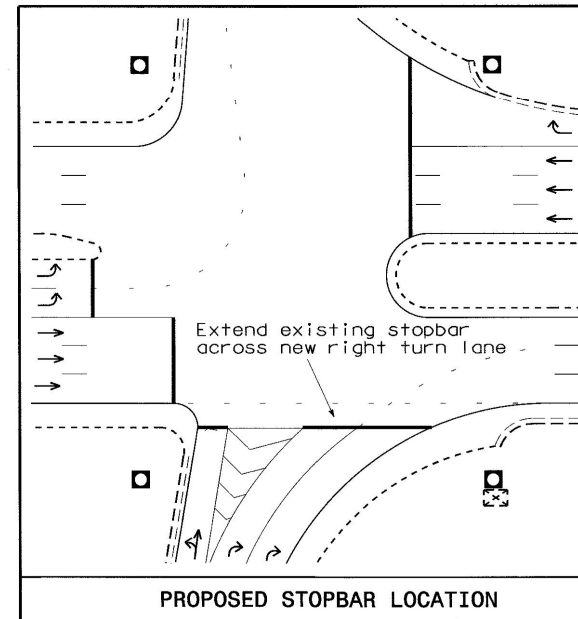
**OASIS 2070L TIMING CHART**

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.

**LEGEND**

- |  |   |     |   |
|--|---|-----|---|
|  | PROPOSED Traffic Signal Head                          |     | EXISTING Traffic Signal Head                          |
|  | PROPOSED Modified Signal Head                         | N/A |   |
|  | PROPOSED Pedestrian Signal Head                       |     | EXISTING Pedestrian Signal Head                       |
|  | PROPOSED Signal Pole with Guy                         |     | EXISTING Signal Pole with Guy                         |
|  | PROPOSED Signal Pole with Sidewalk Guy                |     | EXISTING Signal Pole with Sidewalk Guy                |
|  | PROPOSED Inductive Loop Detector                      |     | EXISTING Inductive Loop Detector                      |
|  | PROPOSED Controller & Cabinet                         |     | EXISTING Controller & Cabinet                         |
|  | PROPOSED Junction Box                                 |     | EXISTING Junction Box                                 |
|  | PROPOSED 2-in Underground Conduit                     |     | EXISTING 2-in Underground Conduit                     |
|  | PROPOSED Right of Way                                 |     | EXISTING Right of Way                                 |
|  | PROPOSED Directional Arrow                            |     | EXISTING Directional Arrow                            |
|  | PROPOSED Metal Strain Pole                            |     | EXISTING Metal Strain Pole                            |
|  | PROPOSED Out of Pavement Detector                     |     | EXISTING Out of Pavement Detector                     |
|  | PROPOSED Out of Pavement Detection Zone               |     | EXISTING Out of Pavement Detection Zone               |
|  | PROPOSED No U-Turn Sign (R3-4)                        |     | EXISTING No U-Turn Sign (R3-4)                        |
|  | PROPOSED No Left Turn Sign (R3-2)                     |     | EXISTING No Left Turn Sign (R3-2)                     |
|  | PROPOSED No Right Turn Sign (R3-1)                    |     | EXISTING No Right Turn Sign (R3-1)                    |
|  | PROPOSED Combined Through and Left Arrow Sign (R3-6L) |     | EXISTING Combined Through and Left Arrow Sign (R3-6L) |
|  | PROPOSED Through Arrow "ONLY" Sign (R3-5A)            |     | EXISTING Through Arrow "ONLY" Sign (R3-5A)            |
|  | PROPOSED Right Arrow "ONLY" Sign (R3-5R)              |     | EXISTING Right Arrow "ONLY" Sign (R3-5R)              |



**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:  
 REVISIONS: INIT. DATE  
 SCALE: 1" = 40'  
 SIGNATURE: DATE: 1/24/12  
 SIG. INVENTORY NO. 05-2152

08-FEB-2012 16:17:55 #1734514175: S:\gms\1734514175.dwg: 2152.dwg: 2152.dwg



8 Phase Fully Actuated (US 64 Business Knightdale Closed Loop Signal 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.
- Phase 1 or phase 5 may be lagged.
- Phase 3 or phase 7 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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: Local Comm Addr # 3, Area Assignment # 1, Area Address # 3.

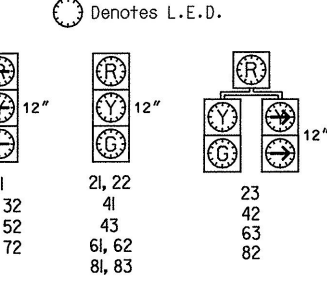
2070L LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CAB
				PHASE	CALLING	EXTENSION	STRETCH TIME		
IA	6X40	0	2-4-2	1	Y	Y		Y	
IB	6X40	0	2-4-2	1	Y	Y		15	Y
2A	6X6	300	5	2	Y	Y			Y
2B	6X6	300	5	2	Y	Y			Y
2C	6X6	300	5	2	Y	Y			Y
3A	6X40	0	2-4-2	3	Y	Y			Y
3B	6X40	0	2-4-2	3	Y	Y			Y
4A	6X40	0	2-4-2	4	Y	Y			Y
5A	6X40	0	2-4-2	5	Y	Y			Y
5B	6X40	0	2-4-2	5	Y	Y			Y
5C	6X40	0	2-4-2	5	Y	Y			Y
6A	6X6	300	5	6	Y	Y			Y
6B	6X6	300	5	6	Y	Y			Y
6C	6X6	300	5	6	Y	Y			Y
7A	6X40	0	2-4-2	7	Y	Y			Y
7B	6X40	0	2-4-2	7	Y	Y			Y
8A	6X40	0	2-4-2	8	Y	Y			Y
S14	6X6	170	4				SYSTEM DETECTOR	Y	Y
S15	6X6	170	4				SYSTEM DETECTOR	Y	Y
S16	6X6	170	4				SYSTEM DETECTOR	Y	Y

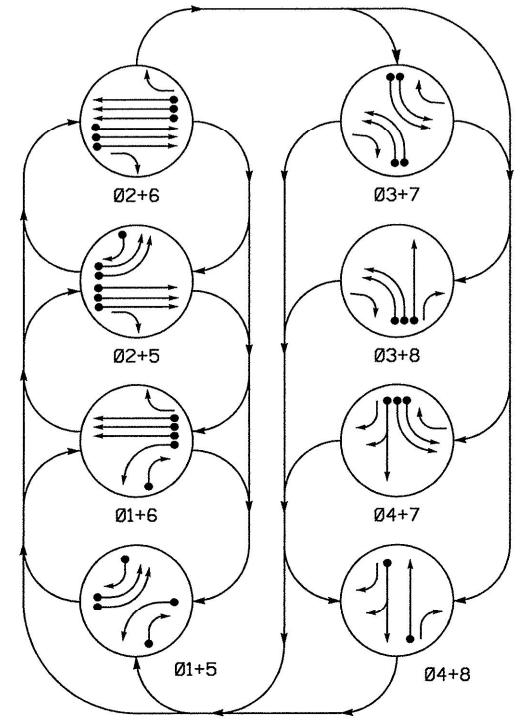
TABLE OF OPERATION

SIGNAL FACE	PHASE								F LAG	
	Ø 1 + 5	Ø 2 + 6	Ø 3 + 7	Ø 4 + 8	Ø 1 + 5	Ø 2 + 6	Ø 3 + 7	Ø 4 + 8		
II	←	←	←	←	←	←	←	←	←	
21, 22	R	R	G	G	R	R	R	R	Y	
23	R	R	G	G	R	R	R	R	Y	
31, 32	←	←	←	←	←	←	←	←	←	
41, 43	R	R	R	R	R	R	G	G	R	
42	R	R	R	R	R	R	G	G	R	
51, 52	←	←	←	←	←	←	←	←	←	
61, 62	R	G	R	G	R	R	R	R	Y	
63	R	G	R	G	R	R	R	R	Y	
71, 72	←	←	←	←	←	←	←	←	←	
81, 83	R	R	R	R	R	G	R	G	R	
82	R	R	R	R	G	R	G	R		

SIGNAL FACE I.D.

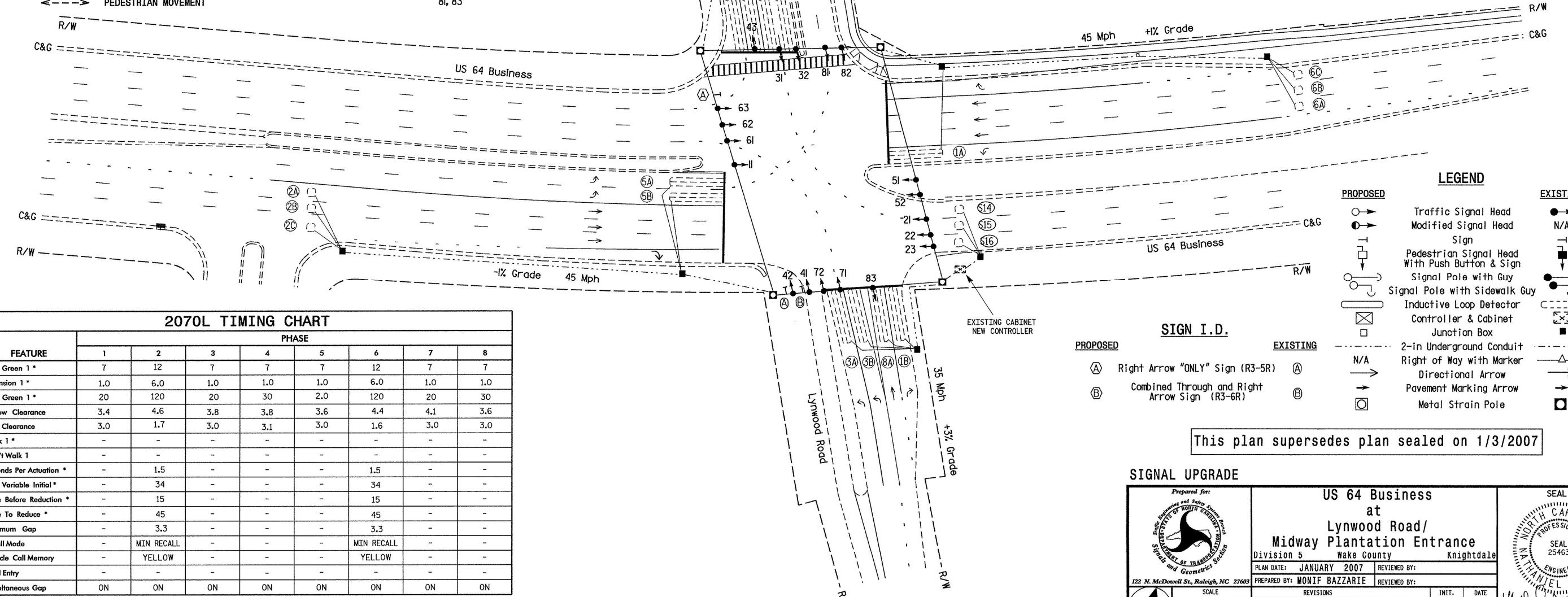


PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT



2070L TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green 1 *	7	12	7	7	7	12	7	7
Extension 1 *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max Green 1 *	20	120	20	30	2.0	120	20	30
Yellow Clearance	3.4	4.6	3.8	3.8	3.6	4.4	4.1	3.6
Red Clearance	3.0	1.7	3.0	3.1	3.0	1.6	3.0	3.0
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	-	3.3	-	-	-	3.3	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	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

- | PROPOSED | EXISTING |
|----------|----------|
|          |          |
|          |          |
|          |          |
|          |          |
|          |          |
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|          |          |
|          |          |
|          |          |

SIGN I.D.

- | PROPOSED | EXISTING |
|----------|----------|
|          |          |
|          |          |

This plan supersedes plan sealed on 1/3/2007

**SIGNAL UPGRADE**

Prepared for: **US 64 Business at Lynwood Road/ Midway Plantation Entrance**

Division 5 Wake County Knightdale

PLAN DATE: JANUARY 2007 REVIEWED BY:

PREPARED BY: MONIF BAZZARIE REVIEWED BY:

122 N. McDowell St., Raleigh, NC 27603

SCALE: 1"=40'

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER 25463

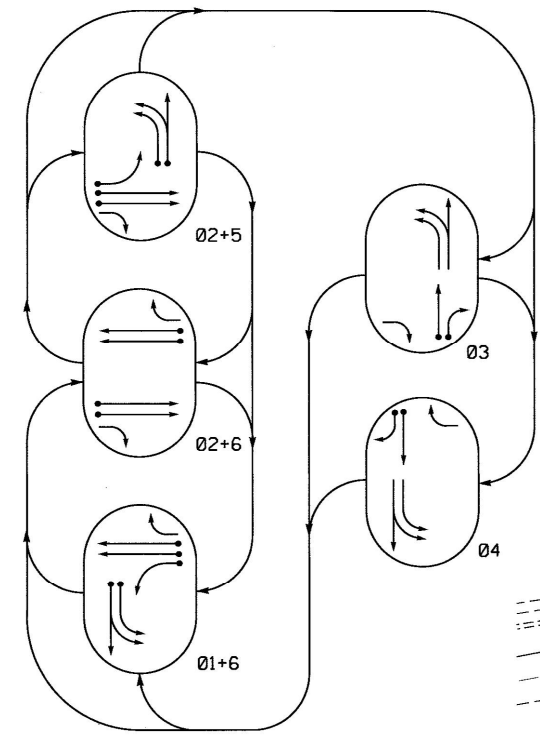
DATE: 1/10/07

SIG. INVENTORY NO. 05-2267

02-001-2007-09-24 10:41:00 AM C:\pwork\2007\01\03.dgn



**PHASING DIAGRAM**



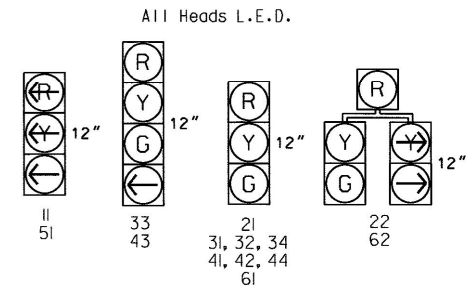
**PHASING DIAGRAM DETECTION LEGEND**

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ⚡ PEDESTRIAN MOVEMENT

**TABLE OF OPERATION**

SIGNAL FACE	PHASE					
	01+6	02+5	02+6	03	04	PEDEST
II	+	+	+	+	+	+
21	R	G	G	R	R	Y
22	R	G	G	R	R	Y
31, 32	R	R	R	G	R	R
33	R	R	G	C	R	R
34	R	R	G	G	R	R
41, 42	R	R	R	R	G	R
43	C	R	R	R	C	R
44	G	R	R	R	G	R
51	+	+	+	+	+	+
61	G	G	R	R	R	Y
62	G	G	R	R	R	Y

**SIGNAL FACE I.D.**



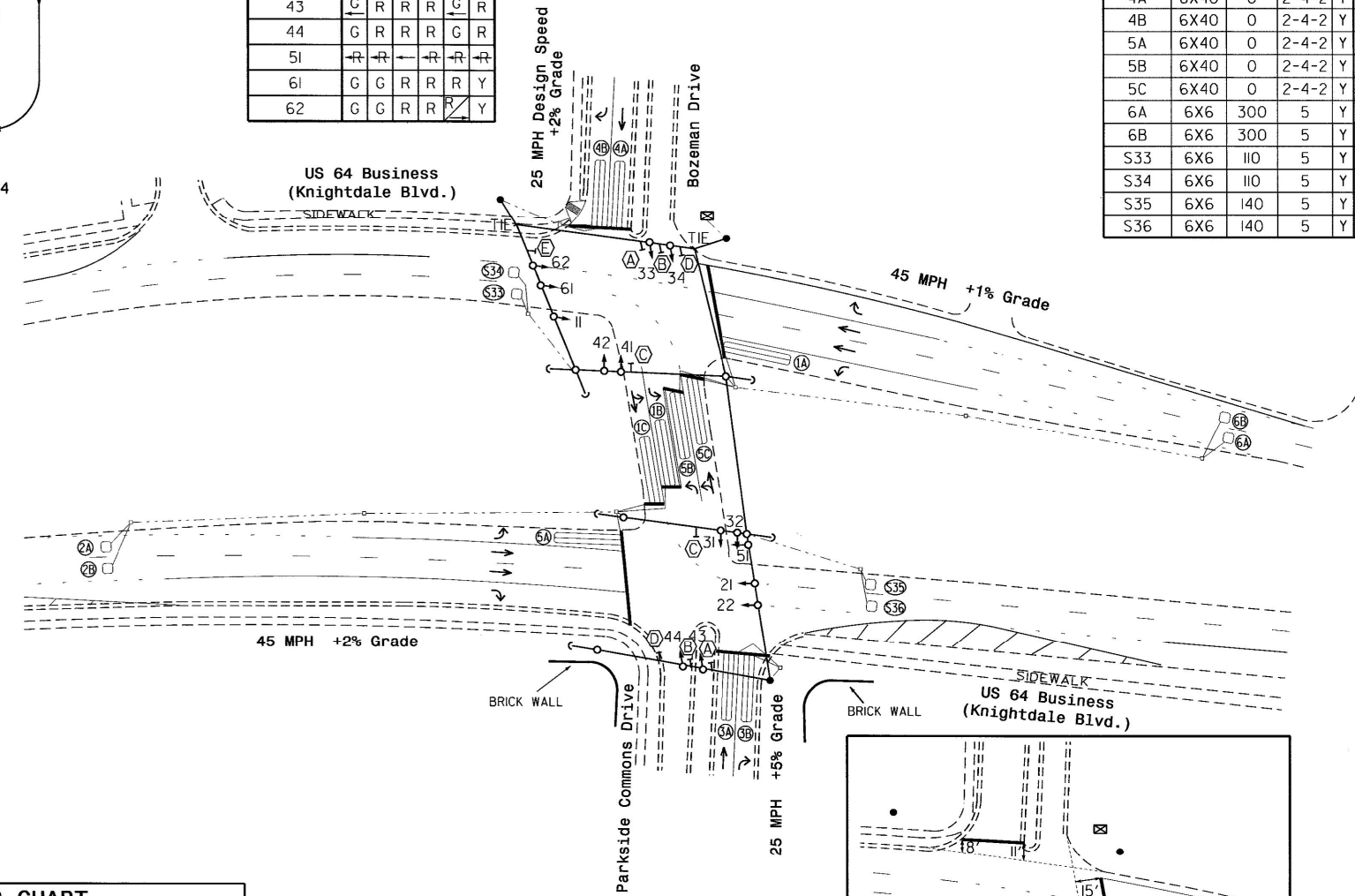
**OASIS 2070L LOOP & DETECTOR INSTALLATION CHART**

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
IA	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-	Y
IB	6X40	0	2-4-2	Y	1	Y	Y	-	-	3	-	Y
IC	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-	Y
2A	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	Y
3B	6X40	0	2-4-2	Y	3	Y	Y	-	-	15	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	15	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-	Y
5B	6X40	0	2-4-2	Y	5	Y	Y	-	-	3	-	Y
5C	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-	Y
6A	6X6	300	5	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	300	5	Y	6	Y	Y	-	-	-	-	Y
S33	6X6	110	5	Y	-	-	-	-	-	-	-	Y
S34	6X6	110	5	Y	-	-	-	-	-	-	-	Y
S35	6X6	140	5	Y	-	-	-	-	-	-	-	Y
S36	6X6	140	5	Y	-	-	-	-	-	-	-	Y

**5 Phase Fully Actuated (US 64 Business 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.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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 #: 0020.

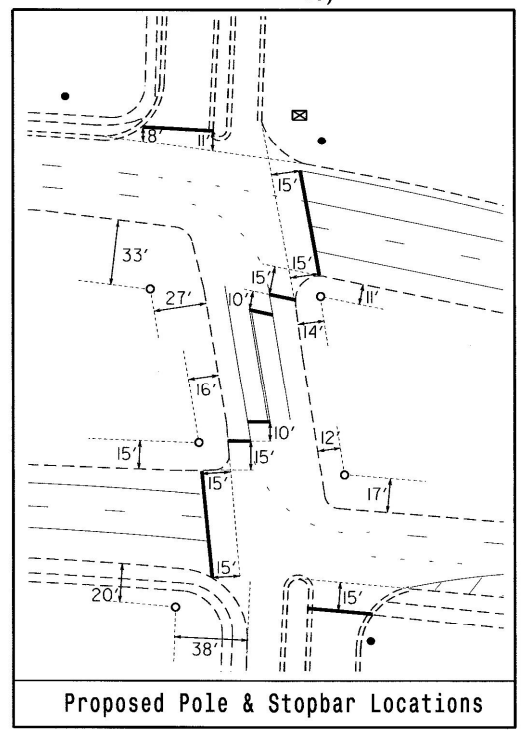
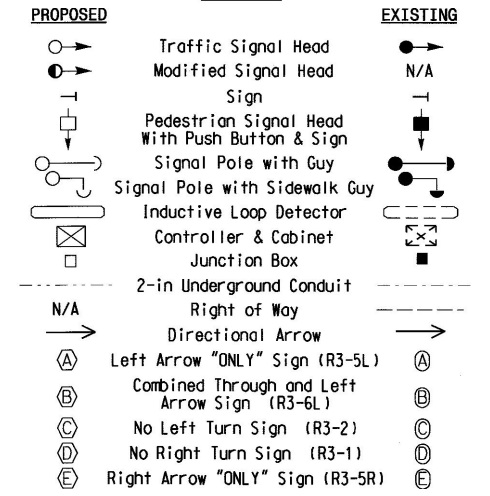


**OASIS 2070L TIMING CHART**

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	90	30	30	15	90
Yellow Clearance	3.0	4.3	3.2	3.1	3.0	4.4
Red Clearance	1.4	1.3	2.6	3.1	1.6	1.1
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*	-	15	-	-	-	15
Time To Reduce*	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
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**



**New Installation**

Prepared in the Offices of:  
TRANSPORTATION MOBILITY AND SAFETY DIVISION  
WAKE COUNTY  
SIGNAL DESIGN SECTION

750 N. Greenfield Pkwy, Garner, NC 27529

**US 64 Bus. (Knightdale Blvd.) at Parkside Commons Drive / Bozeman Drive**

Division 5 Wake County Knightdale

PLAN DATE: August 2012 REVIEWED BY:

PREPARED BY: C.E. Carter REVIEWED BY:

REVISIONS: \_\_\_\_\_ INIT. DATE

SEAL

ROBERT J. ZIEMBA  
ENGINEER  
026486

SIGNATURE: \_\_\_\_\_ DATE: 8/12/12

SIG. INVENTORY NO. 05-0020

08-001-2012-15-59 SS-4905BN-TS-Signal-51000-0020-0050020-sig-dsn-20121008-dgn P21BMD



502153 - US 64 Bus. @ I-540 EB (Inner)  
 9 - Coordination Plan 1  
 4/21/2016 10:19 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	25	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	0	0	0	40	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2															
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

	(Y/N)	
Split/Timing in percent?	N	
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	1
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

502153 - US 64 Bus. @ I-540 EB (Inner)  
 9 - Coordination Plan 2  
 4/21/2016 10:19 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	5	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	0	0	0	40	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2															
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	1
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



502153 - US 64 Bus. @ I-540 EB (Inner)  
 9 - Coordination Plan 1  
 4/21/2016 10:19 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	25	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	0	0	0	40	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2															
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	1
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



502153 - US 64 Bus. @ I-540 EB (Inner)  
 9 - Coordination Plan 2  
 4/21/2016 10:19 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	5	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	0	0	0	40	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2															
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	1
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



502152 - US 64 Bus. @ I-540 WB (Outer)  
 9 - Coordination Plan 1  
 4/21/2016 10:21 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	70	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	40	30	70	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window 4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

502152 - US 64 Bus. @ I-540 WB (Outer)  
 9 - Coordination Plan 2  
 4/21/2016 10:21 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	35	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	40	30	70	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window 4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



502152 - US 64 Bus. @ I-540 WB (Outer)  
 9 - Coordination Plan 1  
 4/21/2016 10:21 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	70	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	40	30	70	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

502152 - US 64 Bus. @ I-540 WB (Outer)  
 9 - Coordination Plan 2  
 4/21/2016 10:21 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	35	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	0	100	0	40	30	70	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window 4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0





502267 - US 64 Bus. @ Lynwood Rd / Midway Plantation  
 9 - Coordination Plan 1  
 4/21/2016 10:23 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	79	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	75	20	20	25	75	20	20
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	8
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

502267 - US 64 Bus. @ Lynwood Rd / Midway Plantation  
 9 - Coordination Plan 2  
 4/21/2016 10:23 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	50	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	75	20	20	25	75	20	20
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window 4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	8
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



502267 - US 64 Bus. @ Lynwood Rd / Midway Plantation  
 9 - Coordination Plan 1  
 4/21/2016 10:23 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	79	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	75	20	20	25	75	20	20
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	8
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

502267 - US 64 Bus. @ Lynwood Rd / Midway Plantation  
 9 - Coordination Plan 2  
 4/21/2016 10:23 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	50	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	75	20	20	25	75	20	20
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	8
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



502148 - US 64 Bus. @ Widewaters Pkwy / Midway Plantation  
 9 - Coordination Plan 1  
 4/21/2016 10:25 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	79	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	65	25	25	30	55	25	25
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped	8															
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

502148 - US 64 Bus. @ Widewaters Pkwy / Midway Plantation  
 9 - Coordination Plan 2  
 4/21/2016 10:25 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	57	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	65	25	25	25	65	25	25
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped	8															
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0





502148 - US 64 Bus. @ Widewaters Pkwy / Midway Plantation  
 9 - Coordination Plan 1  
 4/21/2016 10:25 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	79	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	65	25	25	30	55	25	25
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped	8															
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window 4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
	Phase 1	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

502148 - US 64 Bus. @ Widewaters Pkwy / Midway Plantation  
 9 - Coordination Plan 2  
 4/21/2016 10:25 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	57	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	65	25	25	25	65	25	25
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped	8															
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	3
Phase Timing Page (1-4)	2
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



500020 - US 64 Bus @ Parkside Commons  
 9 - Coordination Plan 1  
 4/21/2016 10:26 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	10	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	70	25	20	20	75	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	2
Phase Timing Page (1-4)	1
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

500020 - US 64 Bus @ Parkside Commons  
 9 - Coordination Plan 2  
 4/21/2016 10:26 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	125	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	70	25	20	20	75	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	2
Phase Timing Page (1-4)	1
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



500020 - US 64 Bus @ Parkside Commons  
 9 - Coordination Plan 1  
 4/21/2016 10:26 AM

**Coordination Plan # 1**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	10	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	70	25	20	20	75	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	2
Phase Timing Page (1-4)	1
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0



500020 - US 64 Bus @ Parkside Commons  
 9 - Coordination Plan 2  
 4/21/2016 10:26 AM

**Coordination Plan # 2**

Cycle length (0-999 sec)	140
Min Transition Cycle (0-999 sec)	70
Max Transition Cycle (0-999 sec)	150

**Offset # or Ring:**

	1	2	3	4
Offsets (0-999 sec)	125	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

**Splits (0-255 sec)**

Phase	1	2	3	4	5	6	7	8
Split	25	70	25	20	20	75	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

**Phase/Function Settings:**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase	2		6													
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

**Options:**

Split/Timing in percent?	N	(Y/N)
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

**Active Pages:**

Phase Sequence Page (1-12)	2
Phase Timing Page (1-4)	1
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

**Global Manual Permissive windows:**

\*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

**Manual Permissives by Phase:**

\*Applies when "Manual" permissive is selected

(0-255 sec)	Vehicle		Pedestrian	
	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

**Appendix K:**  
**Signal Warrant Analysis**

## Village Park Commons TRAFFIC SIGNAL VOLUME WARRANT ANALYSIS

INTERSECTION NAME: US-64 Business at Site Drive

COUNT DATE: 22-Mar-16

INTERSECTION CONDITION: Build

MAJOR STREET: US-64 Business  
MINOR STREET: Site Drive/Quarry Drwy.

# OF APPROACH LANES: 3  
# OF APPROACH LANES: 2

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): N  
85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N): Y

	MAJOR ST BOTH APPROACHES	HIGHEST HOUR MINOR ST HIGHEST APPROACH	WARRANT 1, Condition A			WARRANT 1, Condition B			WARRANT 1, Combination Warrant						WARRANT 2	WARRANT 3
			MAJOR STREET	MINOR STREET	BOTH MET	MAJOR STREET	MINOR STREET	BOTH MET	CONDITION A			CONDITION B				
									MAJOR STREET	MINOR STREET	BOTH MET	MAJOR STREET	MINOR STREET	BOTH MET		
THRESHOLD VALUES			420	140		630	70		336	112		504	56			
06:00 AM TO 07:00 AM	1,954	56	Y			Y			Y			Y				
07:00 AM TO 08:00 AM	3,078	157	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
08:00 AM TO 09:00 AM	2,601	121	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
09:00 AM TO 10:00 AM	2,338	121	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10:00 AM TO 11:00 AM	2,473	212	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11:00 AM TO 12:00 PM	3,035	242	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12:00 PM TO 01:00 PM	3,288	292	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
01:00 PM TO 02:00 PM	3,056	265	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
02:00 PM TO 03:00 PM	3,110	254	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
03:00 PM TO 04:00 PM	3,528	265	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
04:00 PM TO 05:00 PM	4,064	259	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
05:00 PM TO 06:00 PM	4,152	266	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
06:00 PM TO 07:00 PM	3,361	246	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
07:00 PM TO 08:00 PM	2,290	216	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
08:00 PM TO 09:00 PM	103	159		Y			Y			Y			Y			
09:00 PM TO 10:00 PM	83	125					Y			Y			Y			
	42,513	3,254	11			13			13			13			13	13
			<b>8 HOURS NEEDED SATISFIED</b>			<b>8 HOURS NEEDED SATISFIED</b>			<b>8 HOURS OF BOTH COND. A AND COND. B NEEDED SATISFIED</b>						<b>4 HRS NEEDED SATISFIED</b>	<b>1 HR NEEDED SATISFIED</b>

WARRANT 1 -- Eight-Hour Vehicular Volume Warrant

Condition A : Minimum Vehicular Volume

Condition B : Interruption of Continuous Traffic

Combination : Combination of Condition A and Condition B

WARRANT 2 -- Four-Hour Vehicular Volume Warrant

WARRANT 3 -- Peak Hour Warrant