

Traffic Impact Analysis SilverStone Knightdale, NC



TRAFFIC IMPACT ANALYSIS

FOR

SILVERSTONE

LOCATED

IN

KNIGHTDALE, NORTH CAROLINA

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TRAFFIC IMPACT ANALYSIS
SILVERSTONE
KNIGHTDALE, NORTH CAROLINA

1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed SilverStone development to be located in the northwest quadrant of the intersection of Hodge Road and Kemp Drive in Knightdale, North Carolina. The purpose of this study is to determine the potential impacts to the surrounding transportation system created by traffic generated by the proposed development, as well as recommend improvements to mitigate the impacts.

For the purposes of this study, the development was analyzed in two phases, the first being completed in 2020 and consisting of the following land uses:

- 108 townhome units
- 159 single-family homes

At full-buildout in 2022, the development will consist of the following land uses:

- 108 townhome units
- 282 single-family homes

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

- Existing (2016) Traffic Conditions
- Background (2020) Traffic Conditions with Phase 1 of StoneRiver and without the Hodge Road Business Park
- Combined (2020) Traffic Conditions with Phase 1 of StoneRiver and without the Hodge Road Business Park
- Background (2020) Traffic Conditions with Phase 1 of StoneRiver and with the Hodge Road Business Park
- Combined (2020) Traffic Conditions with Phase 1 of StoneRiver and with the Hodge Road Business Park
- Background (2022) Traffic Conditions with Full Build-Out of StoneRiver and without the Hodge Road Business Park
- Combined (2022) Traffic Conditions with Full Build-Out of StoneRiver and without the Hodge Road Business Park
- Background (2022) Traffic Conditions with Full Build-Out of StoneRiver and with the Hodge Road Business Park
- Combined (2022) Traffic Conditions with Full Build-Out of StoneRiver and with the Hodge Road Business Park
- Future (2032) Traffic Conditions

1.1. Site Location and Study Area

The development is proposed to be located in the northwest quadrant of the intersection of Hodge Road and Kemp Drive in Knightdale, North Carolina. Refer to Figure 1 for the site location map.

The study area for the TIA was determined through coordination with the North Carolina Department of Transportation (NCDOT) and the Town of Knightdale (Town) and consists of the following existing intersections:

- US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road
- US 64 Eastbound Ramps and Hodge Road
- Hodge Road and Ellen Drive / Panther Rock Boulevard
- Hodge Road and Kemp Drive
- Hodge Road and Poole Road

1.2. Proposed Land Use and Site Access

For the purposes of this study, the development was analyzed in two phases, the first being completed in 2020 and consisting of the following land uses:

- 108 townhome units
- 159 single-family homes

At full-buildout in 2022, the development will consist of the following land uses:

- 108 townhome units
- 282 single-family homes

Site access is proposed via one full movement driveways on Hodge Road. Site access will also be provided through roadway connections to the development to the north of the site, StoneRiver. Refer to Figure 2 for a copy of the preliminary site plan.

1.3. Adjacent Land Uses

The proposed development is located in an area consisting primarily of undeveloped land and residential development.

1.4. Existing Roadways

US 64 Bypass is a six-lane roadway running in an east-west direction. Based on the most recent data (2013) from the NCDOT, US 64 Bypass had an average annual daily traffic (AADT) volume of approximately 72,000 vehicles per day (vpd) east of its intersection with Hodge Road.

Hodge Road is a two-lane roadway running in a north-south direction with a posted speed limit of 45 mph within the study area. Based on the most recent data (2013) from the NCDOT, Hodge Road had an average AADT volume of approximately 11,000 vpd north of its intersection with Panther Rock Boulevard.

Panther Rock Boulevard is a two-lane roadway running in an east-west direction with a posted speed limit of 25 mph within the study area. Based on the traffic counts from 2016, and assuming that the peak hour volume is 10% of the average daily traffic, Panther Rock Boulevard has an AADT volume of approximately 940 vpd west of its intersection with Hodge Road.

Kemp Drive is a two-lane roadway running in an east-west direction with no posted speed limit within the study area. For the purpose of this study, a speed limit of 35 mph was assumed. Based on the traffic counts from 2016, and assuming that the peak hour volume is 10% of the average daily traffic, Kemp Drive has an AADT volume of approximately 1,270 vpd east of its intersection with Hodge Road.

Poole Road is a two-lane roadway running in an east-west direction with a posted speed limit of 45 mph within the study area. Based on the most recent data (2013) from the NCDOT, Poole Road had an average AADT volume of approximately 8,900 vpd east of its intersection with Hodge Road.

Existing lane configurations (number of traffic lanes on each intersection approach), lane widths, storage capacities, and other intersection and roadway information was collected through field reconnaissance by Ramey Kemp & Associates, Inc. (RKA). Refer to Figure 3 for an illustration of the existing lane configurations within the study area.

2. EXISTING (2016) PEAK HOUR CONDITIONS

2.1. Existing (2016) Peak Hour Traffic

Peak hour turning movement counts were collected at the following existing study intersections by RKA in February of 2016 during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:30 PM) peak hours.

- US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road
- US 64 Eastbound Ramps and Hodge Road
- Hodge Road and Ellen Drive / Panther Rock Boulevard

Peak hour turning movement counts were collected by RKA at the intersection of Hodge Road and Poole Road by RKA in October of 2016 during a typical weekday AM (7:00 to 9:00) and PM (4:00 to 6:30) peak hours.

Peak hour turning movement counts at the intersection of Hodge Road and Kemp Drive were obtained from the TIA completed for the Hodge Road Business Park in September of 2015. These counts were collected in August of 2015 during a typical weekday AM (6:30 AM – 9:00 AM) and PM (4:00 PM – 6:30 PM) peak hours. The counts were grown one (1) year at a 3% growth rate to get the 2016 traffic volumes. It should be noted these counts were collected while the local schools were in session.

Traffic volumes were balanced between study intersections, where appropriate. Refer to Figure 4 for existing (2016) weekday AM and PM peak hour traffic volumes. A copy of the count data is located in Appendix A of this report.

2.2. Analysis of Existing (2016) Peak Hour Traffic

The existing (2016) weekday AM and PM peak hour traffic volumes were analyzed to determine the current levels of service at the study intersections under existing roadway conditions. Signal information was obtained from NCDOT and is included in Appendix B. The results of the analysis are presented in Section 7 of this report.

3. BACKGROUND (2020, 2022) PEAK HOUR CONDITIONS

In order to account for growth of traffic and subsequent traffic conditions at a future year, background traffic projections are needed. Background traffic is the component of traffic due to the growth of the community and surrounding area that is anticipated to occur regardless of whether or not the proposed development is constructed. Background traffic is comprised of existing traffic growth within the study area and additional traffic created as a result of adjacent approved developments.

3.1. Ambient Traffic Growth

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 3% would be used to generate projected (2020, 2022) weekday AM and PM peak hour traffic volumes. Refer to Figures 5a and 5b for projected (2020) peak hour traffic and projected (2022) peak hour traffic.

3.2. Adjacent Development Traffic

Through coordination with the Town, Cheswick Phases 2B and 3, Hodge Road Business Park, and StoneRiver were identified to be included as an adjacent developments in this study.

Cheswick Phases 2B and 3 are expected to consist of a total of 100 single-family homes, located in the southwest quadrant of the intersection of Hodge Road and US 64 in Knightdale, North Carolina. Currently, the development is partially built-out with 36 single-family homes occupied. The adjacent development trip generation was based on the remaining 64 single-family homes and trips were distributed using the same regional trip distribution as the StoneRiver development.

Hodge Road Business Park is expected to consist of 1,000,000 sq. ft. of warehouse space located in the northeast quadrant of Hodge Road and Kemp Drive in Knightdale, North Carolina. The business park is expected to be built-out in 2020.

StoneRiver is expected to be completed in two phases, the first consisting of 70 single-family homes. At full build-out the development will consist of approximately 286 single-family homes

and 98 townhomes. It should be noted that trips from this development were diverted to utilize the SilverStone site driveway instead of Water Tower Road. Once the SilverStone development is constructed, it is recommended that the SilverStone site driveway be utilized as the second driveway for the StoneRiver development, in lieu of Water Tower Road. For the purpose of this study, Phase 1 of StoneRiver was considered under Phase 1 of the SilverStone study and full build-out was considered with full build-out of the SilverStone study.

Adjacent development trips are shown in Figures 6a-6d. Adjacent development information can be found in Appendix C.

3.3. Future Roadway Improvements

Based on coordination with the NCDOT and the Town, it was determined there were no future roadway improvements to consider with this study.

3.4. Diverted Trips

It should be noted that trips were diverted from the StoneRiver development to utilize the SilverStone site driveway. Once the SilverStone development is constructed, it is currently planned that the SilverStone site driveway be utilized as the second driveway for the StoneRiver development, in lieu of Water Tower Road. Refer to Figure 7 for the diverted trips.

3.5. Background (2020, 2022) Peak Hour Traffic Volumes

The background (2020, 2022) traffic volumes were determined by projecting the existing (2016) peak hour traffic to the year 2020 and 2022, and adding the respective adjacent development trips. Refer to Figures 8a-8d for an illustration of the background (2020) peak hour traffic volumes and background (2022) peak hour traffic volumes at the study intersections.

3.6. Analysis of Background (2020, 2022) Peak Hour Traffic Conditions

The background (2020, 2022) AM and PM peak hour traffic volumes at the study intersections were analyzed with future geometric roadway conditions and traffic control. The analysis results are presented in Section 7 of this report.

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

The proposed development is assumed to consist of approximately 108 townhome units and 282 single-family homes at full build-out. Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 9th Edition. Tables 1 and 2 provide a summary of the trip generation potential for the site at Phase 1 and full build-out.

Table 1: Trip Generation Summary – Phase 1

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Detached Housing (210)	159 dwellings	1,520	30	89	100	59
Townhomes (230)	108 dwellings	630	8	40	38	18
Total Site Trips		2,150	38	129	138	77

It is estimated that Phase 1 of the proposed development will generate approximately 2,150 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 167 trips (38 entering and 129 exiting) will occur during the AM peak hour and 215 (138 entering and 77 exiting) will occur during the PM peak hour.

Table 2: Trip Generation Summary – Full Build-Out

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Detached Housing (210)	282 dwellings	2,690	53	159	178	104
Townhomes (230)	108 dwellings	630	8	40	38	18
Total Site Trips		3,320	61	199	216	122

It is estimated the proposed development will generate approximately 3,320 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 260 trips (61 entering and 199 exiting) will occur during the AM peak hour and 338 (216 entering and 122 exiting) will occur during the PM peak hour.

4.2. Site Trip Distribution and Assignment

Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, and engineering judgment. The trip distribution was assumed to be consistent upon full build-out (as compared to Phase 1) since it is expected that the residential development will have similar destinations regardless of development size. The site trip distribution, which has been approved through coordination with the Town, is expected to be as follows:

- 40% to/from the east via US 64 Bypass
- 35% to/from the west via US 64 Bypass
- 15% to/from the north via Hodge Road
- 5% to/from the east via Poole Road
- 5% to/from the west via Poole Road

The site trip distribution is shown in Figure 9. Refer to Figures 10a and 10b for the site trip assignment for Phase 1 and full build-out.

5. COMBINED (2020, 2022) TRAFFIC CONDITIONS

5.1. Combined (2020, 2022) Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the background (2020, 2022) traffic volumes to determine the combined (2020, 2022) traffic volumes. Refer to Figures 11a-11d for an illustration of the combined (2020) peak hour traffic volumes and combined (2022) peak hour traffic volumes.

5.2. Analysis of Combined (2020, 2022) Peak Hour Traffic

Study intersections were analyzed with the combined (2020, 2022) traffic volumes using the same methodology previously discussed for existing and background traffic conditions. Intersections were analyzed with improvements necessary to accommodate future traffic volumes. The results of the capacity analysis for each intersection are presented in Section 7 of this report.

6. TRAFFIC ANALYSIS PROCEDURE

Study intersections were analyzed using the methodology outlined in the *2010 Highway Capacity Manual* (HCM) published by the Transportation Research Board. Capacity and level of service are the design criteria for this traffic study. A computer software package, Synchro (Version 9.1), was used to complete the analyses for most of the study area intersections. Please note that the unsignalized capacity analysis does not provide an overall level of service for an intersection; only delay for an approach with a conflicting movement.

The HCM defines capacity as “the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions.” Level of service (LOS) is a term used to represent different driving conditions, and is defined as a “qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers.” Level of service varies from Level “A” representing free flow, to Level “F” where breakdown conditions are evident. Refer to Table 3 for HCM levels of service and related average control delay per vehicle for both signalized and unsignalized intersections. Control delay as defined by the HCM includes “initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay”. An average control delay of 50 seconds at a signalized intersection results in LOS “D” operation at the intersection.

Table 3: Highway Capacity Manual – Levels-of-Service and Delay

UNSIGNALIZED INTERSECTION		SIGNALIZED INTERSECTION	
LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)
A	0-10	A	0-10
B	10-15	B	10-20
C	15-25	C	20-35
D	25-35	D	35-55
E	35-50	E	55-80
F	>50	F	>80

6.1. Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the NCDOT Congestions Management Guidelines and the Town’s Unified Development Ordinance (UDO), with the exception of the following items:

- The intersection of US 64 Bypass Eastbound Ramps and Hodge Road is expected to operate at an overall LOS E or worse under combined (2022) traffic conditions with and without the Hodge Road Business Park. According to the Town UDO, all intersections must be mitigated back to an overall LOS D. Due to the proximity of the intersection to the existing bridge on Hodge Road over the US 64 Bypass, there are limited feasible intersection improvements available.

7. CAPACITY ANALYSIS

7.1. US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road

The existing signalized intersection of US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road was analyzed under existing (2016), background (2020), combined (2020), background (2022), combined (2022), and future (2032) traffic conditions. Refer to Table 4 for a summary of the analysis results. Refer to Appendix D for the Synchro capacity analysis reports.

Capacity analysis of all scenarios indicates the intersection of US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road is expected to operate at LOS D or better during the weekday AM and PM peak hours.

7.2. US 64 Bypass Eastbound Ramps and Hodge Road

The existing signalized intersection of US 64 Bypass Eastbound Ramps and Hodge Road was analyzed under existing (2016), background (2020), combined (2020), background (2022), combined (2022), and future (2032) traffic conditions. Refer to Table 4 for a summary of the analysis results. Refer to Appendix E for the Synchro capacity analysis reports.

Capacity analysis of the intersection of US 64 Bypass Eastbound Ramps and Hodge Road indicates the intersection is expected to operate at failing levels of service under background and combined traffic conditions. Signal timing modifications were considered as recommended background improvements for the StoneRiver development, as well as dual eastbound right-turn lanes recommended with the full build-out of the StoneRiver development.

In an effort to mitigate impacts of site traffic, eastbound dual left-turn lanes were considered in all improved scenarios. However, there is only one receiving lane on Hodge Road. To facilitate dual left turn lanes, a second receiving lane would be needed on Hodge Road and would likely need to continue to the US 64 Bypass westbound ramps, which may require widening the Hodge Road bridge over US 64 Bypass. Additionally, most of these trips would not be turning left onto the US 64 Bypass westbound ramps and would likely use the rightmost left turn lane, limiting the effectiveness of the additional left turn lane. The limited distance to the next intersection creates an area of aggressive weaving for most of the left-turn traffic continuing their commute.

Under combined (2020) traffic conditions with the Hodge Road Business Park, the intersection is expected to operate below an overall LOS D. In order to meet the Town's UDO requirements, dual eastbound right-turn lanes on the US 64 Bypass Eastbound Ramps were considered to improve intersection operations back to an overall LOS D. This is an improvement that is expected to be constructed as part of the StoneRiver development upon its full build-out, which is anticipated in 2021. It should be noted these dual eastbound right-turn lanes are not recommended as part of the SilverStone development, as they are existing issues that worsen under background growth and not directly related to the proposed development.

It should be noted that this intersection is expected to operate below an overall LOS D under combined (2022) traffic conditions. According to the Town’s UDO, all intersections must be improved to operate at an overall LOS D or better. Feasible improvements at this intersection are limited due to the width of the existing bridge on Hodge Road over US 64 Bypass, and only certain improvements can be made without widening the bridge. Although improvements are not recommended to improve the intersection operations back to an overall LOS D, improvements were recommended to mitigate the intersection operations that improve the level of service and delay in comparison to the background (2022) scenario.

7.3. Hodge Road and Ellen Drive / Panther Rock Boulevard

The existing unsignalized intersection of Hodge Road and Ellen Drive / Panther Rock Boulevard was analyzed under existing (2016), background (2020), combined (2020), background (2022), combined (2022), and future (2032) traffic conditions. Refer to Table 4 for a summary of the analysis results. Refer to Appendix F for the Synchro capacity analysis reports.

Capacity analysis of the intersection of Hodge Road and Ellen Drive / Panther Rock Boulevard indicates the eastbound approach is expected to operate with some delay and queuing, especially under the 2020 Phase 1 SilverStone and StoneRiver analysis. A traffic signal was considered at this intersection, and background and combined traffic volumes were analyzed utilizing the criteria contained in the *Manual on Uniform Traffic Control Devices (MUTCD)*. A traffic signal was warranted during the AM peak hour under background traffic conditions and during the PM peak hour under combined traffic conditions. Due to the high volume of residential development, which typically generates trips during two peak hours each day, it is anticipated that a 4- or 8-hour signal warrant would not be met.

Under 2022 traffic conditions, the intersection is recommended to be signalized, when warranted, with full build-out of the StoneRiver development. Under full build-out of the SilverStone and StoneRiver development, the intersection is expected to operate at failing levels of service. It should be noted the intersection experiences heavy volumes on the northbound and southbound approaches during the weekday AM and PM peak hours. Given the existing traffic volumes on Hodge Road, and the background growth, the intersection will not experience significant operation improvements until Hodge Road is widened. Under the combined (2022) traffic conditions with the Hodge Road Business Park developed, a four-lane section on Hodge Road was considered in order to meet the Town UDO requirements to have all intersections operating at an overall LOS D or better. It should be noted that this improvement is not recommended as part of the SilverStone development.

7.4. Hodge Road and Kemp Drive

The existing unsignalized intersection of Hodge Road and Kemp Drive was analyzed under existing (2016), background (2020), combined (2020), background (2022), combined (2022), and future (2032) traffic conditions. Refer to Table 4 for a summary of the analysis results. Refer to Appendix G for the Synchro capacity analysis reports.

Capacity analysis indicates the intersection of Hodge Road and Kemp Drive is expected to operate with some delays and queuing on the westbound approach of Kemp Drive. It should be noted that a traffic signal was considered at this intersection, and combined traffic volumes were analyzed utilizing the criteria contained in the MUTCD. A traffic signal was not warranted during weekday peak hours under combined conditions without the Business Park, and it is unlikely that a 4- or 8-hour signal warrant would be met. Until a signal is warranted or improvements are made to improve operations along the Hodge Road corridor, the intersection is not expected to experience significant improvements in operations. Site traffic is not anticipated to increase the minor-street approach volumes, and low levels of service are not uncommon for minor street approaches with heavy mainline volumes.

7.5. Hodge Road and Poole Road

The existing signalized intersection of Hodge Road and Poole Road was analyzed under existing (2016), background (2020), combined (2020), background (2022), combined (2022), and future (2032) traffic conditions. Refer to Table 4 for a summary of the analysis results. Refer to Appendix H for the Synchro capacity analysis reports.

Capacity analysis indicates the intersection of Hodge Road and Poole Road currently operates at failing levels of service and is expected to worsen with background growth. It should be noted that the difference in delay between background and combined traffic conditions is less than five seconds in each scenario. In order to mitigate the minimal impact of the proposed development site traffic, signal timing adjustments are recommended.

In order to meet the Town UDO requirements, an exclusive westbound right-turn lane on Poole Road was considered, along with signal timing modifications. With these improvements, the intersection is expected to operate better than the existing traffic scenario. It should be noted these improvements are not recommended as part of the SilverStone development, as they are existing issues that worsen under background growth and not directly related to the proposed development.

7.6. Hodge Road and Site Drive / Business Park Site Drive

The future intersection of Hodge Road and Site Drive / Business Park Site Drive was analyzed under background (2020), combined (2020), background (2022), combined (2022), and future (2032) traffic conditions. Refer to Table 4 for a summary of the analysis results. Refer to Appendix H for the Synchro capacity analysis reports.

Capacity analysis of the future intersection of Hodge Road and Site Drive / Business Park Site Drive indicates the intersection is expected to experience queuing and delay under scenarios without the Business Park being constructed. An exclusive southbound right-turn lane was considered at this intersection. An exclusive northbound left-turn lane was not considered due to the proximity to the intersection of Hodge Road and Kemp Drive, but it should be noted that the northbound left-turning vehicles are expected to cause minimal delay in the northbound traffic. A traffic signal was considered at this intersection, and combined traffic volumes were analyzed utilizing the criteria contained in the MUTCD. A traffic signal was not warranted during weekday peak hours under combined conditions without the Business Park, and it is unlikely that a 4- or 8-hour signal warrant would be met.

Once the Hodge Road Business Park is developed, one of the required background improvements is to install a traffic signal when warranted. In order to provide site access to the proposed development, it is recommended that these signal timings are modified in order to accommodate the new approach. With these improvements, the intersection is expected to operate at acceptable levels of service.

Table 4 - Capacity Analysis Summary

Intersection	Approach	Existing (2016) Conditions		Background (2020) Conditions without Hodge Road Business Park		Combined (2020) Conditions without Hodge Road Business Park		Improved Combined (2020) Conditions without Hodge Road Business Park		UDO Compliant Improved Combined (2020) Conditions without HRBP		Background (2020) Conditions with Hodge Road Business Park		Combined (2020) Conditions with Hodge Road Business Park		Improved Combined (2020) Conditions with Hodge Road Business Park		UDO Compliant Improved Combined (2020) Conditions with HRBP	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road	EB	B	C	B	D	B	D	-	-	-	-	B	D	A	D	-	-	-	-
	WB	D	C	C	D	C	D	-	-	-	-	C	D	C	D	-	-	-	-
	NB	B	C	C	C	C	C	-	-	-	-	C	D	C	D	-	-	-	-
	SB	B	C	B	C	B	C	-	-	-	-	C	C	C	C	-	-	-	-
	Overall	C (22)	C (24)	C (26)	C (30)	C (26)	C (32)	-	-	-	-	C (26)	C (35)	C (27)	D (37)	-	-	-	-
US 64 Bypass Eastbound Ramps and Hodge Road	EB	D	D	D	E	D	E	C	D	-	-	C	E	C	E	C	E	C	D
	NB	A	B	A	D	B	E	A	C	-	-	B	F	B	F	B	D	B	D
	SB	A	E	B	E	A	F	B	E	-	-	C	F	C	F	C	E	C	E
	Overall	B (10)	D (47)	B (13)	E (68)	B (15)	F (84)	B (12)	D (55)	-	-	B (17)	F (84)	C (22)	F (104)	B (18)	E (64)	B (18)	D (53)
	EB	F ²	F ²	F ²	F ²	F ²	F ²	-	-	-	-	F ²	F ²	F ²	F ²	-	-	-	-
Hodge Road and Ellen Drive / Panther Rock Boulevard	WB	C ²	C ²	D ²	E ²	E ²	F ²	-	-	-	-	E ²	F ²	F ²	F ²	-	-	-	-
	NB	A ¹	B ¹	A ¹	B ¹	A ¹	B ¹	-	-	-	-	A ¹	B ¹	A ¹	B ¹	-	-	-	-
	SB	B ¹	A ¹	B ¹	A ¹	B ¹	A ¹	-	-	-	-	B ¹	A ¹	B ¹	A ¹	-	-	-	-
	Overall	N/A	N/A	N/A	N/A	N/A	N/A	-	-	-	-	N/A	N/A	N/A	N/A	-	-	-	-
	EB	D ²	E ²	E ²	F ²	E ²	F ²	-	-	-	-	F ²	F ²	F ²	F ²	-	-	-	-
Hodge Road and Kemp Drive	WB	D ²	D ²	F ²	E ²	F ²	F ²	-	-	-	-	F ²	F ²	F ²	F ²	-	-	-	-
	NB	A ¹	B ¹	A ¹	B ¹	A ¹	B ¹	-	-	-	-	A ¹	B ¹	A ¹	B ¹	-	-	-	-
	SB	B ¹	A ¹	B ¹	A ¹	B ¹	A ¹	-	-	-	-	A ¹	B ¹	A ¹	B ¹	-	-	-	-
	Overall	N/A	N/A	N/A	N/A	N/A	N/A	-	-	-	-	N/A	N/A	N/A	N/A	-	-	-	-
	EB	F	A	F	A	F	B	F	C	A	D	F	B	F	B	F	D	A	D
Hodge Road and Poole Road	WB	C	C	D	C	D	C	F	D	C	D	E	C	E	C	E	D	C	D
	NB	E	C	E	C	E	C	E	B	D	B	E	C	E	C	E	B	D	B
	SB	E	F	F	F	F	F	F	F	D	E	F	F	F	F	F	F	E	E
	Overall	E (62)	F (159)	F (141)	F (211)	F (145)	F (213)	F (104)	F (96)	C (31)	D (55)	F (183)	F (229)	F (186)	F (232)	F (152)	F (94)	C (30)	D (55)
	EB	-	-	-	-	E ²	F ²	-	-	-	-	-	-	E	D	-	-	-	-
Hodge Road and Site Drive / Business Park Site Drive	WB	-	-	-	-	-	-	-	-	-	-	D	D	E	D	-	-	-	-
	NB	-	-	-	-	A ¹	B ¹	-	-	-	-	C	A	D	A	-	-	-	-
	SB	-	-	-	-	-	-	-	-	-	-	C	B	C	A	-	-	-	-
	Overall	-	-	-	-	N/A	N/A	-	-	-	-	C (24)	B (15)	D (36)	B (15)	-	-	-	-

1. Level of service for left turn movement on major approach for unsignalized intersections. The intersection at Irving Parkway was signalized under combined conditions.
 2. Level of service for minor approach.

Intersection	Approach	Background (2022) Conditions without Hodge Road Business Park		Combined (2022) Conditions without Hodge Road Business Park		Improved Combined (2022) Conditions without Hodge Road Business Park		UDO Compliant Improved Combined (2022) Conditions without HRBP		Background (2022) Conditions with Hodge Road Business Park		Combined (2022) Conditions with Hodge Road Business Park		Improved Combined (2022) Conditions with Hodge Road Business Park		UDO Compliant Improved Combined (2022) Conditions with HRBP		Future (2032) Conditions	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road	EB	C	D	C	D	-	-	-	-	C	D	C	D	-	-	-	-	C	D
	WB	D	D	D	D	-	-	-	-	D	D	D	D	-	-	-	-	E	E
	NB	C	B	C	C	-	-	-	-	C	C	D	C	-	-	-	-	D	A
	SB	B	C	C	C	-	-	-	-	B	C	C	C	-	-	-	-	D	C
	Overall	C (27)	C (31)	C (30)	C (34)	-	-	-	-	C (28)	C (32)	C (33)	C (35)	-	-	-	-	D (43)	C (28)
US 64 Bypass Eastbound Ramps and Hodge Road	EB	D	F	D	F	D	D	-	-	D	F	D	F	C	D	-	-	D	D
	NB	B	F	B	F	B	E	-	-	B	F	C	F	C	F	-	-	B	D
	SB	B	F	B	F	B	F	-	-	B	F	C	F	C	F	-	-	B	D
	Overall	B (16)	F (98)	B (20)	F (126)	B (17)	E (73)	-	-	C (21)	F (117)	C (28)	F (148)	C (26)	F (89)	-	-	C (21)	D (47)
	EB	E	F	F	F	F	F	D	F	F	F	F	F	F	F	E	E	D	E
Hodge Road and Ellen Drive / Panther Rock Boulevard	WB	D	E	D	E	D	E	D	E	D	E	D	E	D	E	D	E	D	E
	NB	E	A	F	A	F	B	C	A	E	B	F	B	F	A	C	B	B	B
	SB	A	D	A	D	A	E	A	E	A	D	A	E	A	E	A	B	B	B
	Overall	D (50)	D (37)	E (77)	E (59)	E (76)	E (56)	C (23)	E (55)	E (61)	D (45)	F (82)	E (62)	E (76)	E (61)	C (26)	B (17)	B (19)	B (18)
	EB	F ²	F ²	F ²	F ²	-	-	-	-	F ²	F ²	F ²	F ²	-	-	-	-	F ²	F ²
Hodge Road and Kemp Drive	WB	F ²	F ²	F ²	F ²	-	-	-	-	F ²	F ²	F ²	F ²	-	-	-	-	F ²	F ²
	NB	A ¹	B ¹	A ¹	B ¹	-	-	-	-	A ¹	B ¹	A ¹	B ¹	-	-	-	-	A ¹	C ¹
	SB	B ¹	A ¹	B ¹	A ¹	-	-	-	-	B ¹	A ¹	B ¹	A ¹	-	-	-	-	C ¹	A ¹
	Overall	N/A	N/A	N/A	N/A	-	-	-	-	N/A	N/A	N/A	N/A	-	-	-	-	N/A	N/A
	EB	F	B	F	B	F	E	A	D	F	B	F	B	F	D	B	D	B	C
Hodge Road and Poole Road	WB	E	C	E	C	F	D	C	D	F	C	F	C	F	D	C	D	C	D
	NB	E	C	E	C	E	C	D	B	E	C	E	C	D	C	D	B	E	E
	SB	F	F	F	F	F	F	E	E	F	F	F	F	E	F	E	F	C	C
	Overall	F (181)	F (241)	F (185)	F (245)	F (150)	F (104)	C (33)	E (63)	F (212)	F (260)	F (216)	F (265)	F (212)	F (144)	C (32)	E (78)	C (24)	C (32)
	EB	-	-	F ²	F ²	-	-	-	-	-	-	E	E	E	E	-	-	E	E
Hodge Road and Site Drive / Business Park Site Drive	WB	-	-	-	-	-	-	-	-	D	D	E	D	D	E	-	-	D	E
	NB	-	-	A ¹	B ¹	-	-	-	-	C	B	F	F	D	D	-	-	B	A
	SB	-	-	-	-	-	-	-	-	C	B	C	D	B	A	-	-	B	A
	Overall	-	-	N/A	N/A	-	-	-	-	C (29)	B (20)	E (68)	F (150)	D (42)	C (24)	-	-	B (17)	B (11)

1. Level of service for left turn movement on major approach for unsignalized intersections. The intersection at Irving Parkway was signalized under combined conditions.
 2. Level of service for minor approach.

8. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the proposed SilverStone, located in the northwest quadrant of the intersection of Hodge Road and Kemp Drive in Knightdale, North Carolina. At full-buildout in 2022, the development will consist of 108 townhome units and 282 single-family homes. Site access is proposed via one full movement driveway on Hodge Road. Site access will also be provided through roadway connections to the development to the north of the site, StoneRiver.

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

- Existing (2016) Traffic Conditions
- Background (2020) Traffic Conditions with Phase 1 of StoneRiver and without the Hodge Road Business Park
- Combined (2020) Traffic Conditions with Phase 1 of StoneRiver and without the Hodge Road Business Park
- Background (2020) Traffic Conditions with Phase 1 of StoneRiver and with the Hodge Road Business Park
- Combined (2020) Traffic Conditions with Phase 1 of StoneRiver and with the Hodge Road Business Park
- Background (2022) Traffic Conditions with Full Build-Out of StoneRiver and without the Hodge Road Business Park
- Combined (2022) Traffic Conditions with Full Build-Out of StoneRiver and without the Hodge Road Business Park
- Background (2022) Traffic Conditions with Full Build-Out of StoneRiver and with the Hodge Road Business Park
- Combined (2022) Traffic Conditions with Full Build-Out of StoneRiver and with the Hodge Road Business Park
- Future (2032) Traffic Conditions

Trip Generation

It is estimated that Phase 1 of the proposed development will generate approximately 2,150 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 167 trips (38 entering and 129 exiting) will occur during the AM peak hour and 215 (138 entering and 77 exiting) will occur during the PM peak hour.

It is estimated at full build-out the proposed development will generate approximately 3,320 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 260 trips (61 entering and 199 exiting) will occur during the AM peak hour and 338 (216 entering and 122 exiting) will occur during the PM peak hour.

Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the Town's UDO and NCDOT Congestion Management Guidelines, unless otherwise noted. Refer to section 6.1 of this report for a detailed description of any adjustments to these guidelines made throughout the analysis.

Intersection Capacity Analysis Summary

All the study area intersections (including the proposed site driveways) are expected to operate at acceptable levels-of-service under existing and future year conditions with the exception of the following intersections listed. A summary of these study area intersections, which are expected to need improvements, are as follows:

US 64 Bypass Eastbound Ramps and Hodge Road

Capacity analysis of the intersection of US 64 Bypass Eastbound Ramps and Hodge Road indicates the intersection is expected to operate at failing levels of service under background and combined traffic conditions due to heavy southbound thru volumes and eastbound left-turn volumes. Signal timing modifications and dual eastbound left-turn lanes were considered in all improved scenarios.

In an effort to mitigate impacts of site traffic, eastbound dual left-turn lanes were considered in all improved scenarios. However, there is only one receiving lane on Hodge Road. To facilitate dual left turn lanes, a second receiving lane would be needed on Hodge Road and would likely need to continue to the US 64 Bypass westbound ramps, which may require widening the Hodge Road bridge over US 64 Bypass. Additionally, most of these trips would not be turning left onto the US 64 Bypass westbound ramps and would likely use the rightmost left turn lane, limiting the effectiveness of the additional left turn lane. The limited distance to the next intersection creates an area of aggressive weaving for most of the left-turn traffic continuing their commute.

Hodge Road and Ellen Drive

Capacity analysis of the intersection of Hodge Road and Ellen Drive / Panther Rock Boulevard indicates the eastbound approach is expected to operate with some delay and queuing, especially under the 2020 Phase 1 SilverStone and StoneRiver analysis. A traffic signal was considered at this intersection, and background and combined traffic volumes were analyzed utilizing the criteria contained in the MUTCD. A traffic signal was warranted during the AM peak hour under background traffic conditions and during the PM peak hour under combined traffic conditions. Due to the high volume of residential development, which typically generates trips during two peak hours each day, it is anticipated that a 4- or 8-hour signal warrant would not be met.

Under full build-out of the SilverStone and StoneRiver development, the intersection is expected to operate at failing levels of service. It should be noted the intersection experiences heavy volumes on the northbound and southbound approaches during the weekday AM and PM peak hours. Given the existing traffic volumes on Hodge Road, and the background growth, the intersection will not experience significant operation improvements until Hodge Road is widened. Under the combined (2022) traffic conditions with the Hodge Road Business Park developed, a four-lane section on Hodge Road was considered in order to meet the Town UDO requirements to have all intersections operating at an overall LOS D or better. It should be noted that this improvement is not recommended as part of the SilverStone development.

Hodge Road and Poole Road

Capacity analysis indicates the intersection of Hodge Road and Poole Road currently operates at failing levels of service and is expected to worsen with background growth. It should be noted that the difference in delay between background and combined traffic conditions is less than five seconds in each scenario. In order to mitigate the minimal impact of the proposed development site traffic, signal timing adjustments are recommended.

In order to meet the Town UDO requirements, an exclusive westbound right-turn lane on Poole Road was considered, along with signal timing modifications. With these improvements, the intersection is expected to operate better than the existing traffic scenario. It should be noted these improvements are not recommended as part of the SilverStone development as they are existing issues that worsen under background growth and not directly related to the proposed development.

Hodge Road and Site Drive / Business Park Site Drive

Capacity analysis of the future intersection of Hodge Road and Site Drive / Business Park Site Drive indicates the intersection is expected to experience queuing and delay under scenarios without the Business Park being constructed. An exclusive southbound right-turn lane was considered at this intersection. An exclusive northbound left-turn lane was not considered due to the proximity to the intersection of Hodge Road and Kemp Drive, but it should be noted that the northbound left-turning vehicles are expected to cause minimal delay in the northbound traffic. A traffic signal was considered at this intersection, and combined traffic volumes were analyzed utilizing the criteria contained in the MUTCD. A traffic signal was not warranted during weekday peak hours under combined conditions without the Business Park, and it is unlikely that a 4- or 8-hour signal warrant would be met.

Once the Hodge Road Business Park is developed, one of the required background improvements is to install a traffic signal when warranted. In order to provide site access to the proposed development, it is recommended that these signal timings are modified in order to accommodate the new approach. With these improvements, the intersection is expected to operate at acceptable levels of service.

9. RECOMMENDATIONS

Based on the findings of this study, specific geometric improvements have been identified and are recommended to accommodate future traffic conditions. See a more detailed description of the recommended improvements below. Refer to Figures 12a-12d for an illustration of the recommended lane configurations for the proposed development.

2020 Traffic Conditions without Hodge Road Business Park

Background Improvements by StoneRiver

US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road

- Modify signal timings

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings

Recommended Improvements by SilverStone

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings
- Provide dual eastbound left-turn lanes on the US 64 Bypass Eastbound Ramps, one with 200 feet of storage and another with full width storage.

Hodge Road and Poole Road

- Modify signal timings

Hodge Road and Site Drive

- Provide site access via an eastbound approach with one ingress lane and two egress lanes.
- Provide a southbound right-turn lane on Hodge Road with 100 feet of storage and appropriate taper.
- Provide stop-sign traffic control for the eastbound approach.

2020 Traffic Conditions with Hodge Road Business Park

Background Improvements by StoneRiver

US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road

- Modify signal timings

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings

Background Improvements by Hodge Road Business Park

Hodge Road and Site Drive / Business Park Site Drive

- Provide site access to the Business Park via a westbound approach with two ingress lanes and two egress lanes.
- Provide dual southbound left-turn lanes on Hodge Road with 250 feet of storage and appropriate taper.
- Provide a northbound right-turn lane on Hodge Road with 100 feet of storage and appropriate taper.
- Signalize the intersection when warranted.

Recommended Improvements by SilverStone

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings
- Provide dual eastbound left-turn lanes on the US 64 Bypass Eastbound Ramps, one with 200 feet of storage and another with full width storage.

Hodge Road and Poole Road

- Modify signal timings

Hodge Road and Site Drive / Business Park Site Drive

- Provide site access via an eastbound approach with one ingress lane and two egress lanes.
- Provide a southbound right-turn lane on Hodge Road with 100 feet of storage and appropriate taper.
- Modify signal timings to accommodate eastbound approach.

2022 Traffic Conditions without Hodge Road Business Park

Background Improvements by StoneRiver

US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road

- Modify signal timings
- Provide an exclusive westbound left-turn lane on Old Faison Road with 125 feet of storage and appropriate taper.

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings
- Provide dual eastbound right-turn lanes on the US 64 Bypass Eastbound Ramps with 150 feet of storage and appropriate taper.

Hodge Road and Ellen Drive / Panther Rock Boulevard

- Signalize the intersection when warranted.
- Provide an exclusive southbound right-turn lane on Hodge Road with full width storage back to the US 64 Bypass Eastbound Ramps.

Recommended Improvements by SilverStone

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings. (completed as part of Phase 1)
- Provide dual eastbound left-turn lanes on the US 64 Bypass Eastbound Ramps, one with 200 feet of storage and another with full width storage. (completed as part of Phase 1)

Hodge Road and Ellen Drive / Panther Rock Boulevard

- Modify signal timings.

Hodge Road and Poole Road

- Modify signal timings. (completed as part of Phase 1)

Hodge Road and Site Drive

- Provide site access via an eastbound approach with one ingress lane and two egress lanes. (completed as part of Phase 1)
- Provide a southbound right-turn lane on Hodge Road with 100 feet of storage and appropriate taper. (completed as part of Phase 1)
- Provide stop-sign traffic control for the eastbound approach. (completed as part of Phase 1)

2022 Traffic Conditions with Hodge Road Business Park

Background Improvements by StoneRiver

US 64 Bypass Westbound Ramps / Old Faison Road and Hodge Road

- Modify signal timings.
- Provide an exclusive westbound left-turn lane on Old Faison Road with 125 feet of storage and appropriate taper.

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings.
- Provide dual eastbound right-turn lanes on the US 64 Bypass Eastbound Ramps with 150 feet of storage and appropriate taper.

Hodge Road and Ellen Drive / Panther Rock Boulevard

- Signalize the intersection when warranted.
- Provide an exclusive southbound right-turn lane on Hodge Road with full width storage back to the US 64 Bypass Eastbound Ramps.

Background Improvements by Hodge Road Business Park

Hodge Road and Site Drive / Business Park Site Drive

- Provide site access to the Business Park via a westbound approach with two ingress lanes and two egress lanes.
- Provide dual southbound left-turn lanes on Hodge Road with 250 feet of storage and appropriate taper.
- Provide a northbound right-turn lane on Hodge Road with 100 feet of storage and appropriate taper.
- Signalize the intersection when warranted.

Recommended Improvements by SilverStone

US 64 Bypass Eastbound Ramps and Hodge Road

- Modify signal timings. (completed as part of Phase 1)
- Provide dual eastbound left-turn lanes on the US 64 Bypass Eastbound Ramps, one with 200 feet of storage and another with full width storage. (completed as part of Phase 1)

Hodge Road and Ellen Drive / Panther Rock Boulevard

- Modify signal timings.

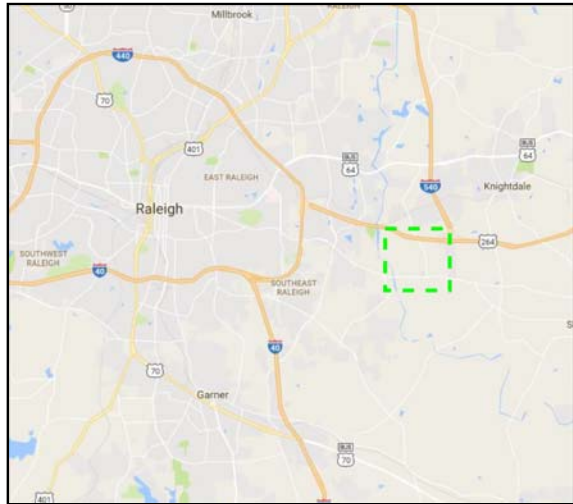
Hodge Road and Poole Road




- Modify signal timings. (completed as part of Phase 1)

Hodge Road and Site Drive / Business Park Site Drive

- Provide site access via an eastbound approach with one ingress lane and two egress lanes. (completed as part of Phase 1)
- Provide a southbound right-turn lane on Hodge Road with 100 feet of storage and appropriate taper. (completed as part of Phase 1)
- Modify signal timings to accommodate eastbound approach. (completed as part of Phase 1)

FIGURES

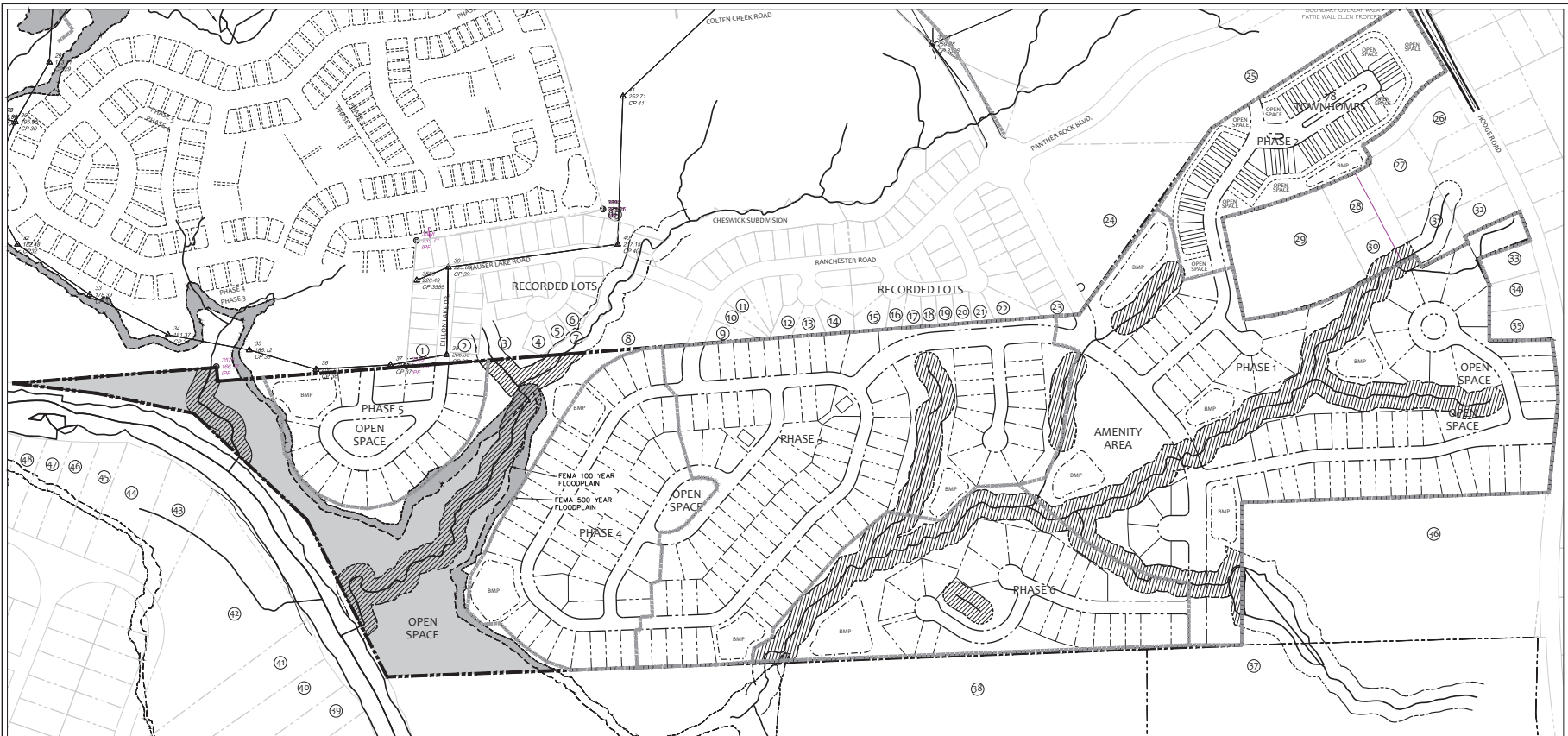


LEGEND	
	Proposed Site Location
	Study Intersection
	Study Area



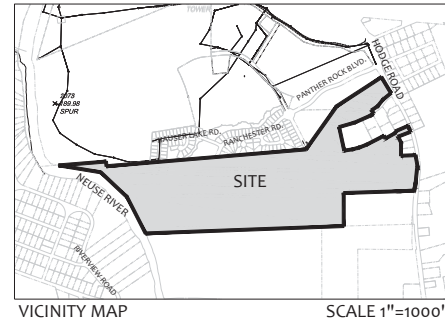
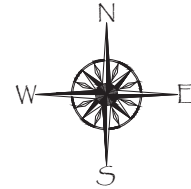
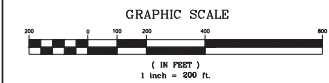
SilverStone
Knightdale, NC

Site Location Map	
Scale: Not to Scale	Figure 1



NUMBER	PIN	OWNER	ZONE	USE
1	1733-02-7209	Juanan Rohda Carrasco	UR-12	SINGFAMILY
2	1733-02-8072	Stephen & Erin Browner	UR-12	SINGFAMILY
3	1733-02-0316	Cheswick Investment LLC	UR-12	VACANT
4	1733-02-1365	Khalid Pickering	UR-12	SINGFAMILY
5	1733-02-2238	Norham & Mary Lynn Dentch	UR-12	SINGFAMILY
6	1733-02-2493	Zachary & Celia Martin	UR-12	SINGFAMILY
7	1733-02-3487	Cheswick Investment LLC	UR-12	VACANT
8	1733-02-5465	Cheswick Investment LLC	UR-12	VACANT
9	1733-02-4268	Justin & Lindsey Sommer	UR-12	SINGFAMILY
10	1733-02-0443	Guy D Pagotto	UR-12	SINGFAMILY
11	1733-02-4487	Charles & Angel Sutton	UR-12	SINGFAMILY
12	1743-02-1443	Tam & Joseph Huth	UR-12	SINGFAMILY
13	1743-02-2422	Gerard D Tustin	UR-12	SINGFAMILY
14	1743-02-2423	Carolea & Robert Skinner	UR-12	SINGFAMILY
15	1743-02-8474	Athenaeva & Theodora Papanicolaou	UR-12	SINGFAMILY
16	1743-02-5466	Jamari Banks & Barbara Saunders	UR-12	SINGFAMILY
17	1743-02-4436	Gwendolyn Clark	UR-12	SINGFAMILY
18	1743-02-4656	Ylan Sanchez	UR-12	SINGFAMILY
19	1743-02-7467	Kevin & Ashley Kirby	UR-12	SINGFAMILY
20	1743-02-4427	Erica & Charles Hunter	UR-12	SINGFAMILY
21	1743-02-8427	Bryon & Candice Ruggiero	UR-12	SINGFAMILY
22	1743-12-0406	Shane & Maria Steele	UR-12	SINGFAMILY
23	1743-12-1487	Kenneth Johnson	UR-12	SINGFAMILY
24	1743-12-3080	Riverside Plantations LLC	HB	VACANT
25	1743-13-4432	Riverside Plantations LLC	HB	VACANT

NUMBER	PIN	OWNER	ZONE	USE
26	1743-23-7223	Ben & Joyce Johnson	NMX	SINGFAMILY
27	1743-23-5001	Gregory & Joanne Woodright	NMX	SINGFAMILY
28	1743-22-3879	Salvador Gomez Trujillo	NMX	SINGFAMILY
29	1743-22-1638	Sam Alan Davis	NMX	SINGFAMILY
30	1743-22-4701	Juan Carlos Martin Salas	NMX	SINGFAMILY
31	1743-22-4700	Renet Gonzalez	NMX	SINGFAMILY
32	1743-22-4606	Calie Denton	NMX	SINGFAMILY
33	1743-32-0006	Donald & Nancy Sanders	NMX	SINGFAMILY
34	1743-32-0234	Blair & Richard Hamilton	NMX	SINGFAMILY
35	1743-32-0441	Melbourne Davis	NMX	SINGFAMILY
36	1743-20-3036	Riverview Land Holdings, LP	RMX	VACANT
37	1733-00-2501	James Estates LLC	CRS	RENTAL
38	1733-00-0666	City of Raleigh	R-1	VACANT
39	1733-700786	City of Raleigh	R-1	VACANT
40	1733-70-8609	City of Raleigh	R-1	VACANT
41	1733-71-8206	City of Raleigh	R-1	VACANT
42	1733-71-7611	Lyman Moore	R-1	MOBILE
43	1733-71-8608	Reya Williams	R-1	SINGFAMILY
44	1733-71-4713	Janet Downing	R-1	VACANT
45	1733-71-3715	Janet Downing	R-1	TWOFAM
46	1733-71-2718	Janet Downing	R-1	VACANT
47	1733-71-1802	City of Raleigh	R-1	VACANT
48	1733-71-0621	City of Raleigh	R-1	VACANT



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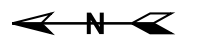
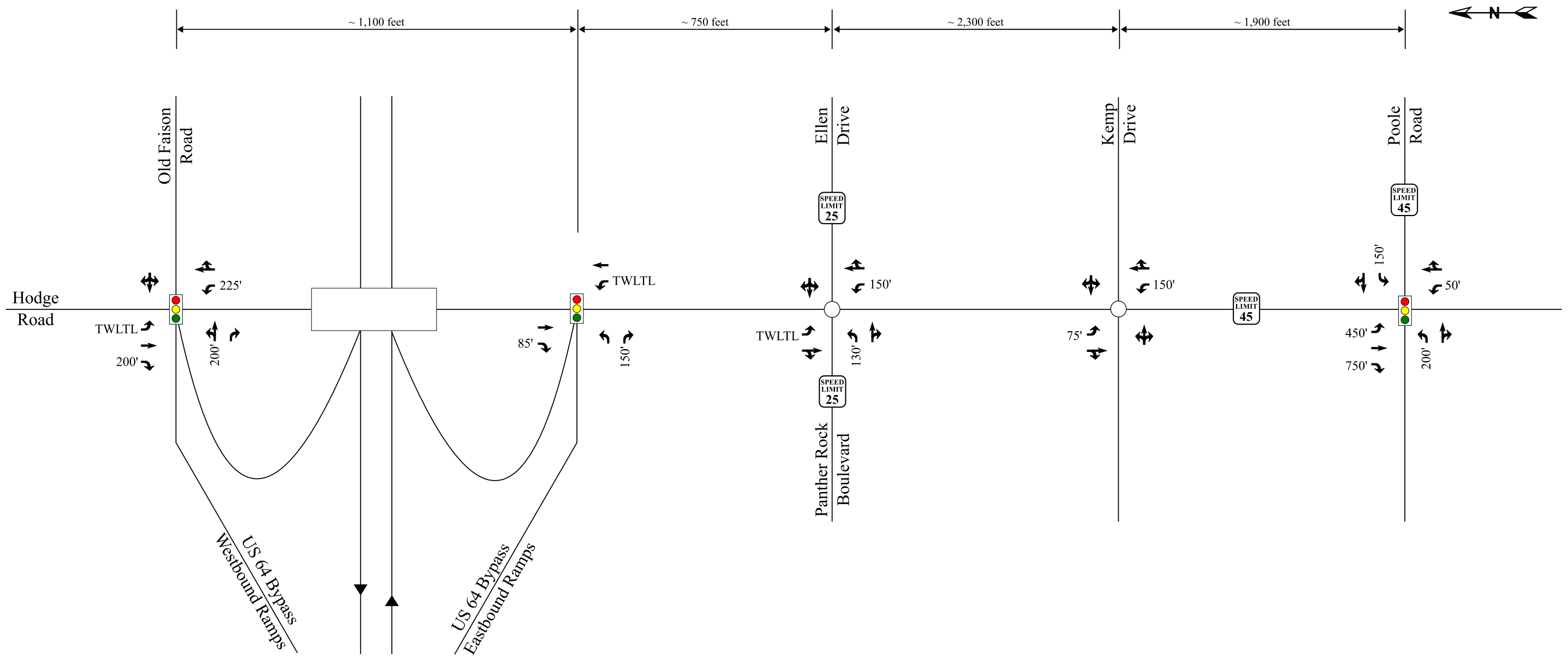
TIMMONS GROUP
 5410 Trinity Road
 Raleigh, NC 27607

REVISIONS:

REZONING EXHIBIT
 SILVER PROPERTY
 KNIGHTDALE, NC
 ARCADE/LAND, LEECH, RALEIGH NC

SCALE:
 1"=200'
 DRAWN BY:
 PMP
 PROJECT #
 15105
 DATE:
 08/10/16

SHEET
R-1
 OF 1

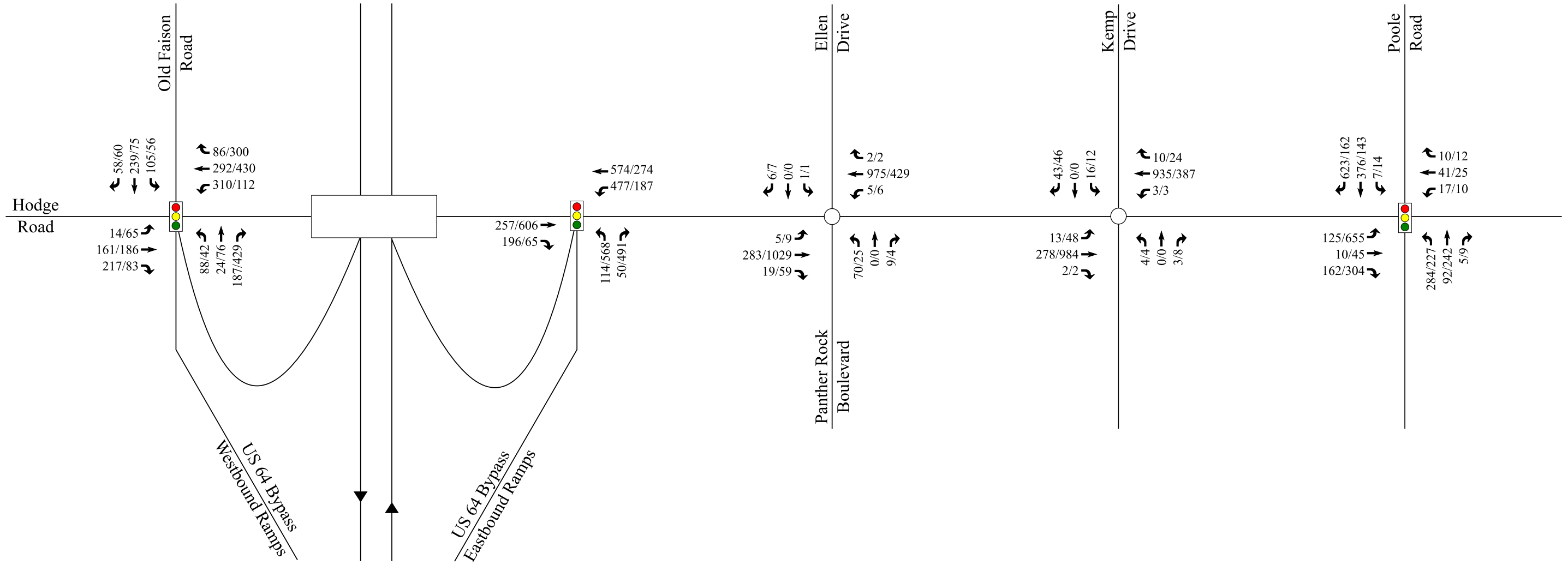
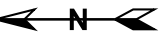


LEGEND	
	Unsignalized Intersection
	Signalized Intersection
	Existing Lane
X'	Storage (In Feet)
TWLTL	Two-Way Left-Turn Lane
	Posted Speed Limit



SilverStone
Knightdale, NC

Existing Lane Configurations	
Scale: Not to Scale	Figure 3



LEGEND

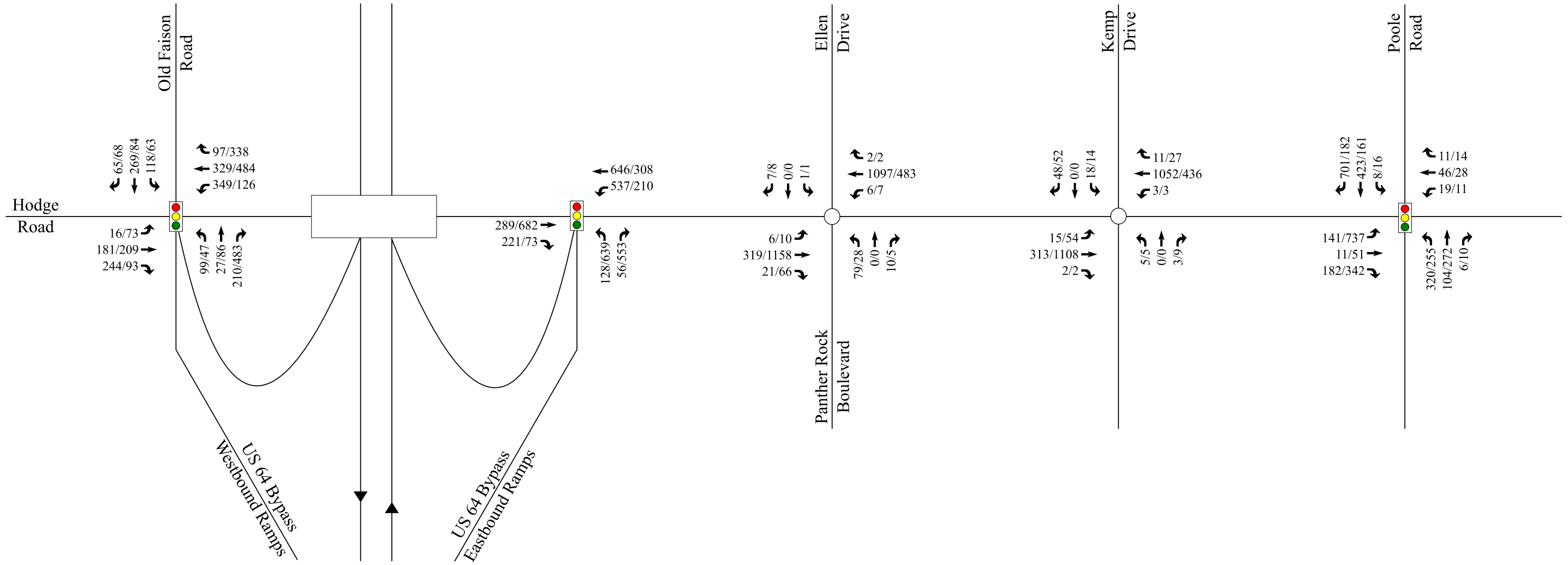
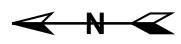
- Unsignalized Intersection
- ◫ Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



SilverStone
Knightdale, NC

Existing (2016)
Peak Hour Traffic

Scale: Not to Scale Figure 4



LEGEND

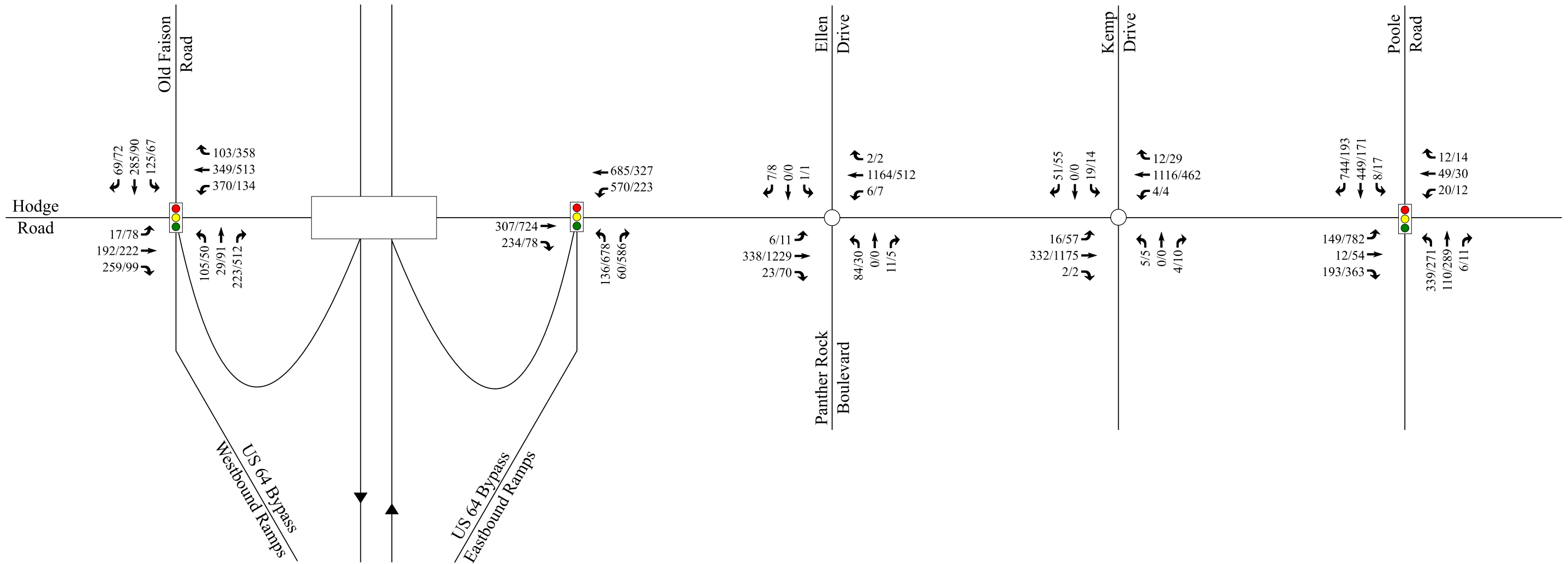
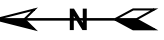
- Unsignalized Intersection
- ◫ Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



SilverStone
Knightdale, NC

Projected (2020)
Peak Hour Traffic

Scale: Not to Scale Figure 5a



LEGEND

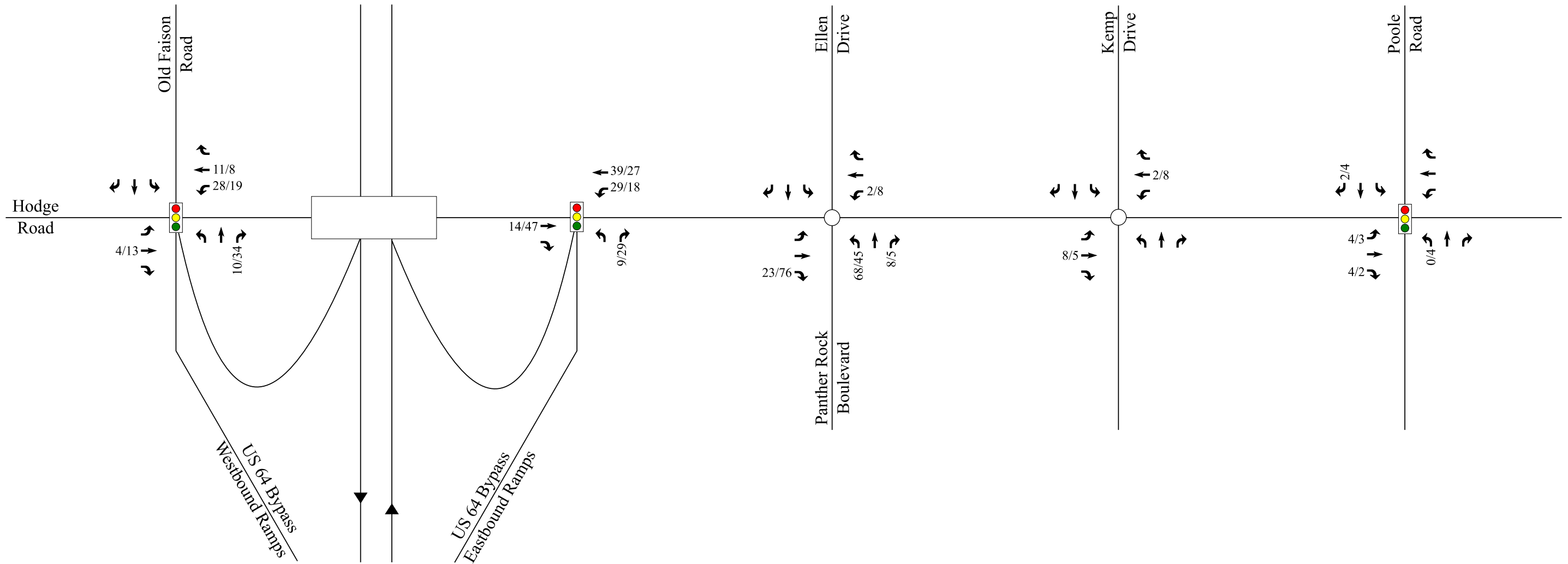
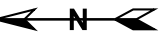
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



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Knightdale, NC

Projected (2022)
Peak Hour Traffic

Scale: Not to Scale Figure 5b

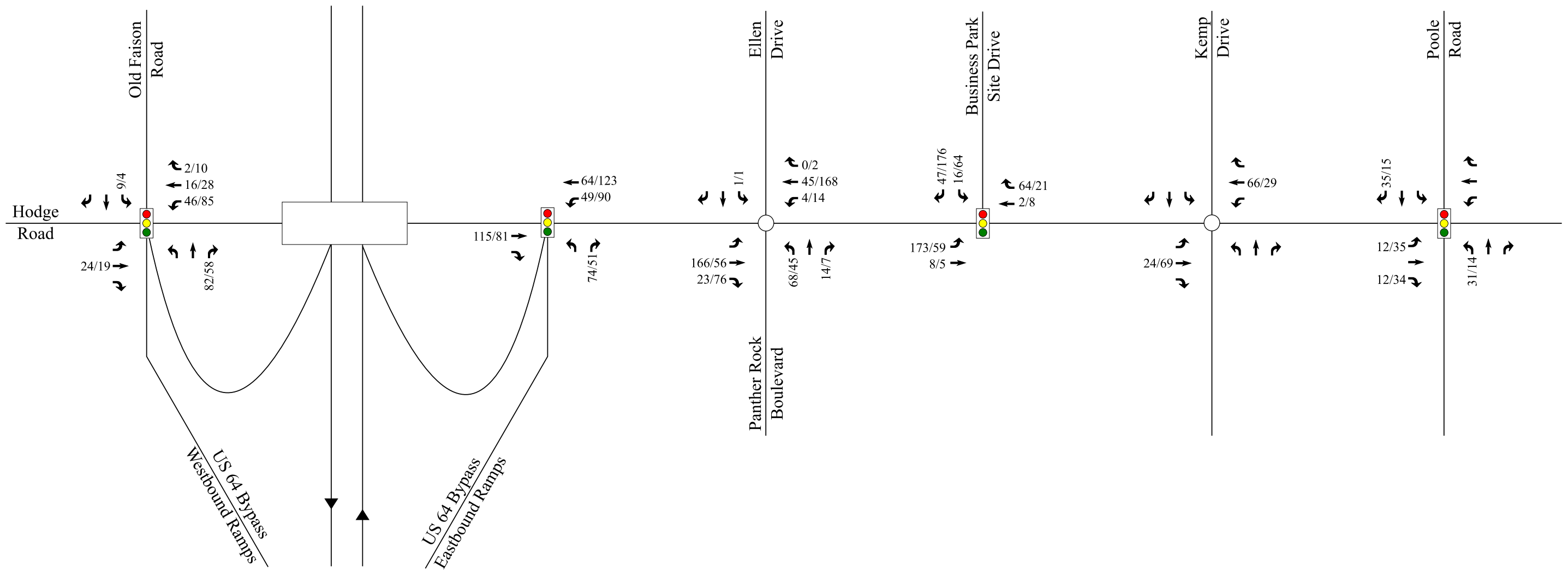
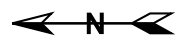


LEGEND	
	Unsignalized Intersection
	Signalized Intersection
X/Y →	AM / PM Peak Hour Traffic



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Adjacent Development Trips 2020 without Hodge Road Business Park	
Scale: Not to Scale	Figure 6a



LEGEND

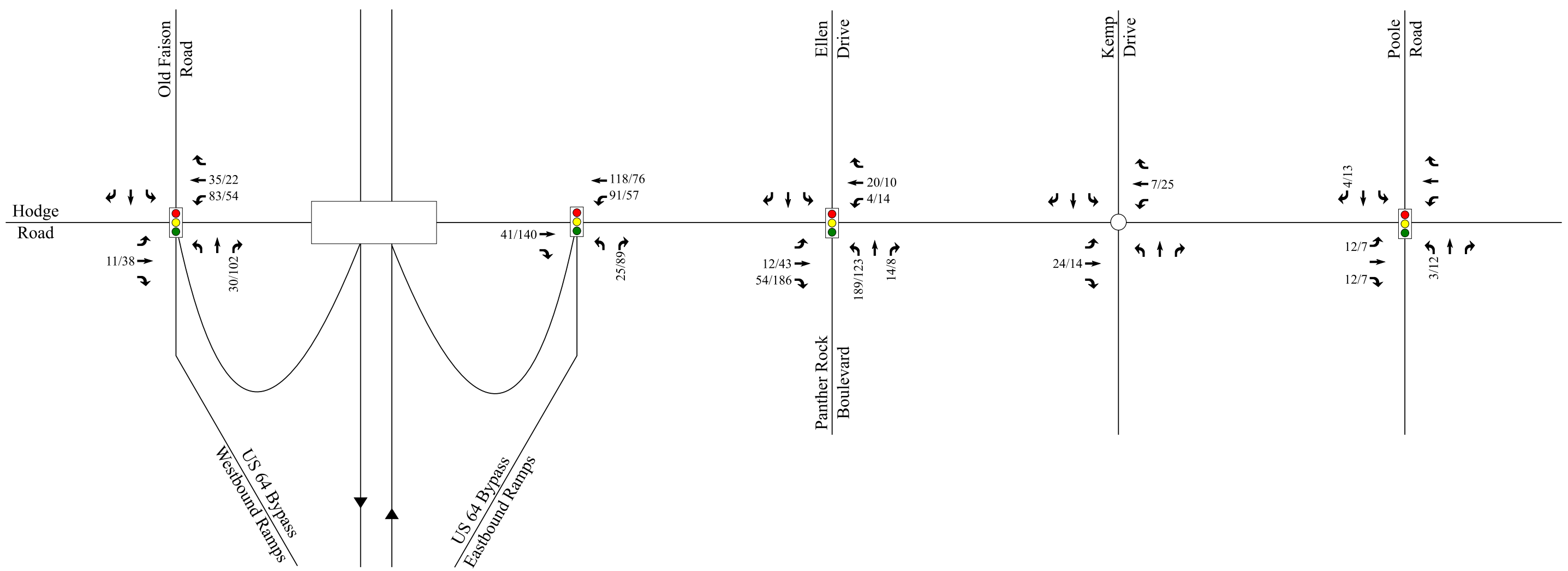
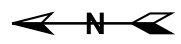
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



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Knightdale, NC

Adjacent Development Trips
2020
with Hodge Road Business Park

Scale: Not to Scale Figure 6b



LEGEND

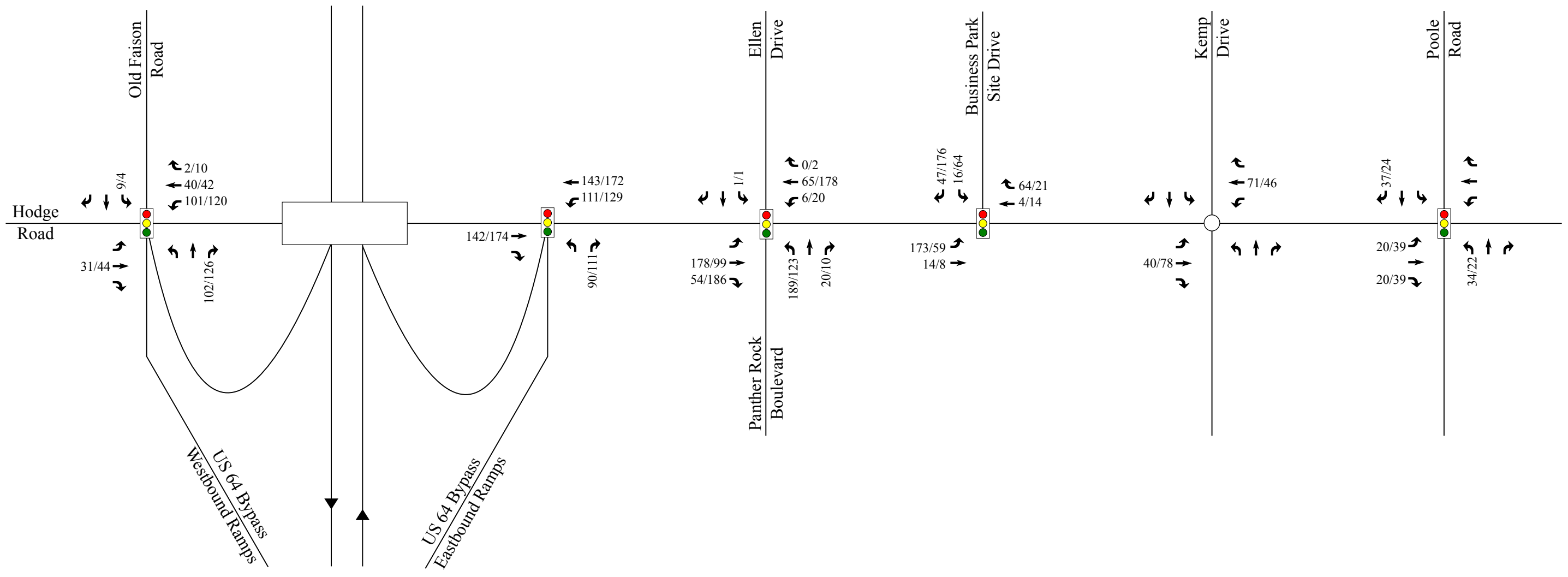
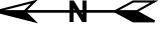
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



SilverStone
Knightdale, NC

Adjacent Development Trips
2022
without Hodge Road Business Park

Scale: Not to Scale	Figure 6c
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LEGEND

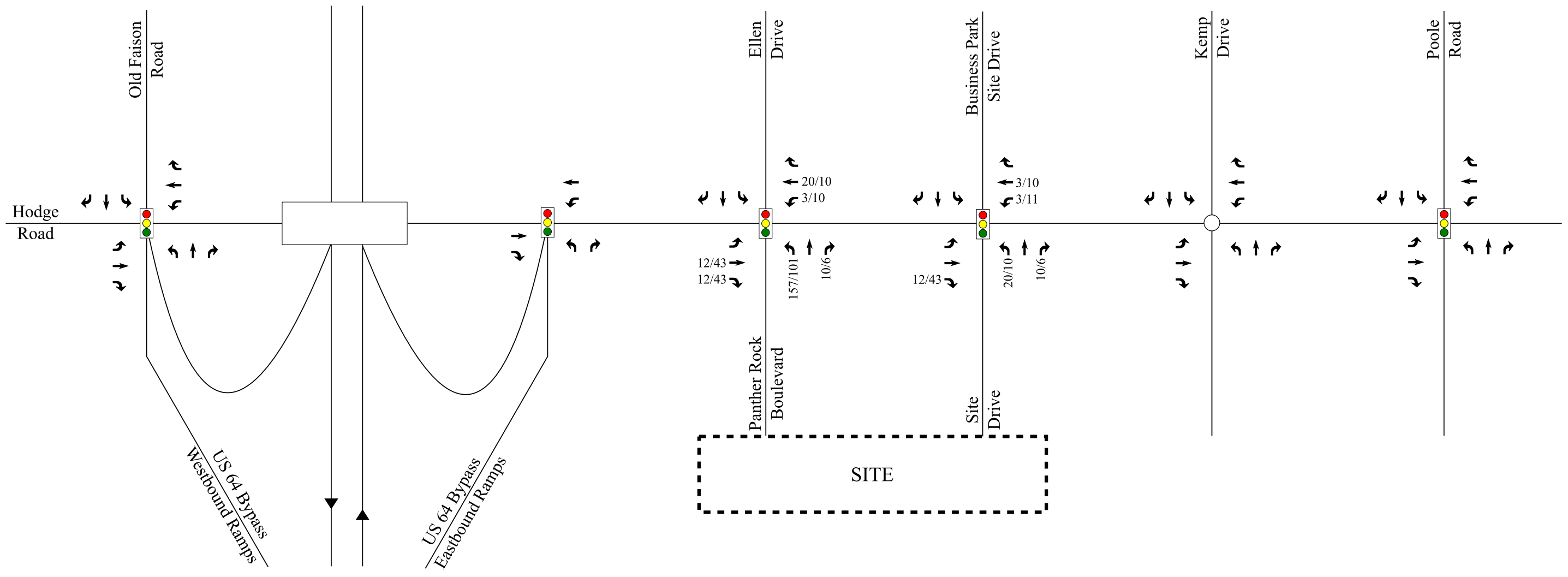
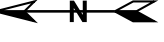
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



SilverStone
Knightdale, NC

Adjacent Development Trips
2022
with Hodge Road Business Park

Scale: Not to Scale Figure 6d



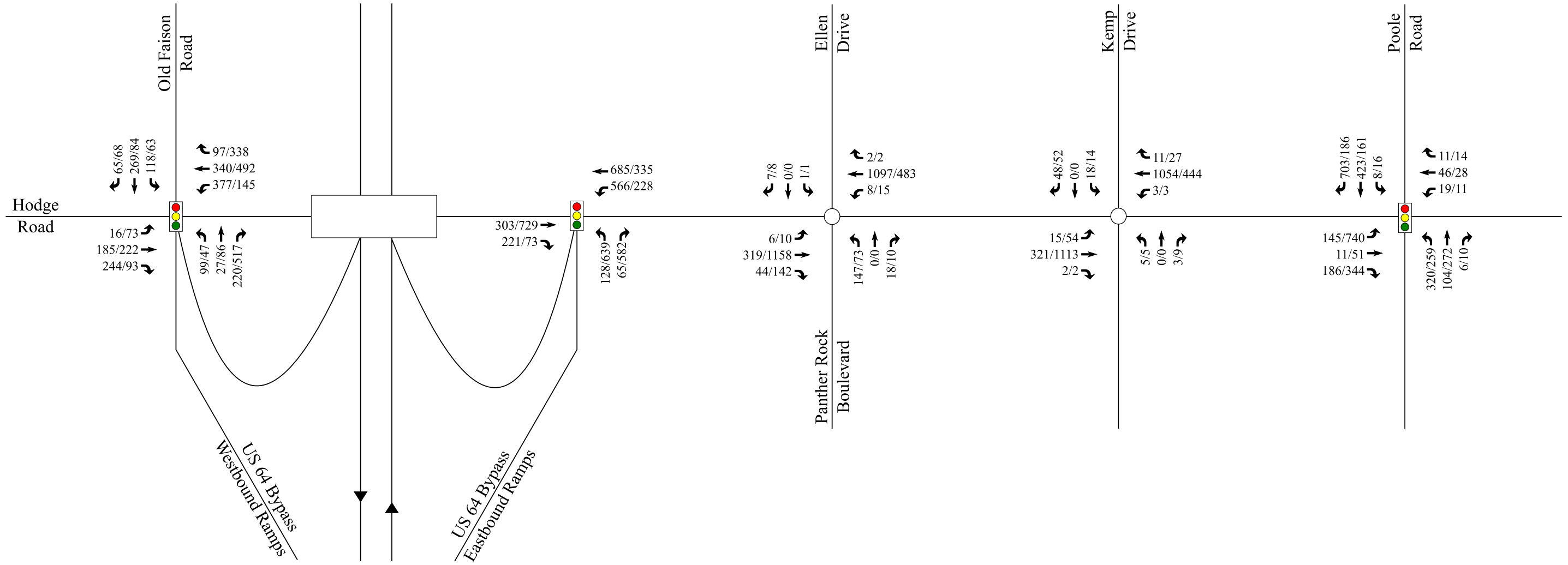
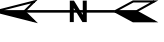
LEGEND

- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic

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Diverted Trips 2022	
Scale: Not to Scale	Figure 7



LEGEND

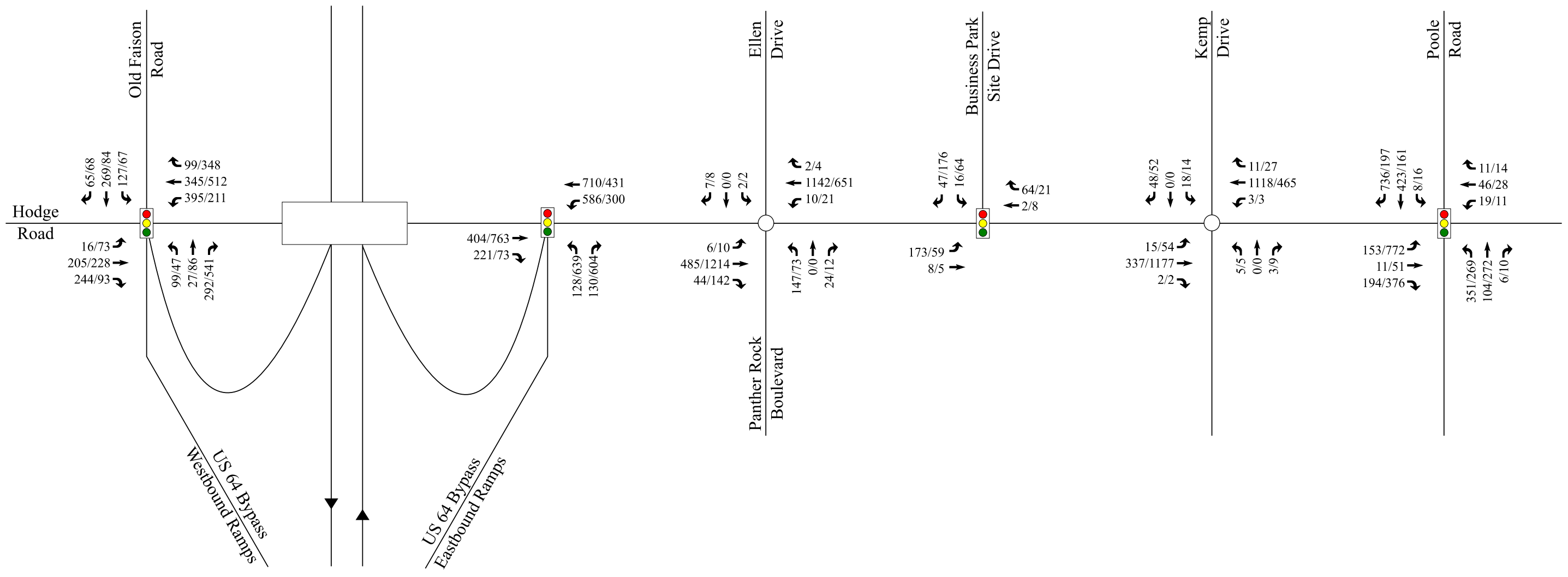
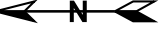
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



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Background (2020)
Peak Hour Traffic
Without Hodge Road Business Park

Scale: Not to Scale Figure 8a



LEGEND

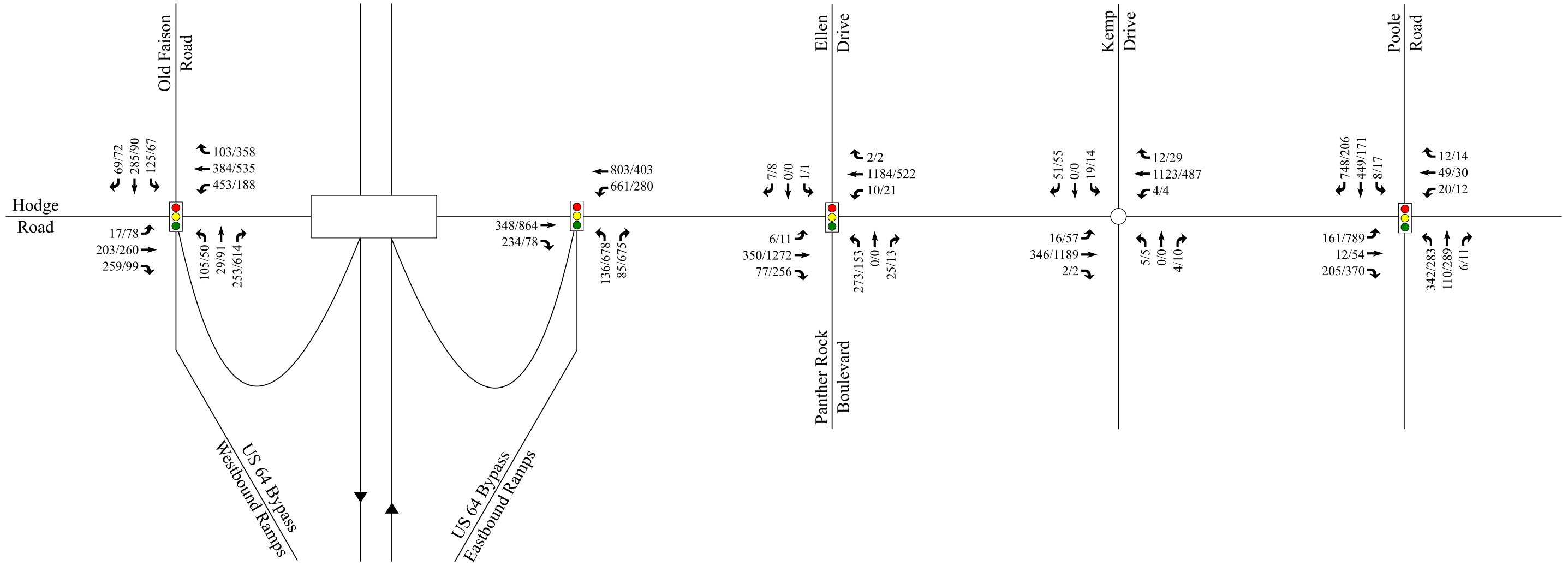
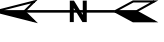
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



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Background (2020)
Peak Hour Traffic
With Hodge Road Business Park

Scale: Not to Scale Figure 8b



LEGEND

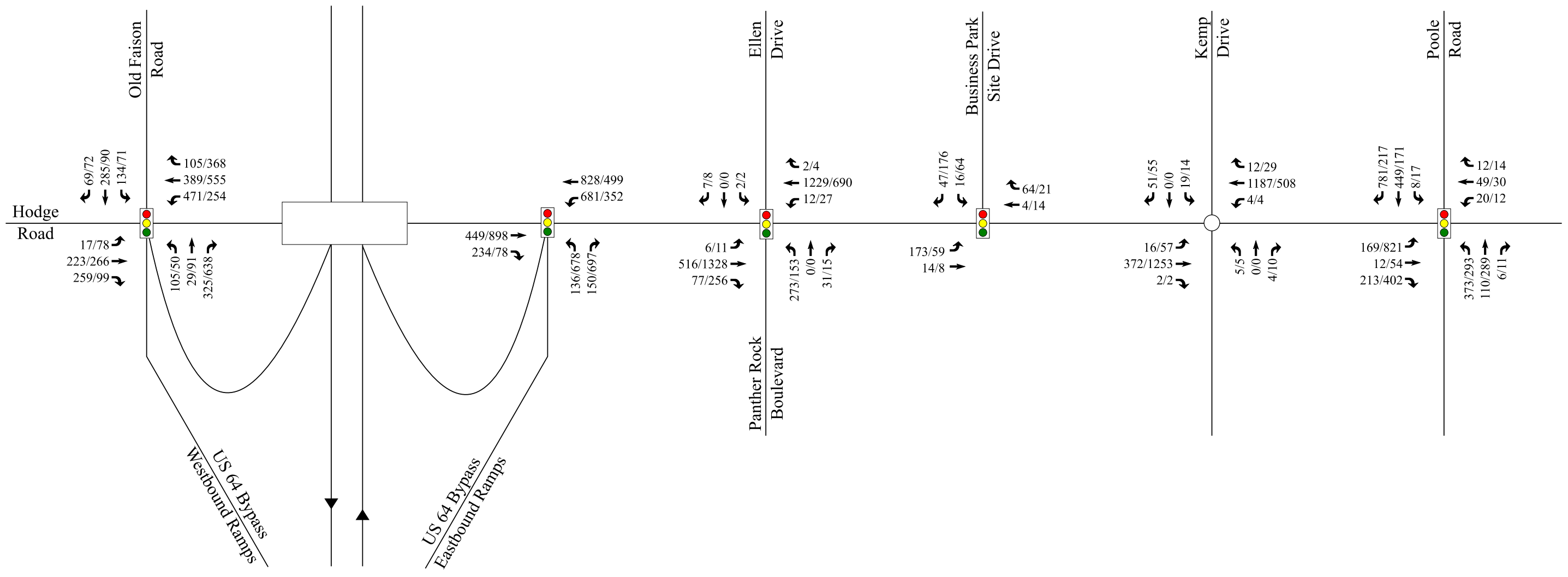
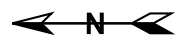
- Unsignalized Intersection
- Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



SilverStone
 Knightdale, NC

Background (2022)
 Peak Hour Traffic
 Without Hodge Road Business Park

Scale: Not to Scale Figure 8c



LEGEND

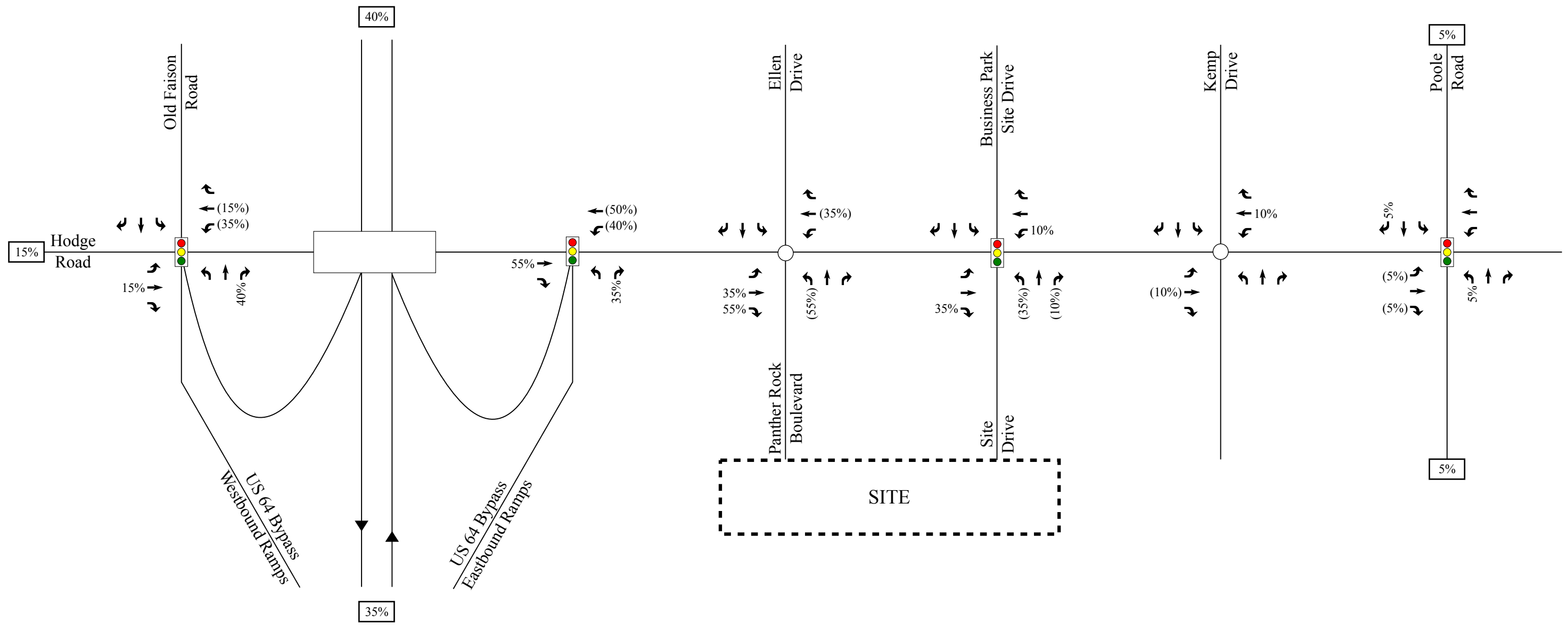
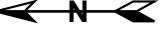
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



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Knightdale, NC

Background (2022)
Peak Hour Traffic
With Hodge Road Business Park

Scale: Not to Scale Figure 8d



LEGEND

- Unsignalized Intersection
- 🚦 Signalized Intersection
- x% → Entering Trip Distribution
- (Y)% → Exiting Trip Distribution
- XX% Regional Trip Distribution

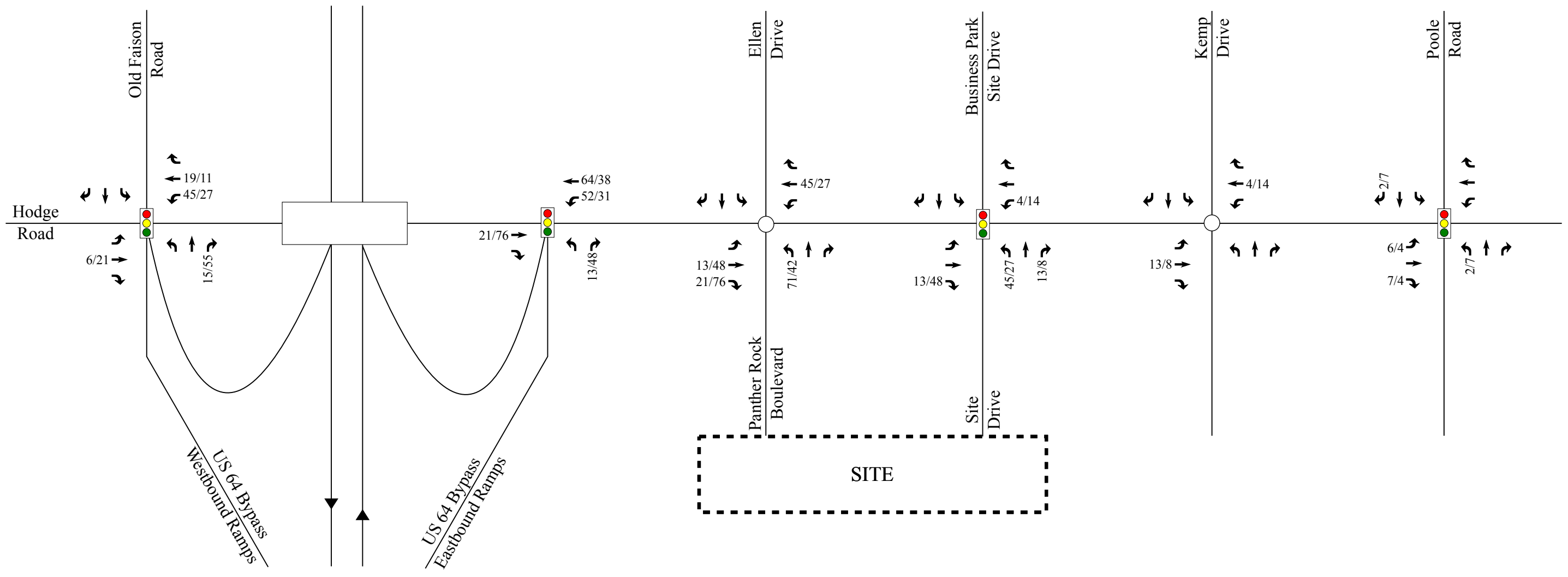
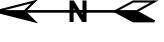


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Site Trip Distribution

Scale: Not to Scale

Figure 9



LEGEND

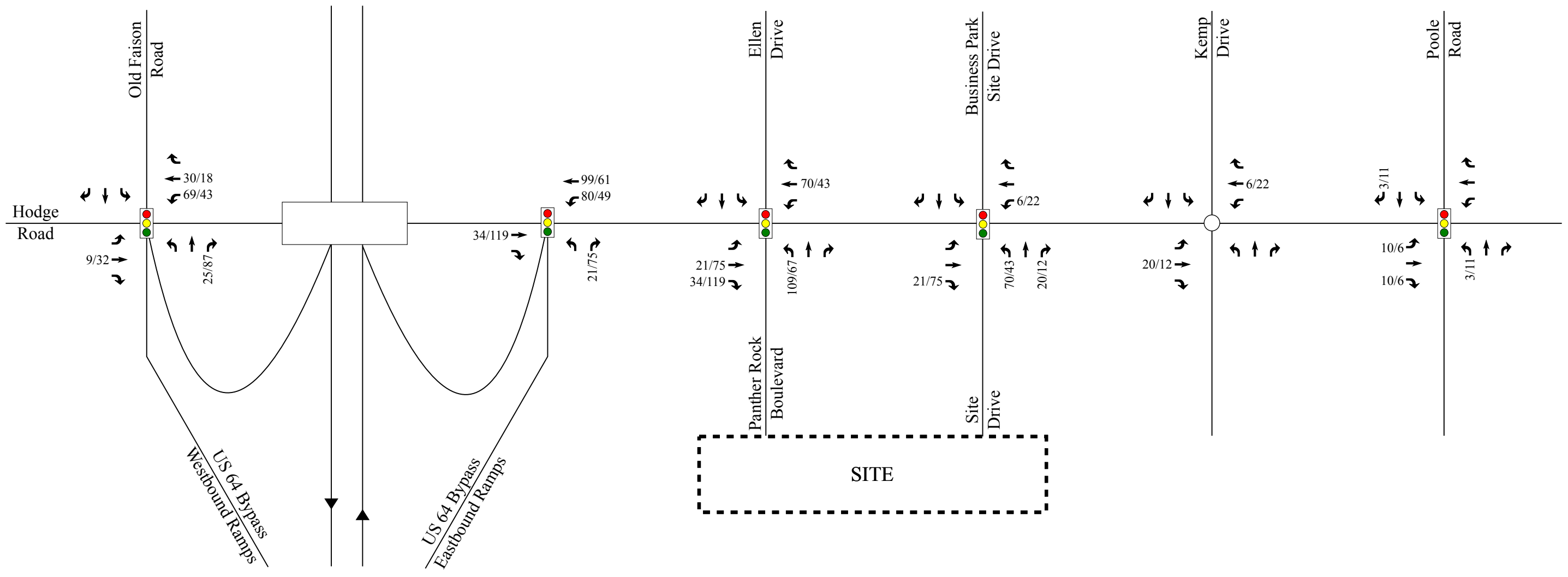
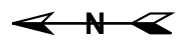
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Site Trips

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Site Trip Assignment
Phase 1

Scale: Not to Scale Figure 10a

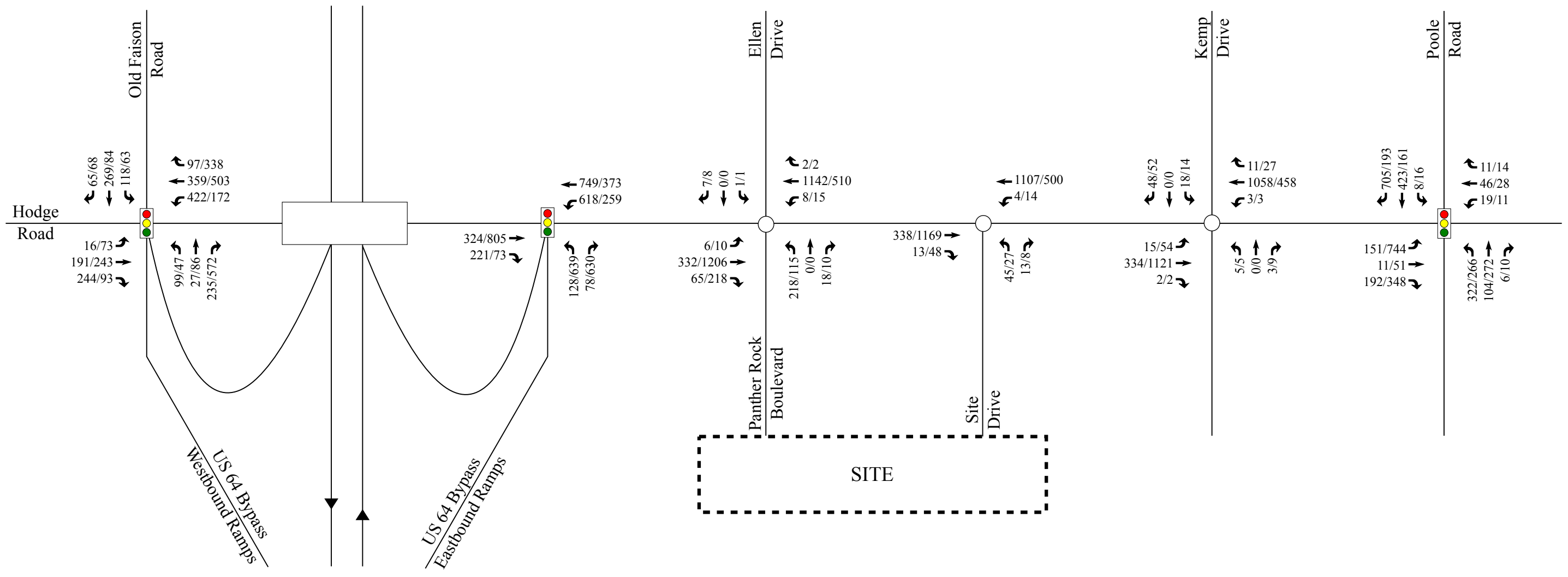
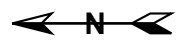


LEGEND	
	Unsignalized Intersection
	Signalized Intersection
X/Y →	AM / PM Peak Hour Site Trips



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Site Trip Assignment Full Build-Out	
Scale: Not to Scale	Figure 10b



LEGEND

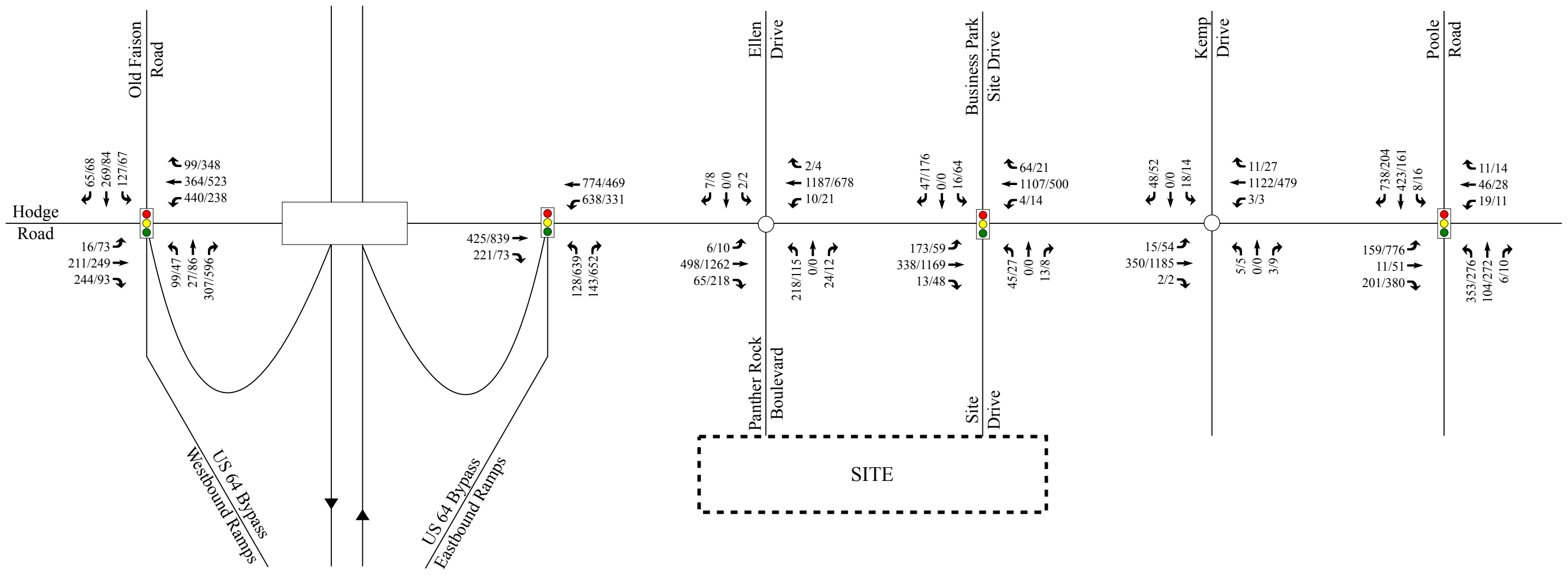
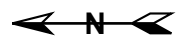
- Unsignalized Intersection
- Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic

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Combined (2020)
Peak Hour Traffic
Without Hodge Road Business Park

Scale: Not to Scale Figure 11a



LEGEND

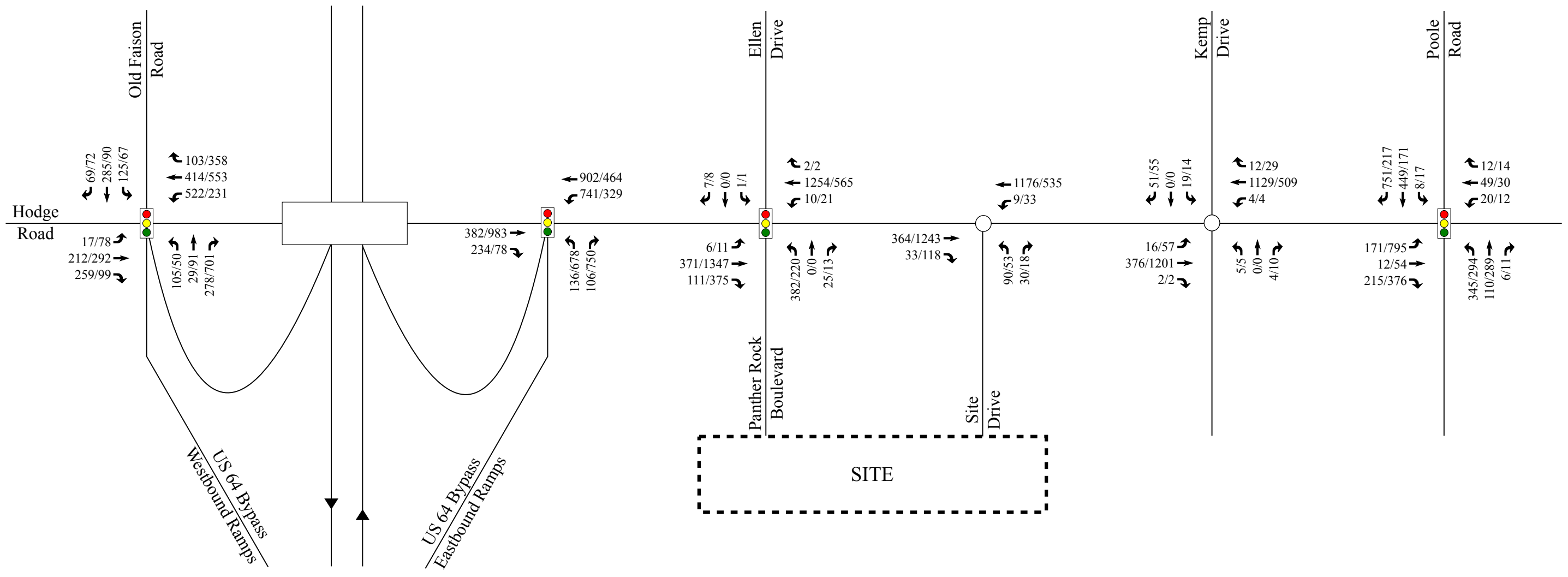
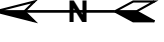
- Unsignalized Intersection
- Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



SilverStone
Knightdale, NC

Combined (2020)
Peak Hour Traffic
With Hodge Road Business Park

Scale: Not to Scale Figure 11b



LEGEND

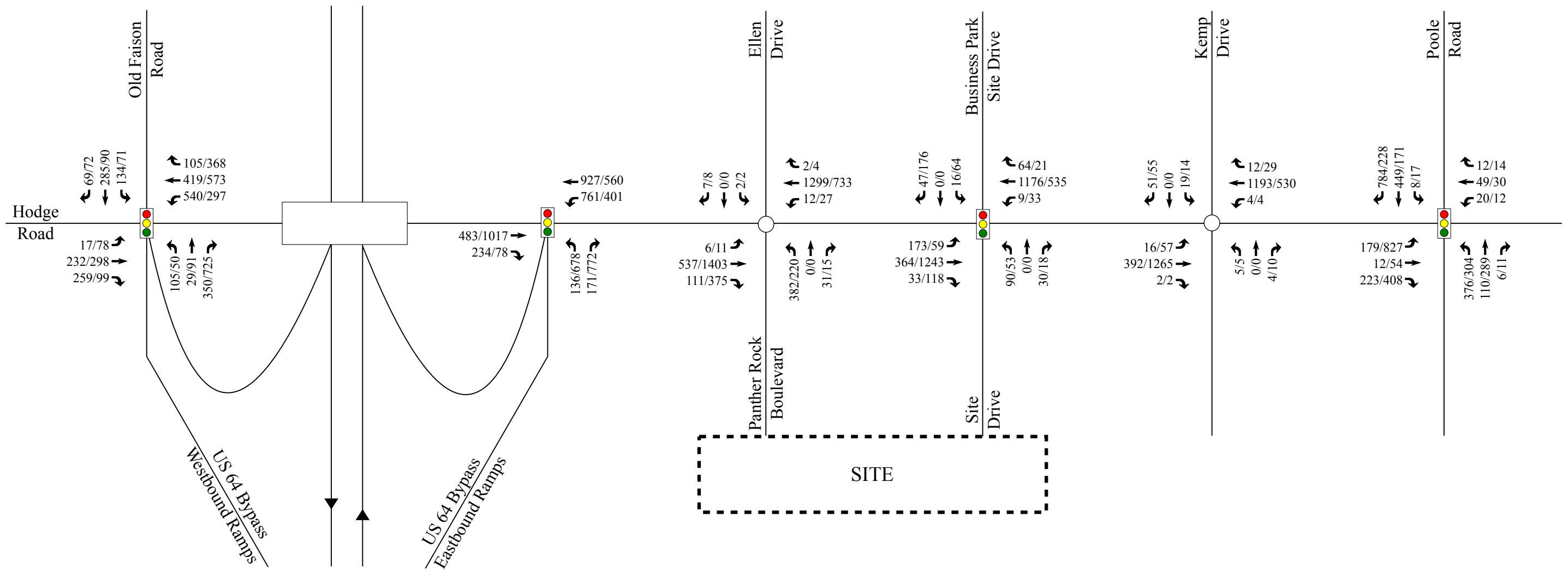
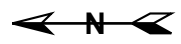
- Unsignalized Intersection
- Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic



SilverStone
Knightdale, NC

Combined (2022)
Peak Hour Traffic
Without Hodge Road Business Park

Scale: Not to Scale Figure 11c



LEGEND

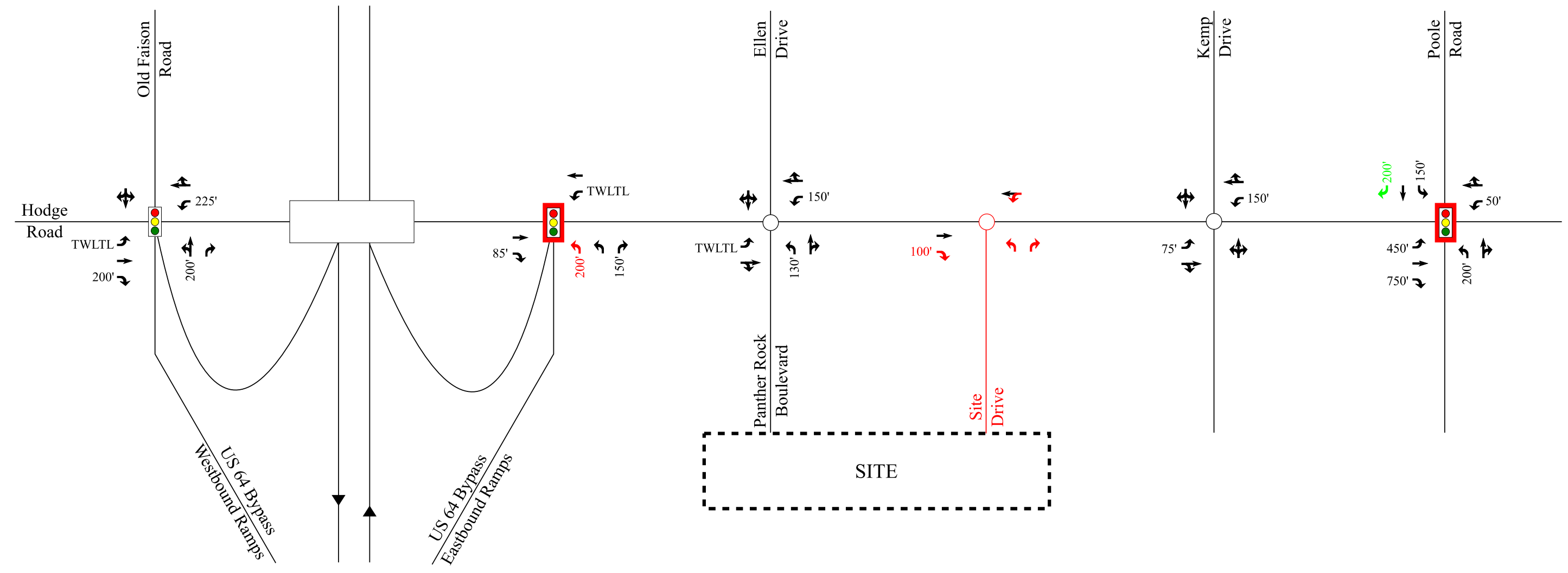
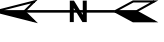
- Unsignalized Intersection
- 🚦 Signalized Intersection
- X/Y → AM / PM Peak Hour Traffic

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TRANSPORTATION ENGINEERS

SilverStone
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Combined (2022)
Peak Hour Traffic
With Hodge Road Business Park

Scale: Not to Scale Figure 11d



LEGEND

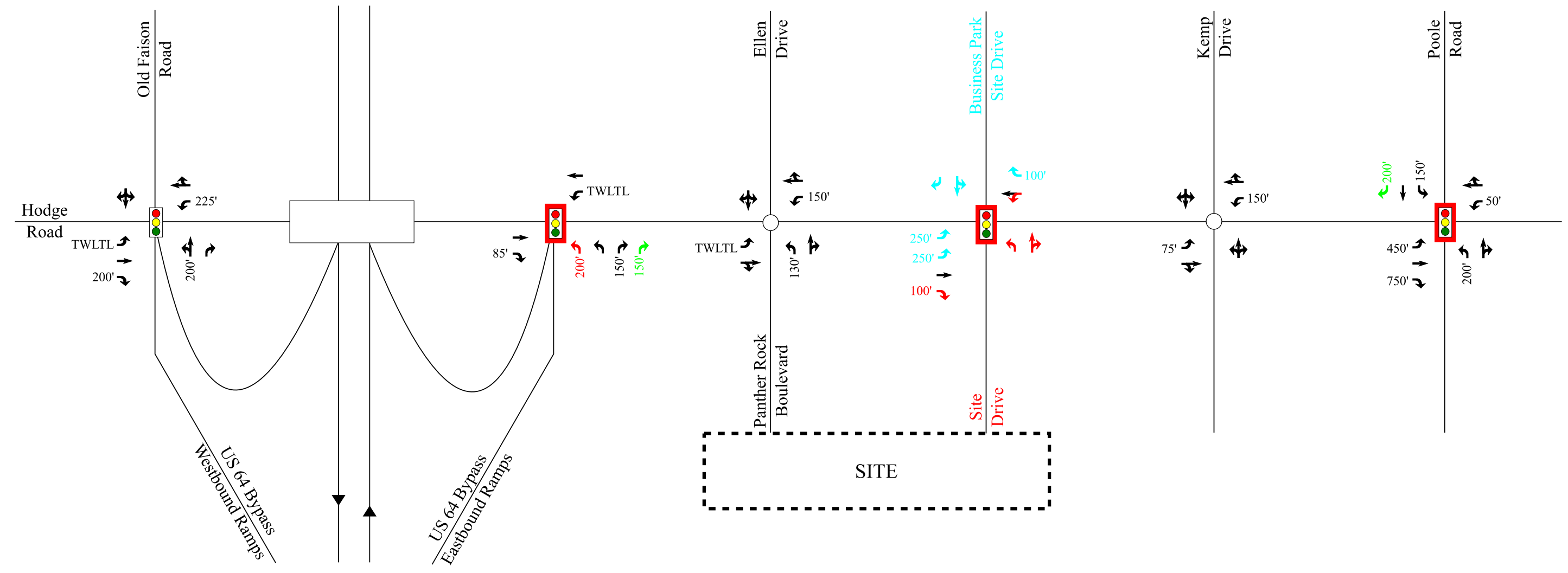
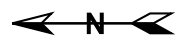
- Unsignalized Intersection
- ◫ Signalized Intersection
- Existing Lane
- X' Storage (In Feet)
- TWLTL Two-Way Left-Turn Lane
- ◫ Modified Signal Timings
- Improvement by Developer
- Improvement to meet UDO



SilverStone
Knightdale, NC

Recommended Lane
Configurations
2020
without Hodge Road Business Park

Scale: Not to Scale	Figure 12a
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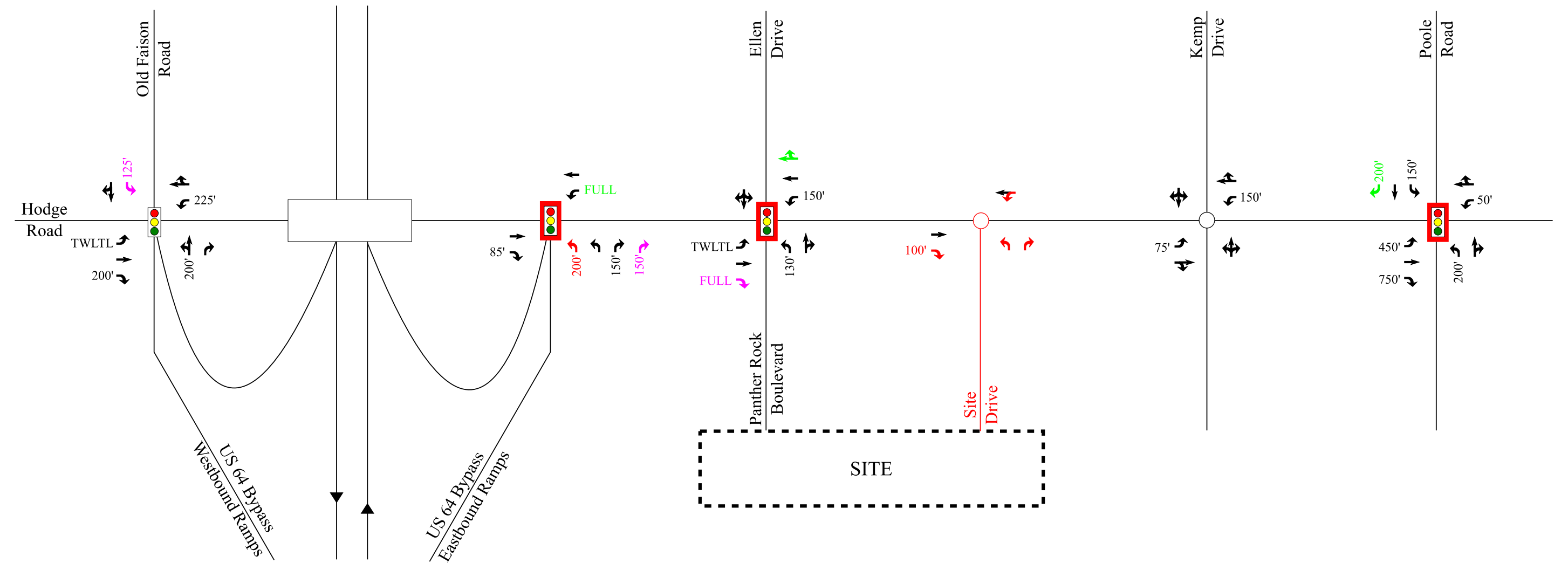
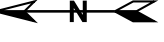
LEGEND	
○	Unsignalized Intersection
⬆️⬆️⬆️	Signalized Intersection
→	Existing Lane
X'	Storage (In Feet)
TWLTL	Two-Way Left-Turn Lane
⬆️⬆️⬆️ (Red)	Modified Signal Timings
→ (Red)	Improvement by Developer
→ (Green)	Improvement to meet UDO
→ (Blue)	Improvements by Business Park



SilverStone
Knightdale, NC

Recommended Lane
Configurations
2020
with Hodge Road Business Park

Scale: Not to Scale Figure 12b

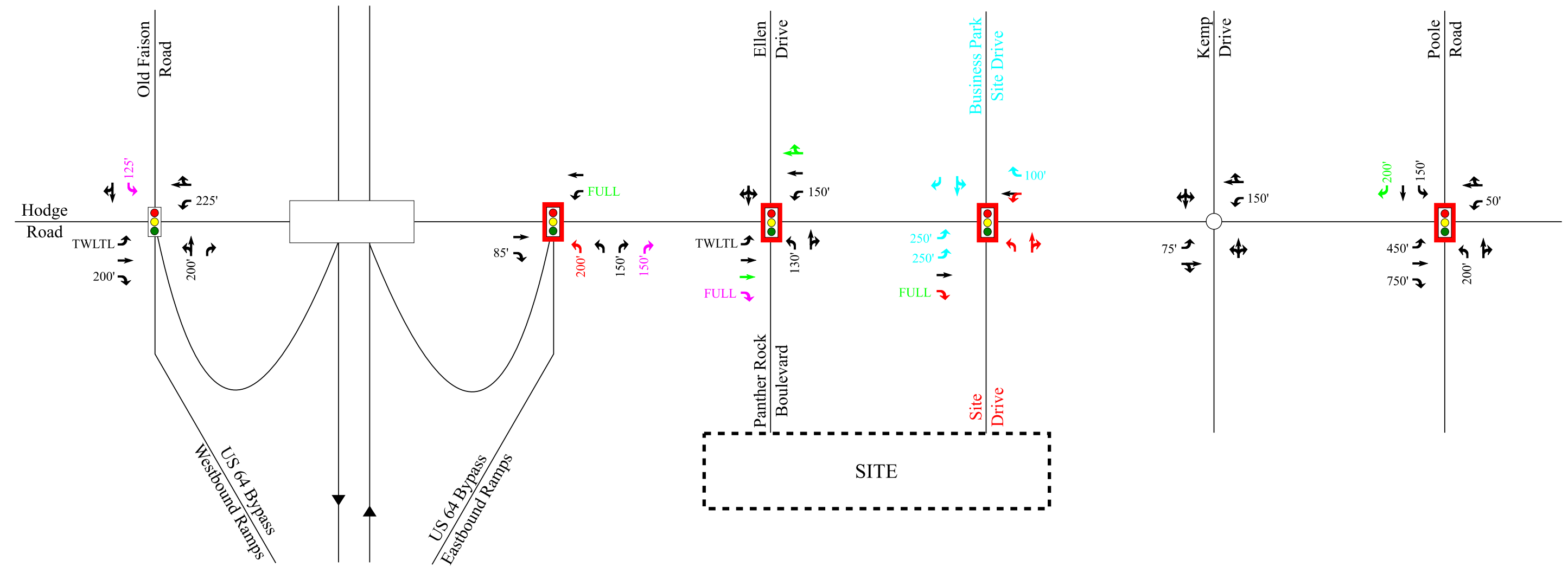
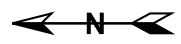


LEGEND			
○	Unsignalized Intersection	⬇️	Modified Signal Timings
⬇️	Signalized Intersection	➡️	Improvement by Developer
➡️	Existing Lane	➡️	Improvement to meet UDO
X'	Storage (In Feet)	➡️	Improvement by StoneRiver
TWLTL	Two-Way Left-Turn Lane		



SilverStone
Knightdale, NC

Recommended Lane Configurations 2022 without Hodge Road Business Park	
Scale: Not to Scale	Figure 12c



LEGEND	
○	Unsignalized Intersection
⬆️⬆️⬆️	Signalized Intersection
➔	Existing Lane
X'	Storage (In Feet)
TWLTL	Two-Way Left-Turn Lane
⬆️⬆️⬆️ (Red)	Modified Signal Timings
➔ (Red)	Improvement by Developer
➔ (Green)	Improvement to meet UDO
➔ (Cyan)	Improvements by Business Park
➔ (Magenta)	Improvements by StoneRiver



SilverStone
Knightdale, NC

Recommended Lane
Configurations
2022
with Hodge Road Business Park

Scale: Not to Scale	Figure 12d
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