

**Draft US 15-501 Corridor Study
Traffic Analysis Report**

US 15-501 from NC 54 to US 64
Year 2013 - 2040



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North Carolina Department of
Transportation

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1. Introduction

1.1 STUDY AREA

The US 15-501 corridor is functionally classified as a north-south principal arterial which serves the inter-county travel demands between Chatham and Orange Counties. US 15-501 is considered a Strategic Corridor between the growing towns of Pittsboro and Chapel Hill and is classified as a Boulevard in the NCDOT Strategic Highway Corridors Vision Plan (July 2008). The corridor has recently seen an increase in retail and residential development serving individuals working in nearby commercial, high-tech, medical, and research centers. US 15-501 serves many different land uses such as: residential, retail, and office.

The fifteen mile study area on US 15-501 begins with the NC 54 interchange in Orange County and continues to the US 64 interchange in Chatham County as illustrated in Figure 1. There are 25 intersections in the project study area; 15 are signalized and 10 are unsignalized.

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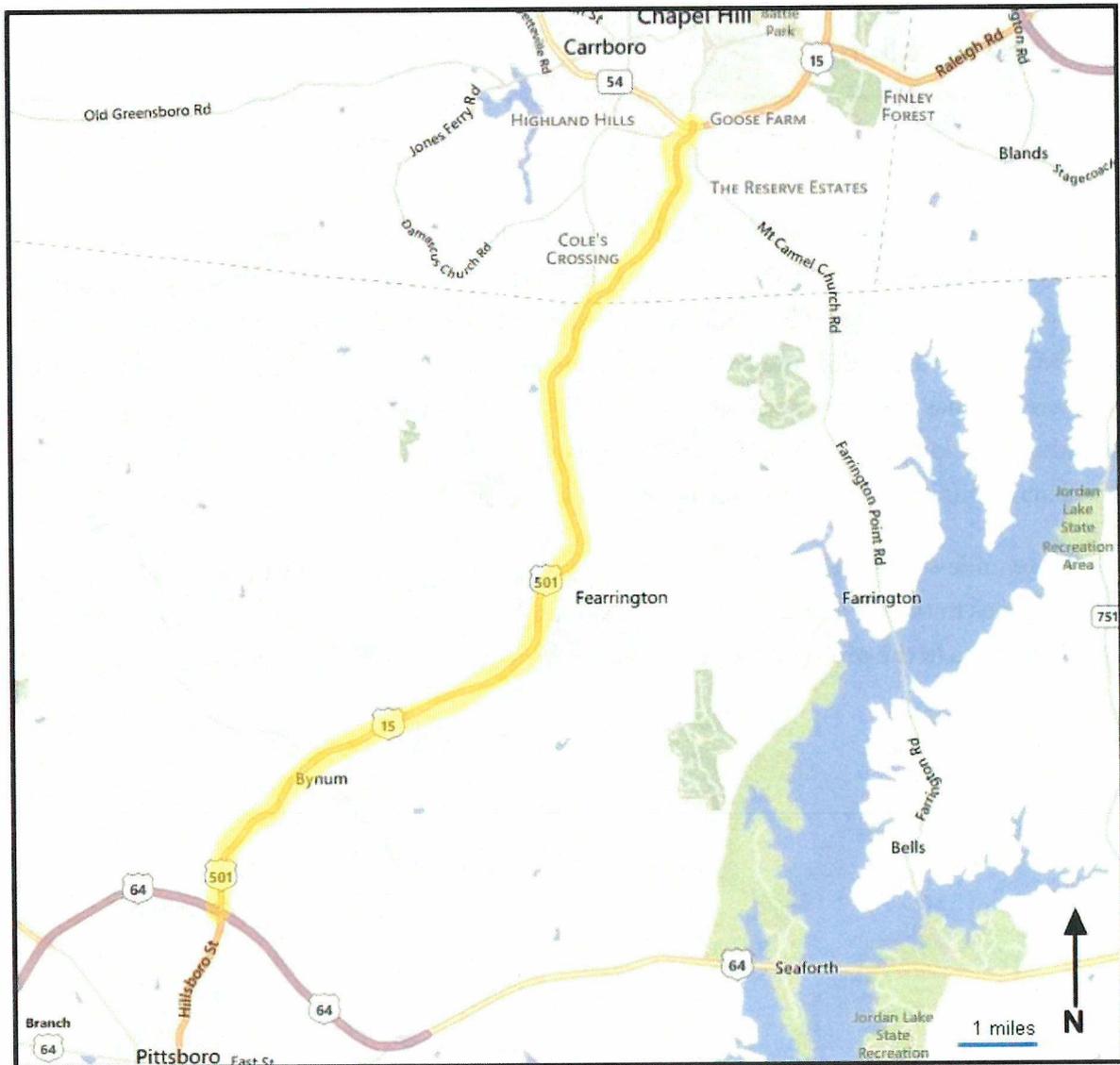


Figure 1 – Project Location

1.2 PURPOSE OF PROJECT

As development interest in the US 15-501 corridor from NC 54 to US 64 grows, so does the need to preserve the current operations along the roadway. NCDOT contracted with Stantec to study the existing (2013) and future year (2040) operations, to determine if current infrastructure

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could support the future growth. Additionally, NCDOT wanted to evaluate the implementation of superstreets along US 15-501. In a collaborative effort, staff from NCDOT Divisions 7 & 8 and NCDOT Congestion Management worked with staff from Chatham and Orange counties, and the Towns of Chapel Hill and Pittsboro to create a clear picture of the existing conditions along the corridor and a vision of what was on the horizon for this area. NCDOT also sought to provide guiding principles for the US 15-501 corridor for the future that may be adopted by local councils and governments.

1.3 STUDY SCENARIOS

There were five scenarios for this study. The first scenario, Existing Scenario 1, evaluated the AM and PM peak hours for existing volumes. Counts taken in April 2013 were used for volumes. The remaining four scenarios studied the future year of 2040. The first three, Future Scenarios 1A – 1C analyzed standard intersections along US 15-501. Future Scenario 2 analyzed superstreets along the US 15-501 corridor. These five scenarios are described in further detail below:

- **Existing Scenario 1 - 2013 Existing Conditions**

The laneage used in the existing scenario was taken from 2013 field visits and 2013 Google aerials. Current signal plans and timing, provided by the Town of Chapel Hill and NCDOT, were used for this analysis.

- **Future Scenario 1A - 2040 With Improved Traditional Intersections**

This scenario evaluates the corridor with the existing 2013 geometry at the NC 54 interchange. The study intersections along US 15-501 were analyzed as standard intersections with some geometric improvements, such as turn lanes, and the signals were optimized.

- **Future Scenario 1B - 2040 With Improved Traditional Intersections and Upgraded NC 54 / US 15-501 Interchange**

Interchange improvements were recommended for the US 15-501 / NC 54 interchange as part of the Obey's Creek TIA performed by HNTB. This study recommends that the NC 54 westbound ramp be reconfigured to add a loop ramp to the western side of the interchange. At the time of this report, this improvement was not funded. An illustration

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of these improvements is displayed in Figure 2.. The laneage in the remainder of the corridor matches Future Scenario 1A.

- **Future Scenario 1C - 2040 With Improved Traditional Intersections, Widening along Northern Section of US 15-501, and Upgraded NC 54 / US 15-501 Interchange**

This scenario uses the same NC 54 interchange modifications as the previous scenario, Future Scenario 1B. Additionally, this scenario evaluates widening US 15-501 to six lanes from the NC 54 interchange to the Mann's Chapel Rd/ Plaza Rd intersection. The laneage in the remainder of the corridor matches Future Scenario 1A.

- **Future Scenario 2 - 2040 with Superstreets and Upgraded NC 54 / US 15-501 Interchange**

This scenario evaluates the use of superstreets along the corridor. Superstreet configurations limit movements and signal phases at the intersection. In this study, what can be referred to as "standard superstreet configurations", were used. The standard superstreets used in this study remove the left turn and through movements from the side streets. U-turn locations are positioned downstream and upstream from the main intersection, and can be signalized or unsignalized. Left turns off of US 15-501 onto the side streets are permitted. All signals run with two phase signal timing plans. An illustration of an example superstreet intersection is shown in Figure 3. Some of the intersections in the vicinity of the Polks Landing Development utilize different types of superstreet intersections, but they still utilize the concept of minimizing traffic movements and reducing the number of signal phases.

Laneage and volume figures for all scenarios are included in Appendix A



Figure 2 - Concept of NC 54 Improvements recommended by HNTB in the Obey's Creek TIA

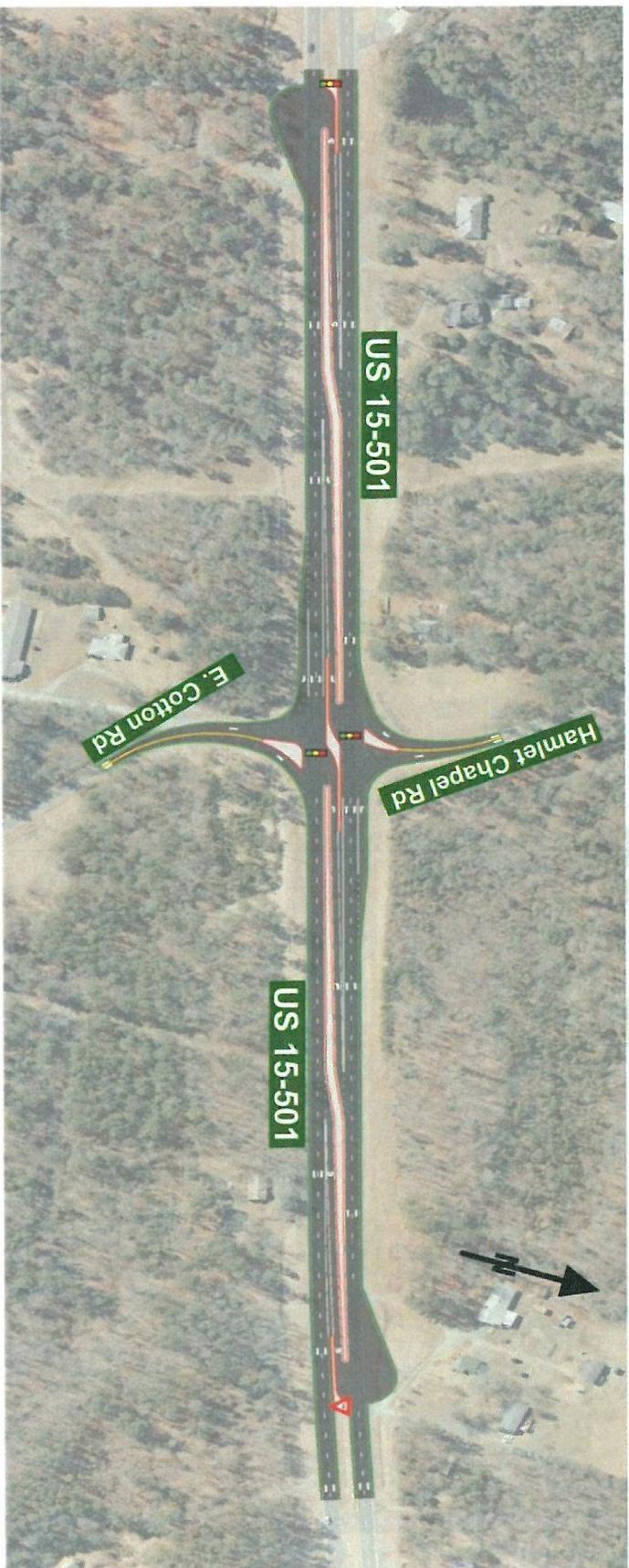


Figure 3- Concept of Standard Superstreet Intersection

2. Traffic Analysis

2.1 TRAFFIC ANALYSIS

Capacity analyses were performed for the roadway network in the project study area. The traffic analysis program Synchro[®] Version 7 was used to analyze all intersections according to methods put forth by the Transportation Research Board's *Highway Capacity Manual (HCM)*. The Highway Capacity Manual defines capacity as "the maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform section of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions, usually expressed as vehicles per lane per hour."

Level-of-service (LOS) is a term used to describe different traffic conditions and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists/ or passengers." LOS varies from Level A, representing free flow, to Level F where traffic breakdown conditions are evident. Traffic conditions with LOS of E or F are deemed unacceptable and represent significant travel delay, increased accident potential, and inefficient motor vehicle operation. At an unsignalized intersection, the primary traffic on the main roadway is virtually uninterrupted. Therefore, the overall delay for the intersection is usually less than what is calculated for the minor street movements. The overall intersection delay and the delay for the intersection's minor street(s) are reported in the summary tables of this report. Generally, LOS D is acceptable for signalized intersections in suburban areas during peak periods. With the current method of reporting LOS for unsignalized intersections, it is not uncommon for some of the minor street movements to be operating at a LOS F during peak hour conditions.

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Tables 1 and 2 present the criteria of each LOS as indicated in the *Highway Capacity Manual*.

Table 1: Level-of-Service Criteria - Signalized Intersections

Level-of-Service Criteria Signalized Intersections	
Level-of-Service	Stopped Delay per Vehicle (sec)
A	≤ 10.0
B	>10.0 and ≤ 20.0
C	>20.0 and ≤ 35.0
D	>35.0 and ≤ 55.0
E	>55.0 and ≤ 80.0
F	>80.0

Table 2: Level-of-Service Criteria - Unsignalized Intersections

Level-of-Service Criteria Unsignalized Intersections	
Level-of-Service	Stopped Delay per Vehicle (sec)
A	≤ 10.0
B	>10.0 and ≤ 15
C	>15 and ≤ 25
D	>25 and ≤ 35
E	>35 and ≤ 50
F	>50

2.2 EXISTING ANALYSIS (2013)

The 15 mile section of US 15-501 between NC 54 and US 64 is currently a four-lane divided roadway. Many access management principles are currently being implemented along this roadway: There is a

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median throughout, driveway connections are limited, full movement access intersections are limited. Also, u-turns are located at intersections along the corridor to accommodate turning vehicles, and there is currently good spacing between signalized intersections. For the existing conditions analysis, turning movement counts at the 25 study area intersections were taken on April 23rd and 24th, 2013 for the AM (7-9) and PM (4-6) peak hours. The existing volumes and laneage figures are illustrated in Appendix A.

The existing analysis shows that intersections along the US 15-501 corridor are operating at overall acceptable levels of service. The only exception is at the Mount Carmel Church Road / Culbreth Road intersection at US 15-501 which is operating at LOS F during the PM peak hour. Side street operations at some of the intersections are operating at unacceptable levels of service; however, the overall intersection operates at an acceptable level of service. This demonstrates how good access management can maintain an acceptable level of service along a high volume corridor.

Proposed median breaks and additional new signals should be limited along this corridor in the future. Additionally, existing signals should be evaluated for phase reduction where possible as additional parcels develop. Many of the approved TIA's in this area demonstrate good access management as a part of their proposed site plans which should aid to further preserve levels of service along the US 15-501 corridor. An example of this is shown in Appendix A

The existing levels of service for the study intersections are shown in Table 3

**Table 3 -
Existing Conditions Level-of-Service Summary
LOS (Delay in Seconds)**

Intersection	2013 Existing	
	AM	PM
US 15-501 at NC 54 WB Ramps	C(25.3) E(77.9)WB A(6.6)NB B(16.2)SB	D(37.4) D(45.9)WB B(16.3)NB D(40.6)SB
US 15-501 at NC 54 EB Ramps	D(45.8) F(98.2)EB D(15.1)NB A(3.7)SB	C(25.5) F(80.7)EB D(35.1)NB A(4.5)SB
US 15-501 at Mt. Carmel Church Rd. / Culbreth Rd.	D(52.7) F(83.0)EB F(119.9)WB D(12.6)NB E(13.7)SB	F(80.3) D(47.3)EB D(11.5)WB C(34.5)NB F(108.2)SB
US 15-501 at Bennett Rd. / Arlen Park Dr.	B(19.1) E(69.8)EB F(81.1)WB B(11.2)NB A(6.3)SB	B(12.9) E(58.9)EB D(53.5)WB A(6.8)NB B(10.4)SB
US 15-501 at Market St.	D(38.1) C(24.7)NB D(28.6)SB E(74.4)EB	C(26.6) D(30.9)EB C(21.2)NB B(17.0)SB
US 15-501 at Dogwood Acres Dr.	A(5.5) F(86.1)EB A(2.9)NB A(0.7)SB	A(4.0) E(62.1)EB A(2.5)NB A(0.6)SB
US 15-501 at Smith Level Rd.	C(21.7) D(37.2)EB D(41.7)WB B(16.3)NB C(27.3)SB	C(20.4) B(19.9)EB C(25.2)WB C(20.8)NB C(20.1)SB
US 15-501 at Old Lystra Rd.	A(3.6) D(53.1)WB A(2.0)NB A(2.1)SB	B(10.3) E(56.8)WB A(2.7)NB A(6.3)SB
US 15-501 at Manns Chapel Rd. / Plaza Dr.	C(23.0) D(51.6)EB E(56.8)WB C(28.8)NB C(21.0)SB	C(32.2) D(50.0)EB E(57.1)WB C(31.2)NB C(24.2)SB
US 15-501 at Polks Landing Rd.	#(0.7) D(26.9)EB	#(1.0) F(78.3)EB
US 15-501 at Lystra Rd.	B(10.4) C(27.7)WB B(11.1)NB A(3.6)SB	A(8.5) C(20.8)WB B(10.4)NB A(1.3)SB
US 15-501 at Vickers Rd. / Briar Chapel Pkwy.	A(8.9) D(47.9)EB E(56.6)WB A(5.9)NB A(7.6)SB	B(10.3) D(44.3)EB E(56.7)WB A(6.6)NB A(9.2)SB
US 15-501 at Jack Bennett Rd.	B(14.3) E(50.9)WB A(9.1)NB A(4.4)SB	A(9.8) E(58.1)WB A(7.0)NB A(1.7)SB
US 15-501 at Taylor Rd.	#(0.2) C(15.1)EB	#(0.4) C(22.1)EB
US 15-501 at Andrews Store Rd.	B(12.8) C(22.9)EB A(8.5)NB B(14.6)SB	B(10.9) C(28.9)EB A(1.4)NB B(11.4)SB
US 15-501 at Village Way / Morris Rd.	B(11.6) C(27.5)EB C(33.0)WB B(11.1)NB A(6.2)SB	B(11.6) C(23.7)EB C(29.1)WB B(12.0)NB A(8.1)SB
US 15-501 at Weathersfield Rd.	#(1.0) E(39.2)WB	#(1.6) D(52.2)WB
US 15-501 at Mt. Gilead Church Rd.	#(2.4) C(19.3)WB	#(1.9) C(18.3)WB
US 15-501 at East Cotton Rd. / Hamlet Chapel Rd.	#(1.8) F(42.5)WB C(22.0)EB	#(1.6) C(21.7)WB D(27.1)EB
US 15-501 at Bynum Rd.	#(0.7) C(17.9)WB	#(0.6) B(14.7)WB
US 15-501 at Moore Mountain Rd. / Durham Eubanks Rd.	#(1.9) E(45.7)WB E(13.9)EB	#(1.6) E(38.7)WB C(21.6)EB
US 15-501 at Russell Chapel Church Rd.	#(2.3) E(36.0)EB	#(1.5) D(28.1)EB
US 15-501 at Northwood High School Rd. / Russet Run	B(12.4) C(25.0)EB C(26.7)WB A(6.2)NB B(15.4)SB	A(7.9) C(24.8)EB C(28.5)WB A(2.8)NB A(8.5)SB
US 15-501 at US 64 Bypass WB Ramps	#(5.6) F(83.1)WB	#(3.3) F(67.8)WB
US 15-501 at US 64 Bypass EB Ramps	#(25.3) F(165.8)EB	#(7.2) F(93.3)EB

3. Future Standard Intersection Analysis

3.1 FUTURE STANDARD ANALYSIS

The traffic volumes for 2040 were taken from the US 15-501 Corridor Study Traffic Forecast completed by Stantec on March 4, 2014 in concordance with this project. The AM and PM peak-hour turning movement volumes for the studied access drives and intersections were then analyzed in Synchro for the Build Out year. The 2040 traffic volume figures are included in Appendix A. Additional geometric improvements in future scenarios were recommended in order to maintain acceptable LOS along the corridor. Improvements included turn lanes and signals; while the overall four-lane divided cross-section was maintained. Volume and laneage figures for each scenario are shown in Appendix A.

3.2 TRAFFIC ANALYSIS

Future Scenario 1A - 2040 with Improved Traditional Intersections

This scenario evaluates the corridor with the existing 2013 geometry at the US 15-501 / NC 54 interchange. In 2040, with standard intersections along US 15-501, the intersections surrounding the NC 54 interchange are not expected to perform at acceptable level of service. The study intersections along US 15-501 were analyzed as standard intersections with some geometric improvements, such as turn lanes, and the signals were optimized. The intersections along the corridor, south of the NC 54 interchange are predicted to operate at an overall acceptable level of service but will have failing movements and significant queuing on the side streets.

Future Scenario 1B - 2040 with Improved Traditional Intersections and Upgraded NC 54 / US 15-501 Interchange

Interchange improvements were recommended for the US 15-501 / NC 54 interchange as part of the Obey's Creek TIA performed by HNTB. This study recommends that the NC 54 westbound ramp be reconfigured to add a loop ramp to the western side of the interchange. At the time of this report, this improvement was not funded. According to the Synchro analysis, this improvement is predicted to significantly improve operations at the interchange. Additional

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turning lanes were added to the Mount Carmel Church Road / Culbreth Road intersection, which improved operations at this intersection as well.

Future Scenario 1C - 2040 with Improved Traditional Intersections, Widening along Northern Section of US 15-501, and Upgraded NC 54 / US 15-501 Interchange

Widening US 15-501 to six lanes from the NC 54 interchange to the Mann's Chapel Rd/ Plaza Rd intersection brings the overall LOS for all study intersections to acceptable levels. However, there are unacceptable delays predicted for several side street movements.

Table 4, shown on the next page, displays the LOS and delay in seconds for the standard intersection scenarios.

**Table 4 -
2040 Standard Intersection Conditions Level-of-Service Summary
Overall LOS (Delay in Seconds)**

Intersection	Future Scenario 1A - 2040 with Improved Traditional Intersections		Future Scenario 1B - 2040 with Improved Traditional Intersections and Upgraded NC 54 / US 15-501 Interchange		Future Scenario 1C - 2040 with Improved Traditional Intersections, Widening along Northern Section of US 15-501, and Upgraded NC 54 / US 15-501 Interchange	
	AM	PM	AM	PM	AM	PM
US 15-501 at NC 54 WB Ramps	E (66.0)*	F (160.2)*	A (7.5)	E (67.7)*	A (7.9)	B (15.6)
US 15-501 at NC 54 EB Ramps	D (54.9)*	F (106.5)*	D (35.6)*	E (61.9)*	D (33.7)*	B (19.5)
US 15-501 at Mt. Carmel Church Rd. / Culbreth Rd.	F (214.2)*	E (61.3)*	F (53.4)*	D (50.8)*	D (45.3)*	D (36.5)*
US 15-501 at Bennett Rd. / Arlen Park Dr.	D (25.2)*	C (21.0)*			C (23.4)*	C (17.6)*
US 15-501 at Market St.	E (59.2)*	D (50.7)*			D (37.8)*	D (45.4)*
US 15-501 at Dogwood Acres Dr.	A (5.4)*	A (4.4)*			A (5.0)*	A (4.1)*
US 15-501 at Smith Level Rd.	D (44.1)*	D (44.1)*			D (39.5)	D (41.5)
US 15-501 at Old Lystra Rd.	B (11.6)*	D (53.9)*			A (8.6)*	D (47.7)*
US 15-501 at Manns Chapel Rd. / Plaza Dr.	E (79.2)*	E (71.5)*			D (55.0)*	D (53.3)*
US 15-501 at Holly Ridge Rd. Ext. / Center Driveway.	A (6.1)	A (6.6)				
US 15-501 at Polks Landing Rd. / South Driveway	B (15.3)	B (17.2)				
US 15-501 at Lystra Rd.	C (24.6)*	B (18.7)				
US 15-501 at Vickers Rd. / Briar Chapel Pkwy.	C (21.4)*	D (35.2)*				
US 15-501 at Jack Bennett Rd.	B (17.2)*	B (12.5)*				
US 15-501 at Taylor Rd.	C (27.4)	C (34.2)				
US 15-501 at Andrews Store Rd.	C (18.3)	C (27.7)*				
US 15-501 at Village Way / Morris Rd.	D (50.7)*	D (42.4)*				
US 15-501 at Weathersfield Rd.	B (12.8)*	B (12.3)				
US 15-501 at Mt. Gilead Church Rd.	D (41.7)*	C (22.6)				
US 15-501 at East Cotton Rd. / Hamlet Chapel Rd.	C (29.5)*	C (29.1)*				
US 15-501 at Bynum Rd.	A (7.0)	A (7.6)				
US 15-501 at Moore Mountain Rd. / Durham Eubanks Rd.	C (23.3)	C (28.2)*				
US 15-501 at Russell Chapel Church Rd. / Proposed Chatham, Park Dr	D (46.0)*	D (50.2)*				
US 15-501 at Northwood High School Rd. / Russet Run	D (42.7)*	D (35.9)*				
US 15-501 at US 64 Bypass WB Ramps	C (28.7)	D (40.3)*				
US 15-501 at US 64 Bypass EB Ramps	B (16.3)	B (18.3)				

* Indicates that an intersection leg is predicted to operate at an undesirable Level of Service

4. Future Superstreet Analysis

4.1 FUTURE SUPERSTREET ANALYSIS

Traffic volumes were taken from the 2040 Standard Intersection Analyses and distributed to match superstreet movements. The AM and PM peak-hour turning movement volumes for the studied access drives and intersections were then calculated and analyzed for the Build Out year. The 2040 Build Out superstreet traffic volume figures are illustrated in Appendix A.

4.2 TRAFFIC ANALYSIS

Future Scenario 2 - 2040 with Superstreets and Upgraded NC 54 / US 15-501 Interchange

Future Scenario 2 incorporates the suggested NC 54 interchange improvements from the Obey's Creek TIA. Given the close proximity of the Mt. Carmel Church Rd/ Culbreth Rd intersection to the NC 54 interchange, a superstreet configuration would not geometrically fit. Therefore, the intersection was kept with a standard configuration. Additionally, the TIA for Williams Corner and Polks Landing suggested lane configurations at the Polks Landing Road and Lystra Road intersections. These were altered slightly to operate optimally with the superstreet intersections.

A majority of the superstreet intersections operate at an acceptable LOS. A few intersections are predicted to have unacceptable side street movement delays. These intersections can be investigated in detail as development requiring changes in the intersection operations occurs.

The overall levels of service and delay in seconds for this scenario are displayed in Table 5.

**Table 5 -
Future Scenario 2 - 2040 with Superstreets and Upgraded NC 54 / US 15-501 Interchange
Overall LOS (Delay in Seconds)**

Intersection	2040 Superstreet AM		2040 Superstreet PM	
	Intersection	U-Turn	Intersection	U-Turn
US 15-501 at NC 54 WB Ramps	A (7.4)	-	D (48.3)*	-
US 15-501 at NC 54 EB Ramps	C (33.9)*	-	D (42.9)*	-
US 15-501 at Culbreth Rd. / Mt. Carmel Church Rd	D (48.7)*	-	D (40.6)*	-
US 15-501 at Bennett Rd.	C (20.9)*	B (13.9)	A (6.7)	B (13.0)
US 15-501 at Arlen Park Dr.	B (11.3)	B (11.8)	B (12.3)	B (7.7)
US 15-501 at Proposed Obey's Creek Driveway	C (27.8)	A (5.5)	C (18.0)	A (7.8)
US 15-501 at Market St.	B (12.3)	B (16.8)	C (25.5)	B (17.7)
US 15-501 at Dogwood Acres Dr.	A (8.1)	# (1.1)	A (6.6)	# (1.1)
US 15-501 at Wal-Mart Driveway.	B (19.8)	B (18.1)	B (19.3)	B (17.8)
US 15-501 at Smith Level Rd.	C (25.1)	B (15.6)	D (49.1)*	B (10.0)
US 15-501 at Old Lystra Rd.	B (11.8)	A (8.3)	B (19.0)	C (24.4)
US 15-501 at Plaza Dr.	D (41.3)*	B (11.0)	B (13.3)	B (13.3)
US 15-501 at Manns Chapel Rd.	B (19.6)	C (26.3)*	D (36.3)*	B (14.8)
US 15-501 at Holly Ridge Rd Ext. / Center Driveway.	A (4.3)	-	A (8.3)	-
US 15-501 at Polks Landing Rd.	A (9.5)	-	B (10.3)	-
US 15-501 at South Driveway.	A (7.3)	-	B (10.7)	-
US 15-501 at Lystra Rd.	A (8.4)	B (11.4)	B (11.0)	B (10.7)
US 15-501 at Vickers Rd.	A (4.9)	# (0.4)	A (5.4)	# (0.5)
US 15-501 at Briar Chapel Pkwy.	B (10.9)	# (1.9)	B (13.4)	# (1.5)
US 15-501 at Jack Bennett Rd.	A (9.8)	# (1.8)	A (8.5)	# (2.0)
US 15-501 at Taylor Rd.	B (17.9)	B (10.2)*	B (18.7)	A (4.6)
US 15-501 at Andrews Store Rd.	C (21.0)	C (20.7)	C (22.8)	A (9.8)
US 15-501 at Village Way	B (11.8)	A (5.7)	B (10.8)	A (8.4)
US 15-501 at Morris Rd.	B (11.5)	B (13.7)	B (10.7)	A (4.0)
US 15-501 at Weathersfield Rd.	A (9.0)	A (5.2)	A (4.3)	B (15.9)
US 15-501 at Mt. Gilead Church Rd.	B (16.9)	A (5.2)	B (11.0)	A (8.9)*
US 15-501 at East Cotton Rd.	A (1.7)	# (0.2)	A (2.1)	# (0.2)
US 15-501 at Hamlet Chapel Rd.	B (15.5)	A (5.3)	B (16.9)	A (3.3)
US 15-501 at Bynum Rd.	A (4.5)	# (0.4)	A (4.7)	# (0.4)
US 15-501 at Durham Eubanks Rd.	A (1.0)	# (1.3)	A (7.5)	# (0.8)
US 15-501 at Moore Mountain Rd.	A (4.6)	# (0.9)	A (6.8)	# (0.5)
US 15-501 at Russell Chapel Church Rd.	C (20.9)	# (1.6)	B (13.2)	# (1.0)
US 15-501 at Proposed Chatham Park Driveway	C (20.9)	B (11.0)	B (17.9)	A (7.4)
US 15-501 at Russet Run	B (11.5)	B (12.2)	B (13.1)	B (14.3)
US 15-501 at Northwood High School Rd.	B (14.1)	B (14.6)	B (14.9)	A (7.2)
US 15-501 at US 64 Bypass WB Ramps	C (22.3)	-	C (29.7)	-
US 15-501 at US 64 Bypass EB Ramps	B (14.5)	-	B (13.9)	-

* Indicates that an intersection leg is predicted to operate at an undesirable Level of Service

5. Guiding Principles

US 15-501 in Orange and Chatham counties, is identified as a Boulevard in the NCDOT Strategic Highway Corridor Vision Plan prepared by the Transportation Planning Branch in July 2008 (<https://connect.ncdot.gov/projects/planning/TPB%20%20Strategic%20Highway%20Corridors/Strategic%20Highway%20Corridors%20Vision%20Plan.pdf>). Information on the Strategic Highway Corridor initiative across the state can be found on NCDOT's website at: (<https://connect.ncdot.gov/projects/planning/Pages/StrategicHighwayCorridors.aspx>). NCDOT provides recommendations for the control of access for strategic boulevards in their Strategic Highway Corridors Concept Development Report from October 2005. (<https://connect.ncdot.gov/projects/planning/TPB%20%20Strategic%20Highway%20Corridors/Strategic%20Highway%20Corridors%20Concept%20Development%20Report.pdf>). Relative excerpts from these reports are included in Appendix A.

The Concept Development Report recommends partial control of access. This can include, but is not limited to: one driveway connection per parcel, consolidated/shared driveways, limited access to connecting and service roads, and right in/right out restrictions. For any proposed superstreet configurations, it is recommended by NCDOT Congestion Management that the minimum spacing requirements for u-turns begin at 600' from the intersection and do not exceed 1,000'. Special circumstances will be accounted for on a case by case basis.

Figure 4 illustrates the preferred progression for conversion of current intersections.

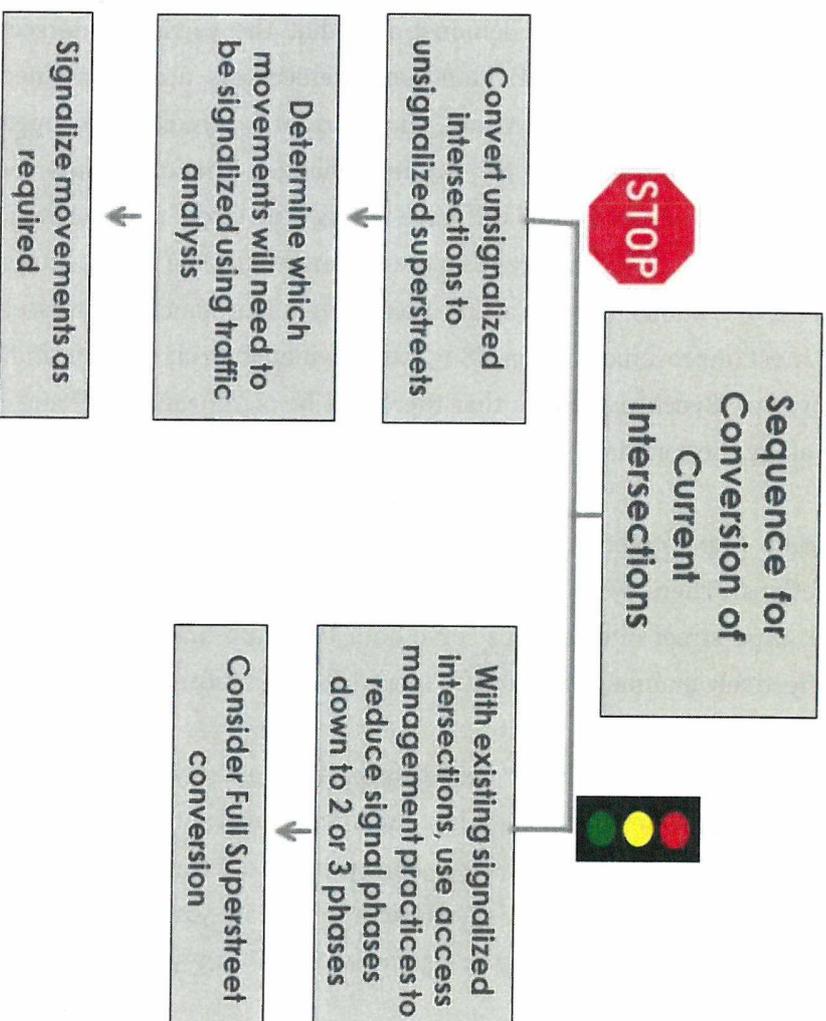


Figure 4 - Recommended Progression Sequence

6. Conclusion

The Existing Analysis (2013) demonstrates that the corridor intersections are operating at acceptable levels of service. If standard intersections are maintained through 2040, with geometric and signal improvements, the corridor is predicted to operate with unacceptable levels of service around the NC 54 interchange. The other intersections will operate at acceptable levels of service but will have failing side street movements and significant queuing on the side streets. With the proposed improvements to the NC 54 interchange from the Obey's Creek TIA, operations improve at the interchange. The standard intersections along the corridor see the most improvement when US 15-501 is widened to six lanes from NC 54 to Mann's Chapel Rd. However, Synchro predicts that there will be significant delay and queuing along the side streets along the corridor.

The 2040 Superstreet Analysis resulted in acceptable overall levels of service for all intersections. There were a few intersections with unacceptable delay on the side streets. Overall, superstreet intersections serve both the main-line and the side streets efficiently, and most effectively maintain the current operations with future growth.

Maintaining the use of access management that already exists along the corridor will help ensure that operations stay highly functional. Incorporating geometric improvements and reducing signal phases at existing and proposed intersections as developments and re-developments occur will help transition the US 15-501 corridor. Access management and alternative intersections will be the key to keeping US 15-501 operating efficiently both now and in the future.

7. Appendix

7.1 APPENDIX A

A1 – Existing Scenario 1 Laneage

A2 – Existing Scenario 1 Traffic Volumes

A3 – Future Scenario 1A Laneage

A4 -- Future Scenario 1B Laneage

A5 – Future Scenario 1C Laneage

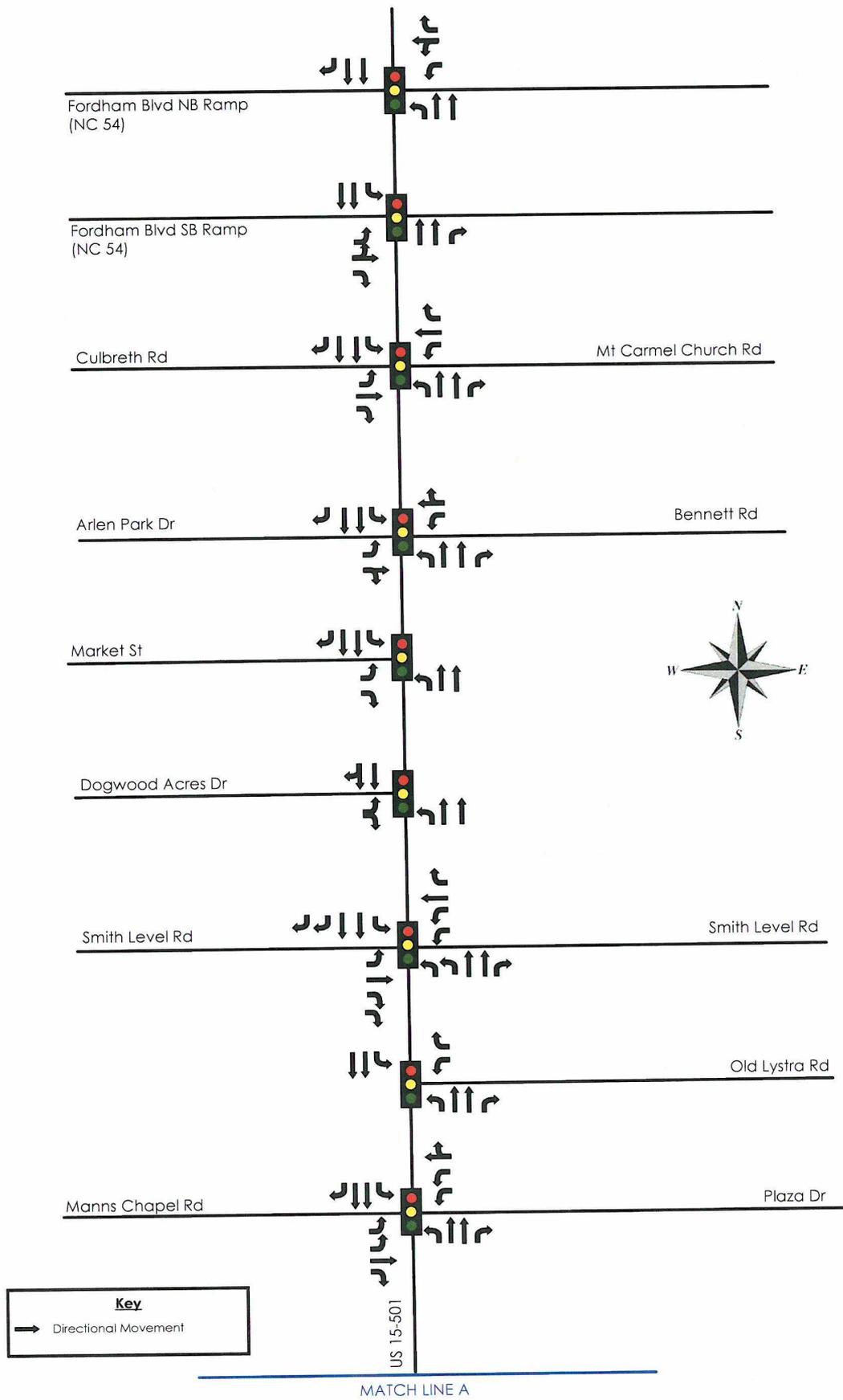
A6 – Future Scenario 1A – 1C Traffic Volumes

A7 – Future Scenario 2 Laneage

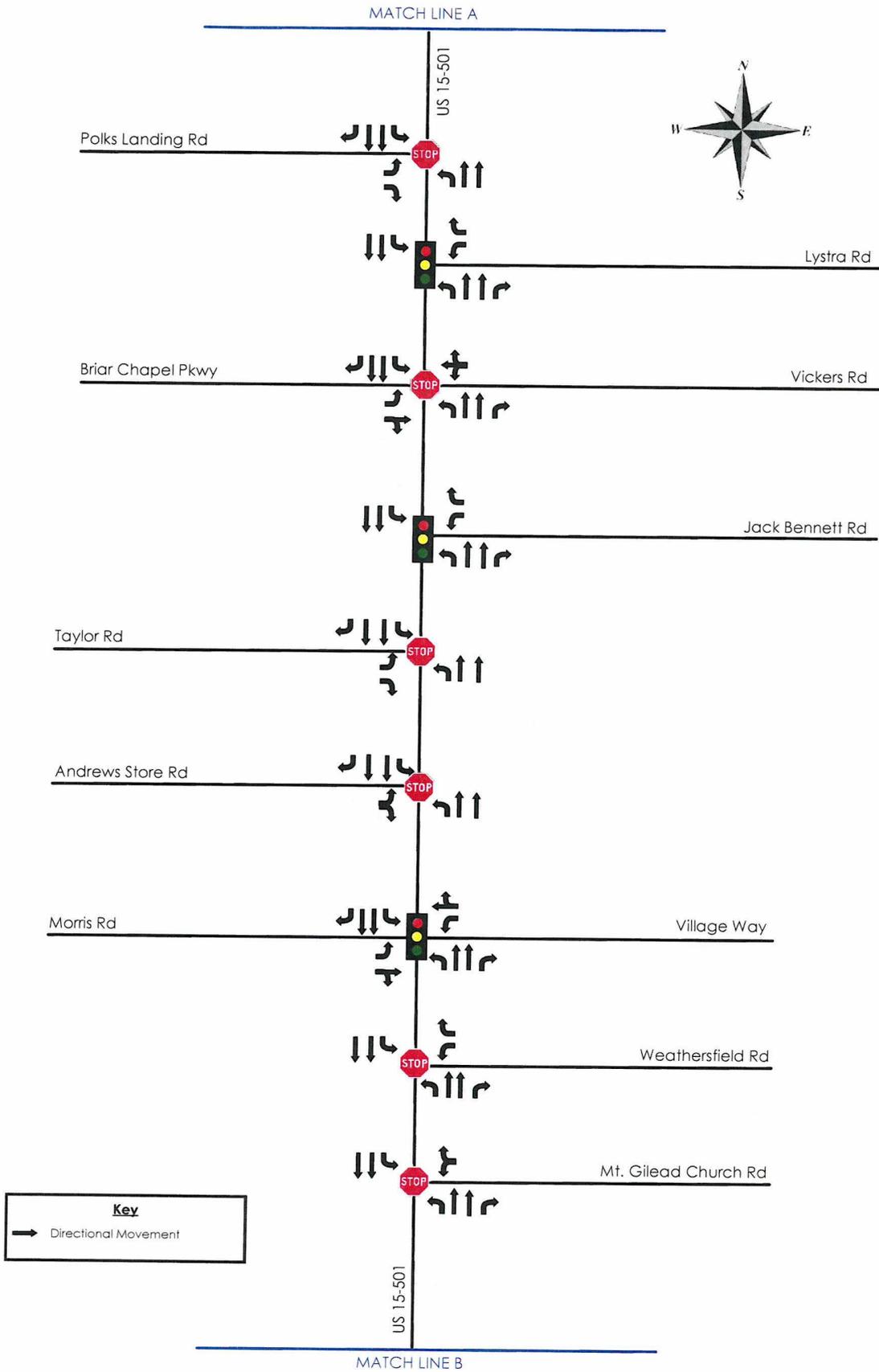
A8 – Future Scenario 2 Traffic Volumes

A9 – Strategic Corridor Documentation

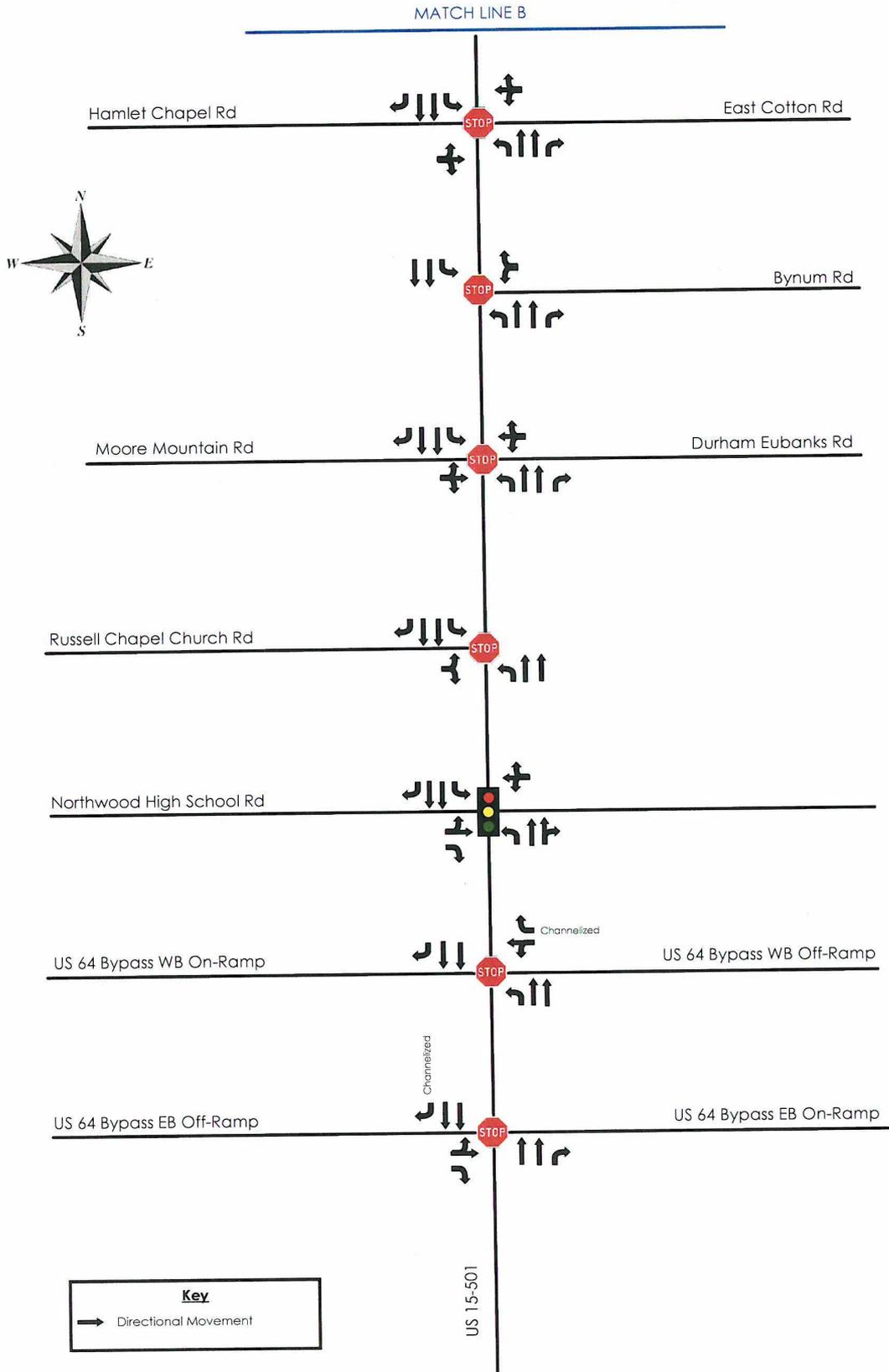
A10 – Approved Development Concept Map



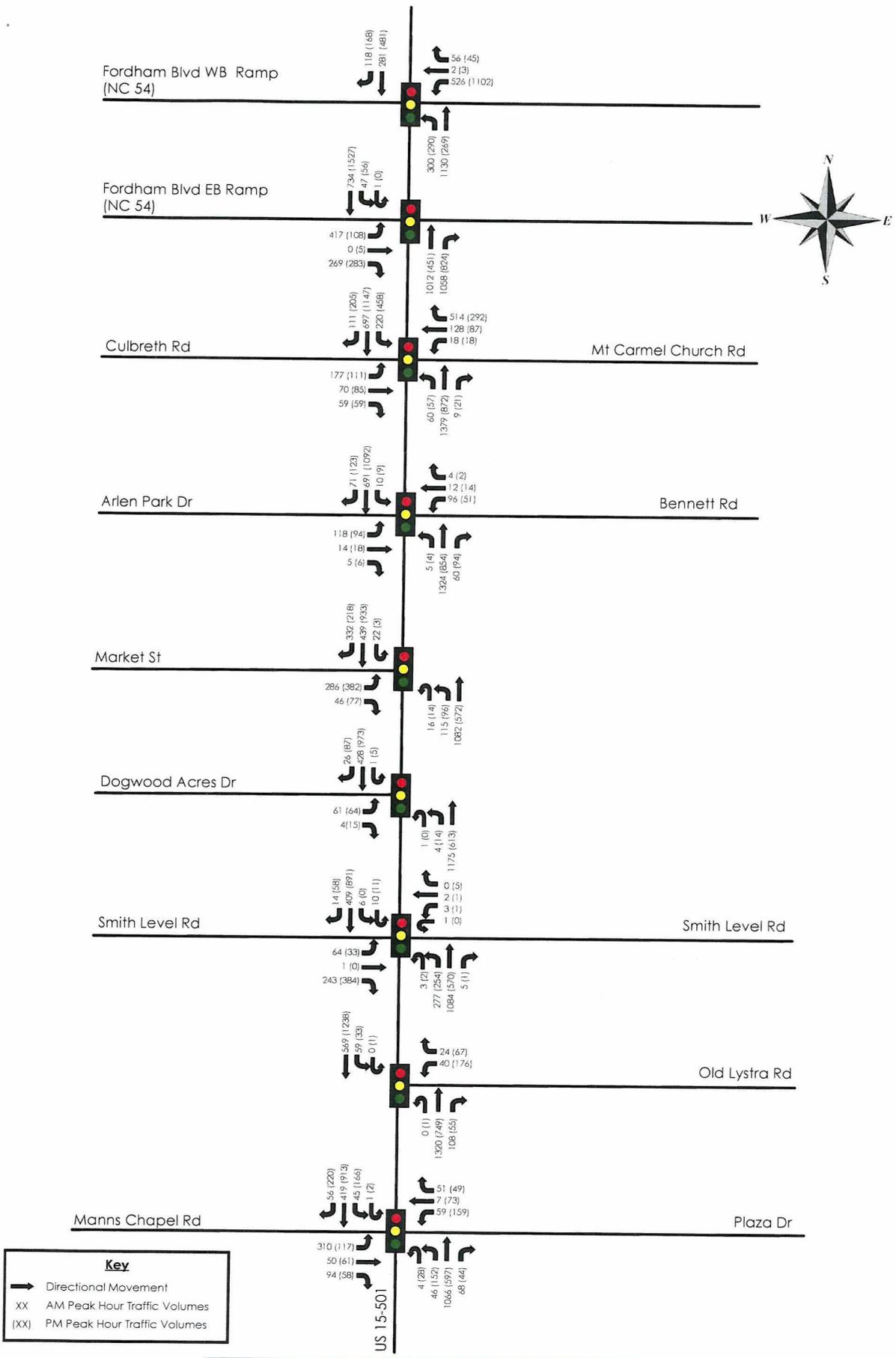
Appendix A1: Existing Scenario 1
Laneage



Appendix A1: Existing Scenario 1
Laneage

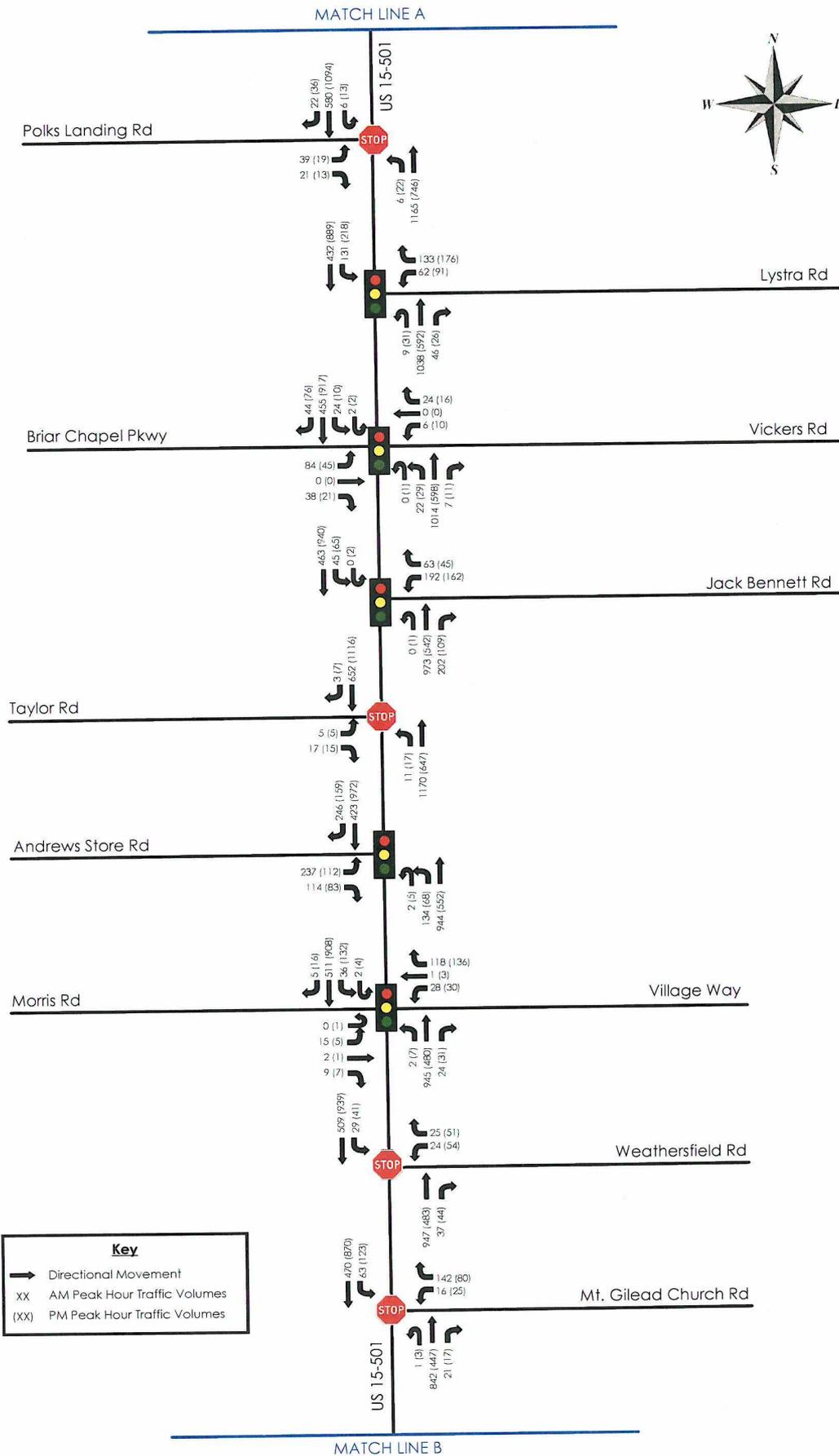


Appendix A1: Existing Scenario 1
Laneage

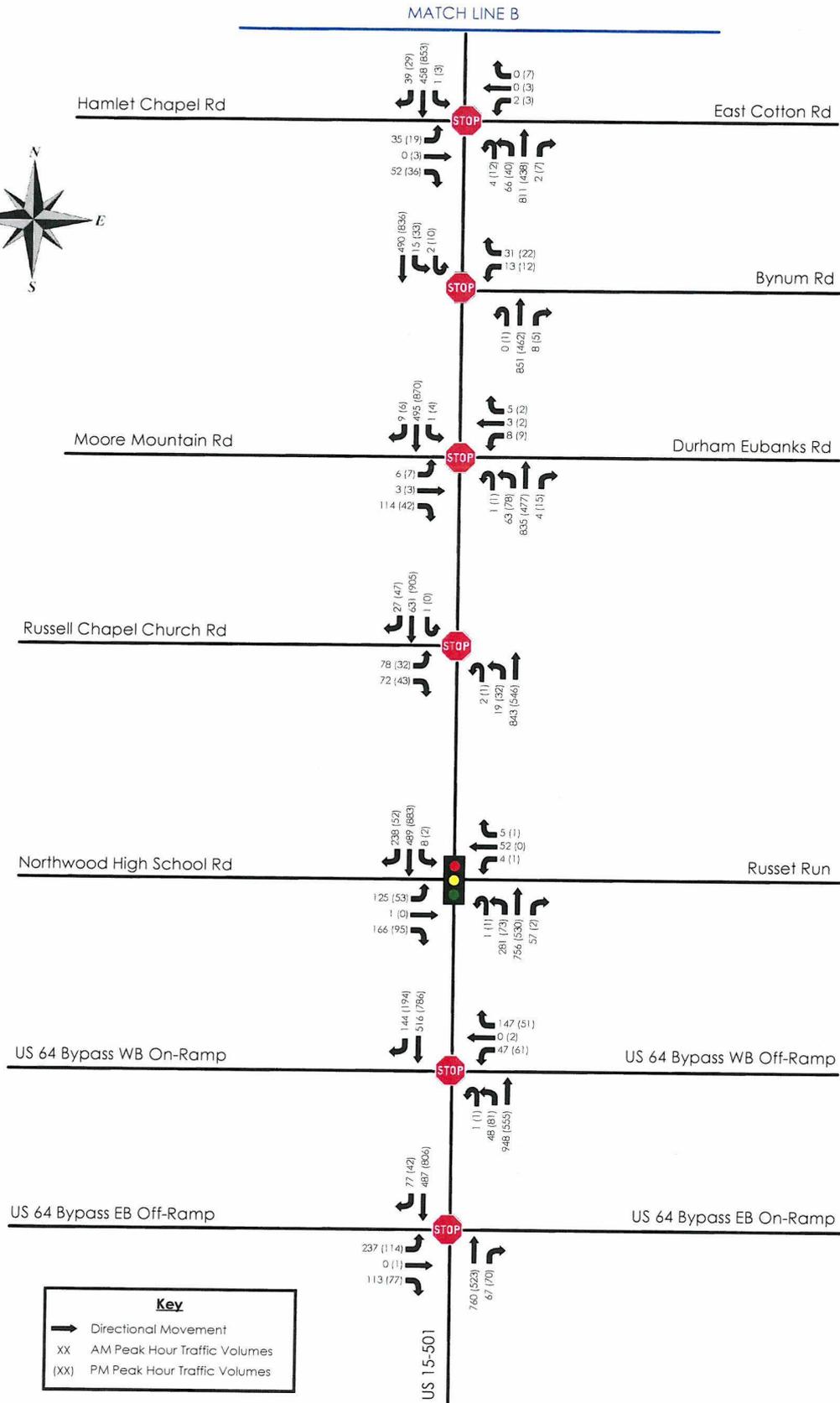


MATCH LINE A

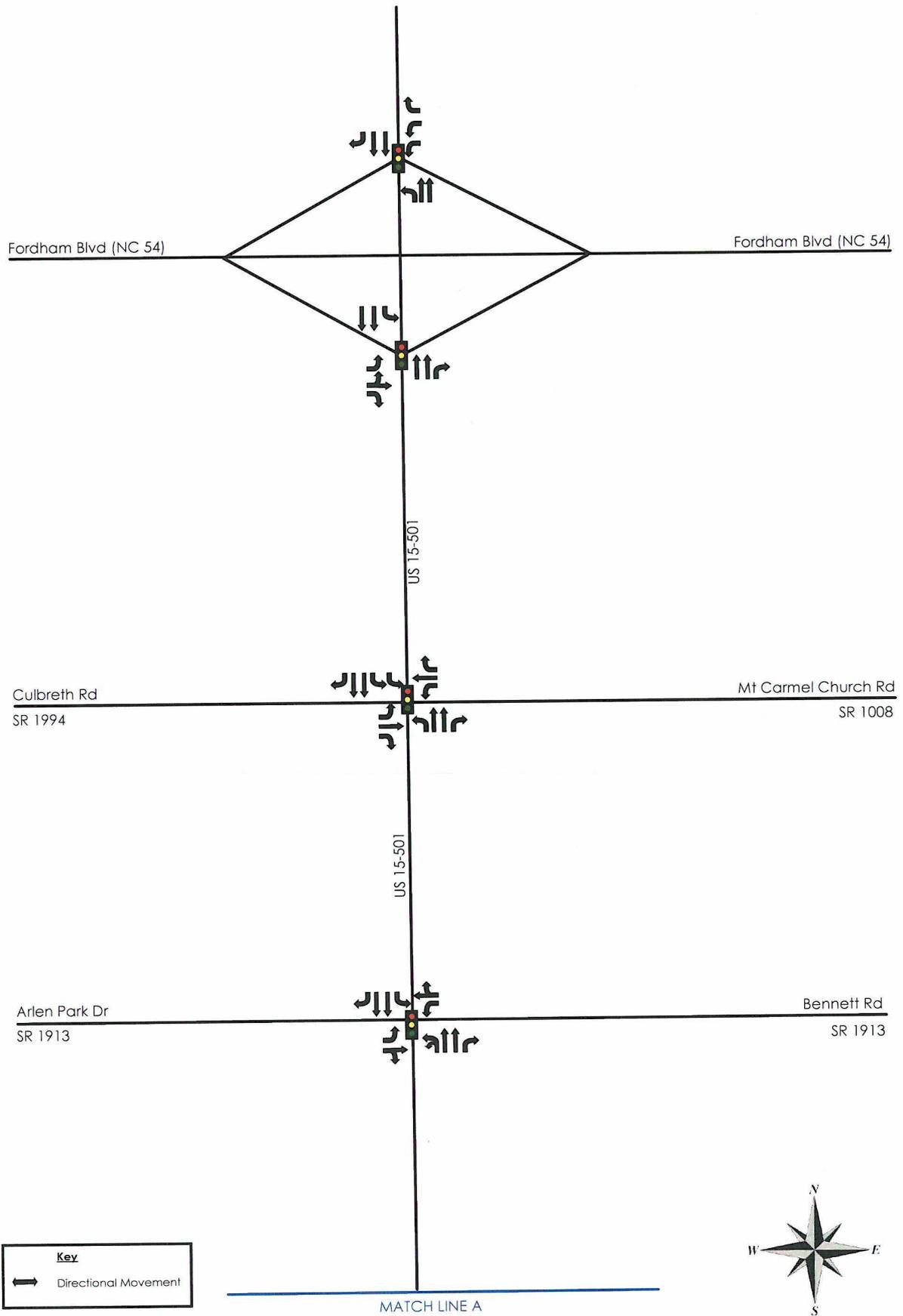
Appendix A2: Existing Scenario 1
Traffic Volumes



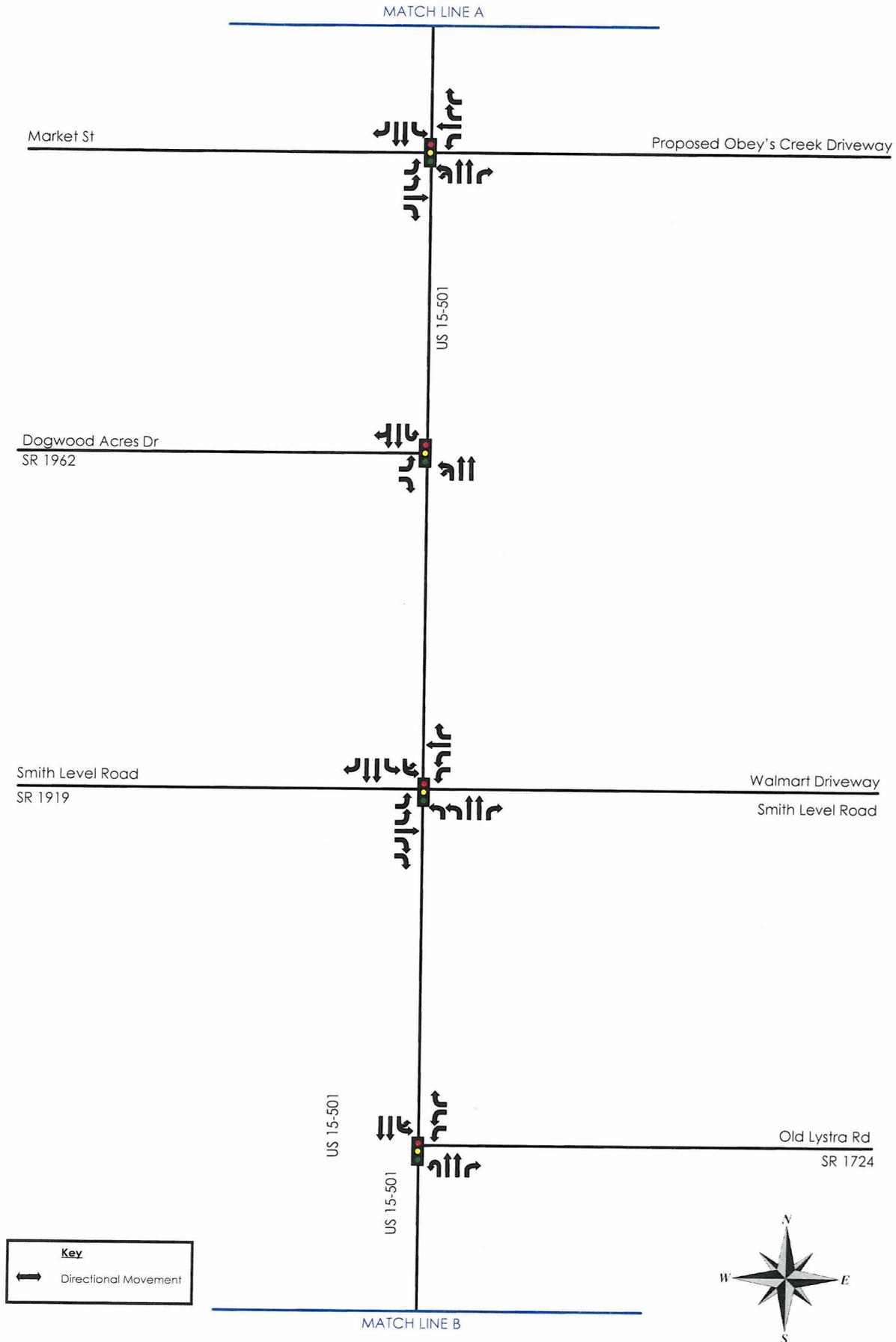
Appendix A2: Existing Scenario 1 Traffic Volumes



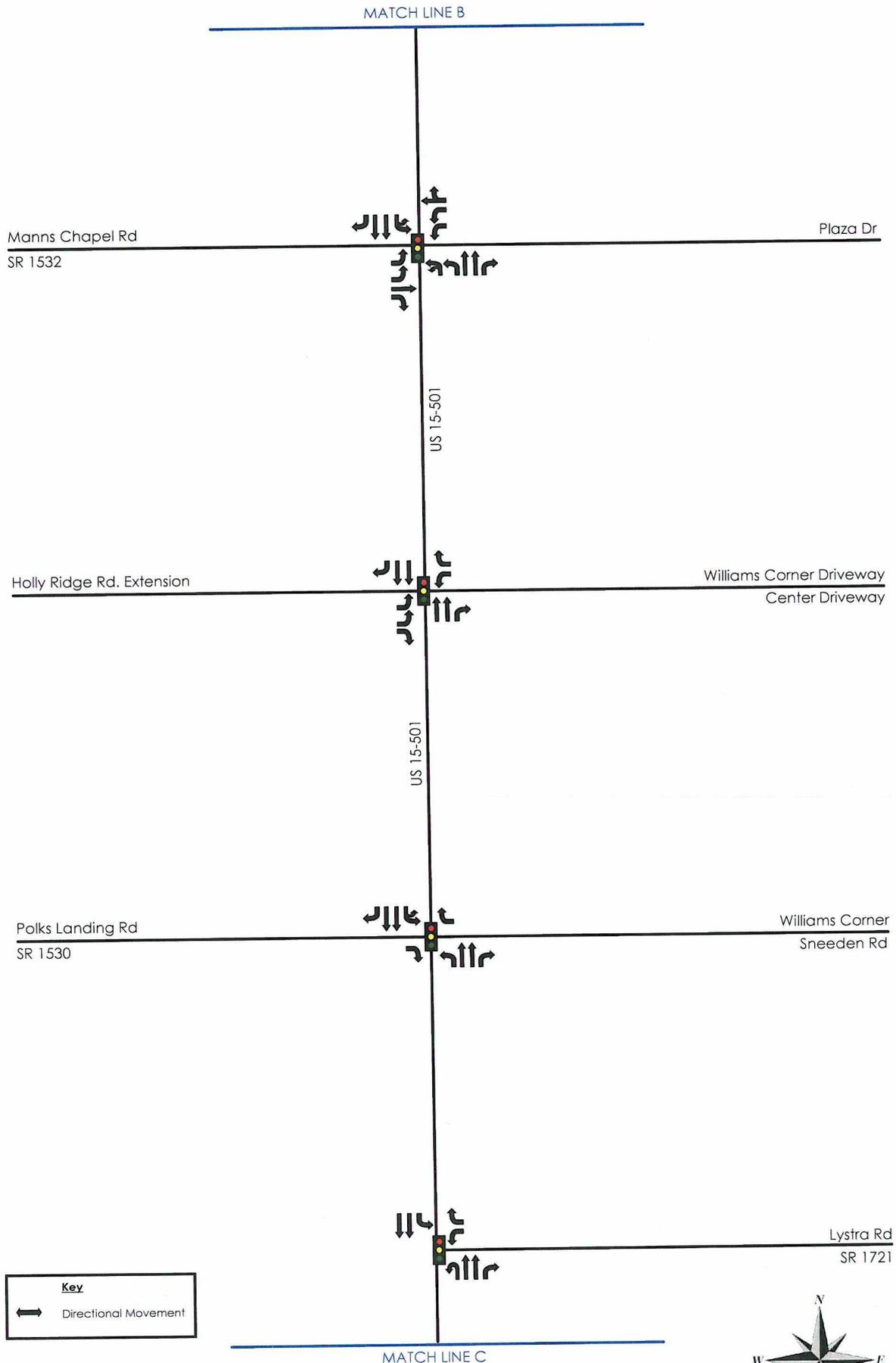
Appendix A2: Existing Scenario 1
Traffic Volumes



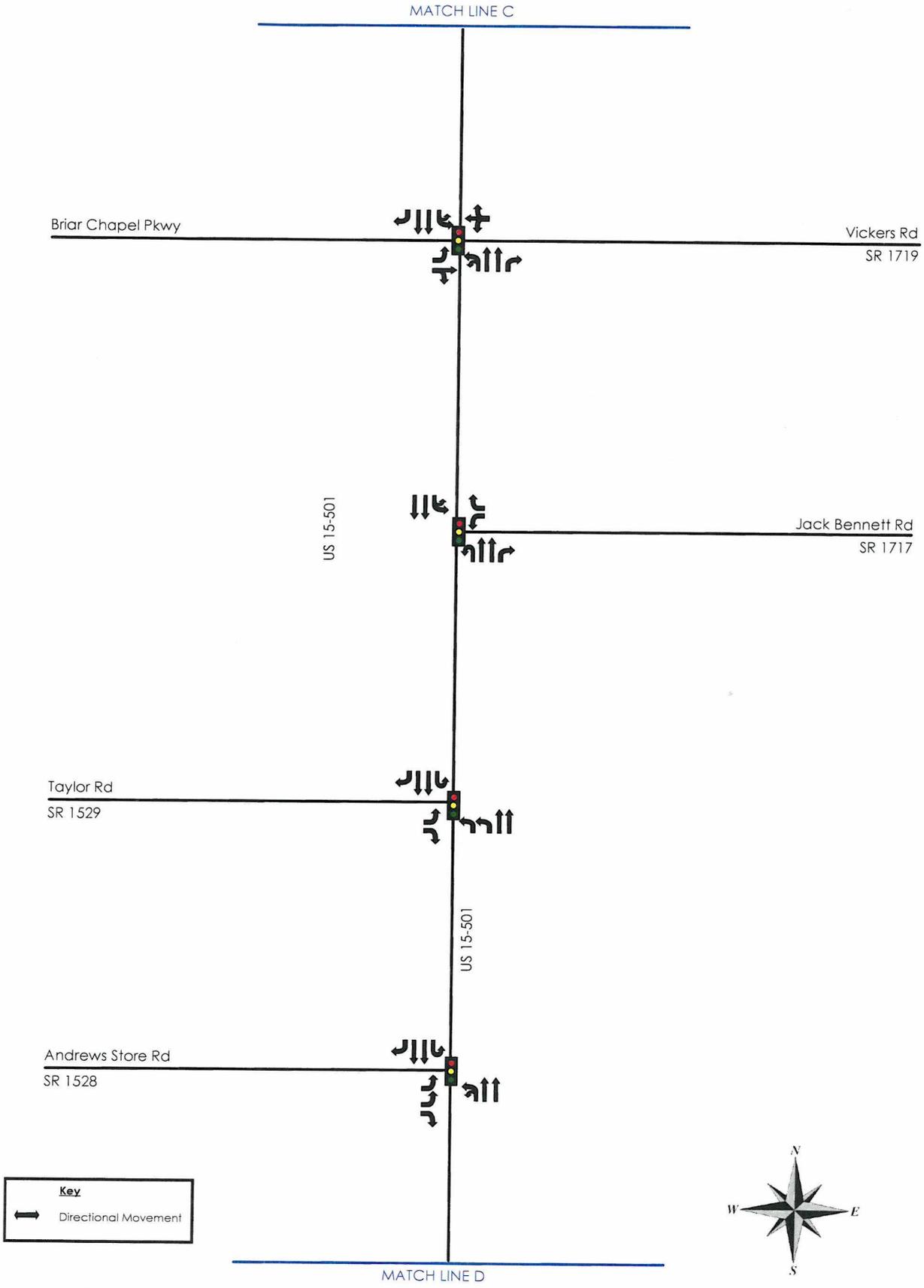
Appendix A3 : Future Scenario 1A
Laneage



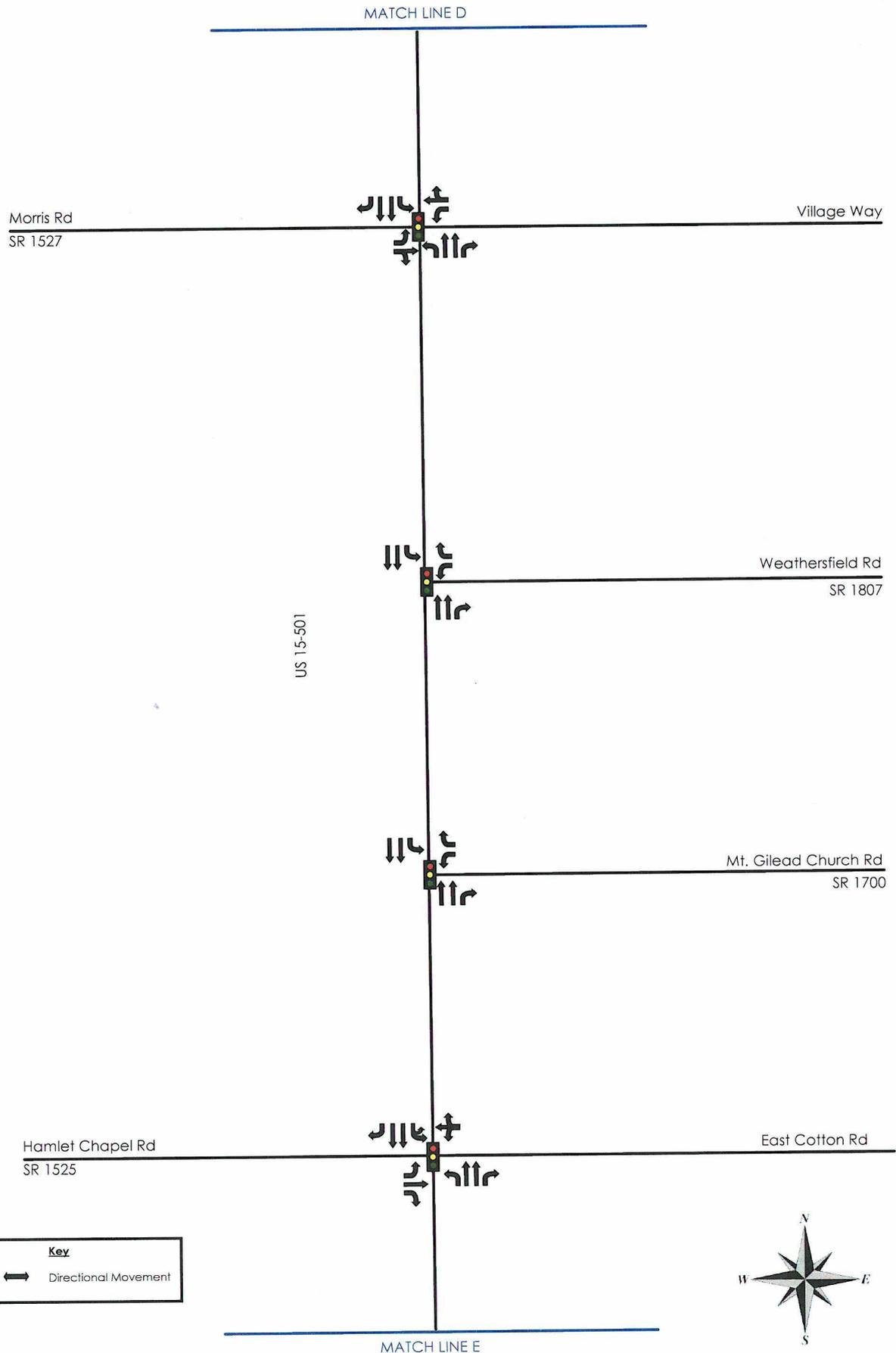
Appendix A3 : Future Scenario 1A
Laneage



Appendix A3 : Future Scenario 1A
Laneage

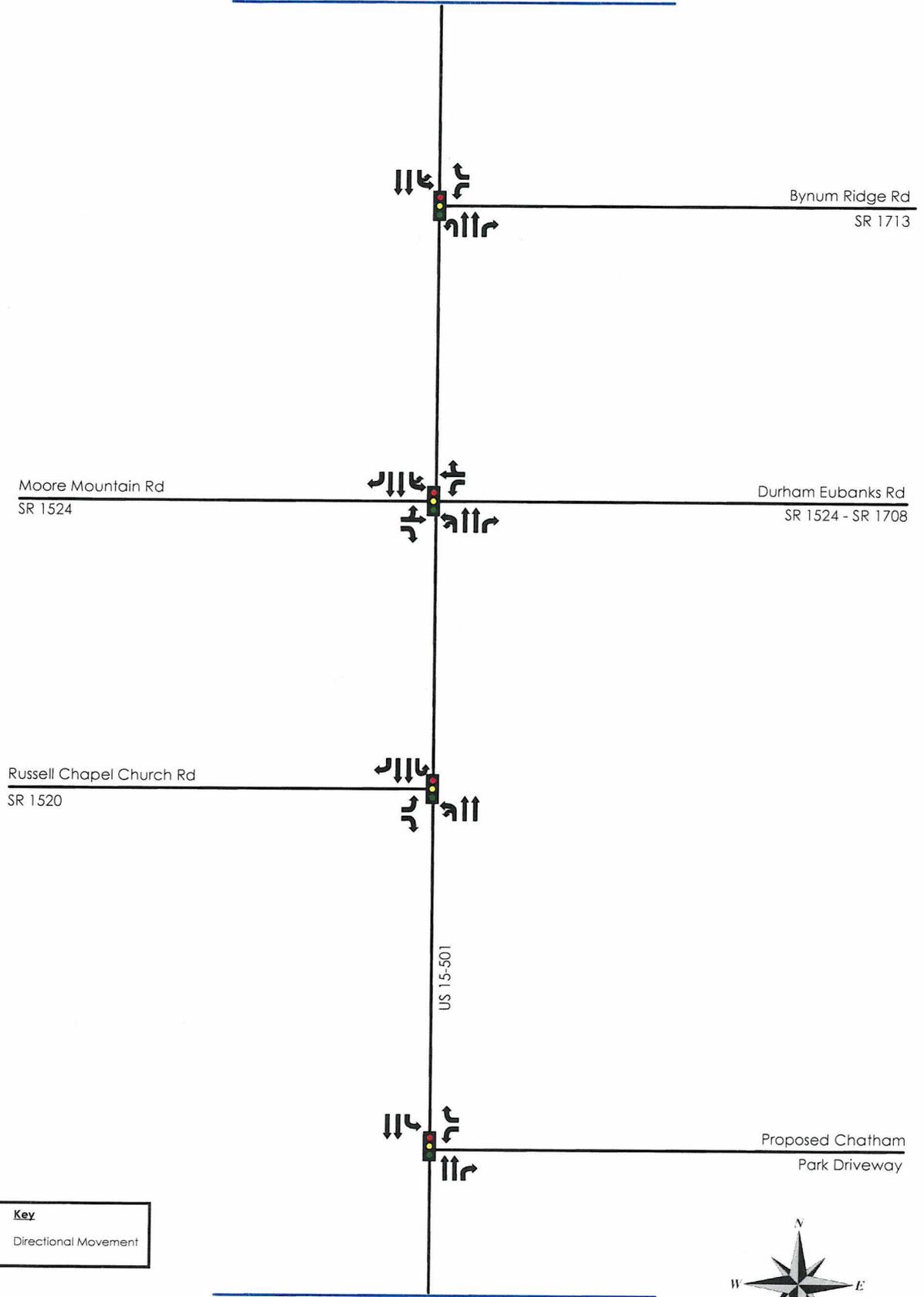


Appendix A3 : Future Scenario 1 A
Laneage

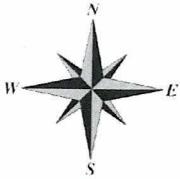


Appendix A3 : Future Scenario 1A
Laneage

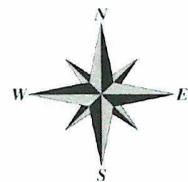
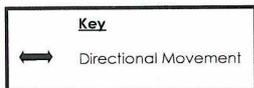
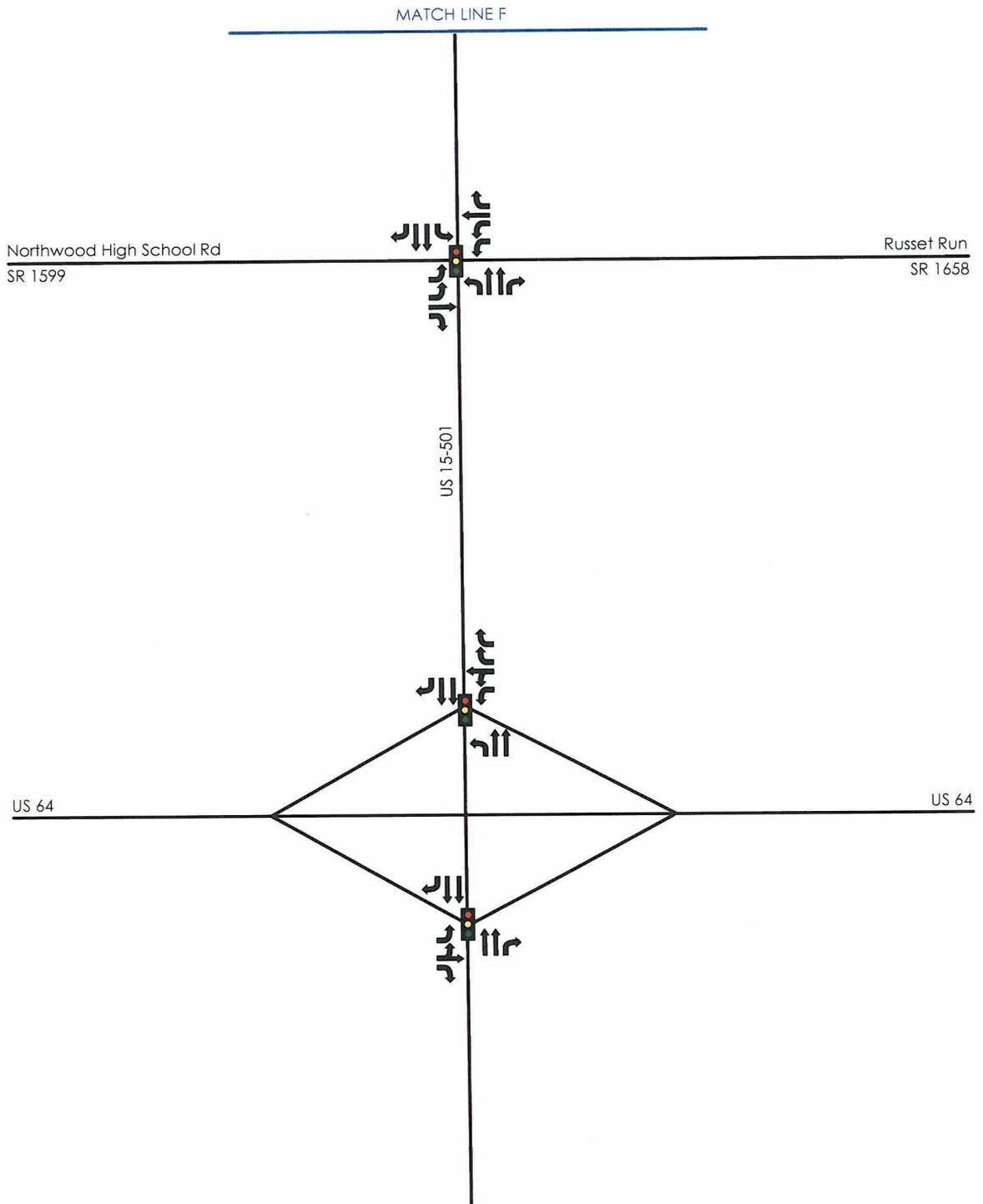
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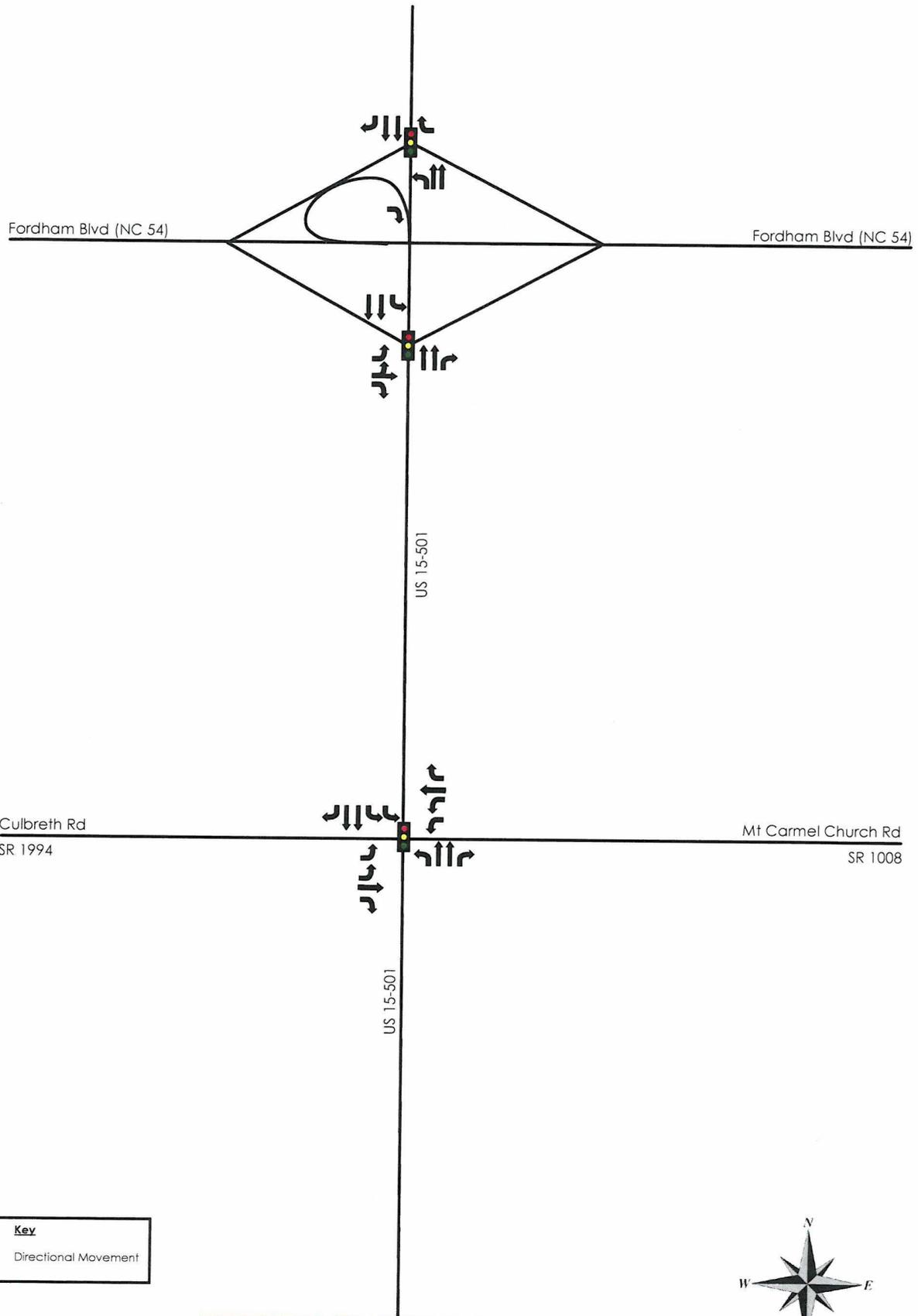
Key
→ Directional Movement



Appendix A3 : Future Scenario 1A
Laneage

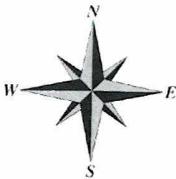


Appendix A3 : Future Scenario 1A
Laneage



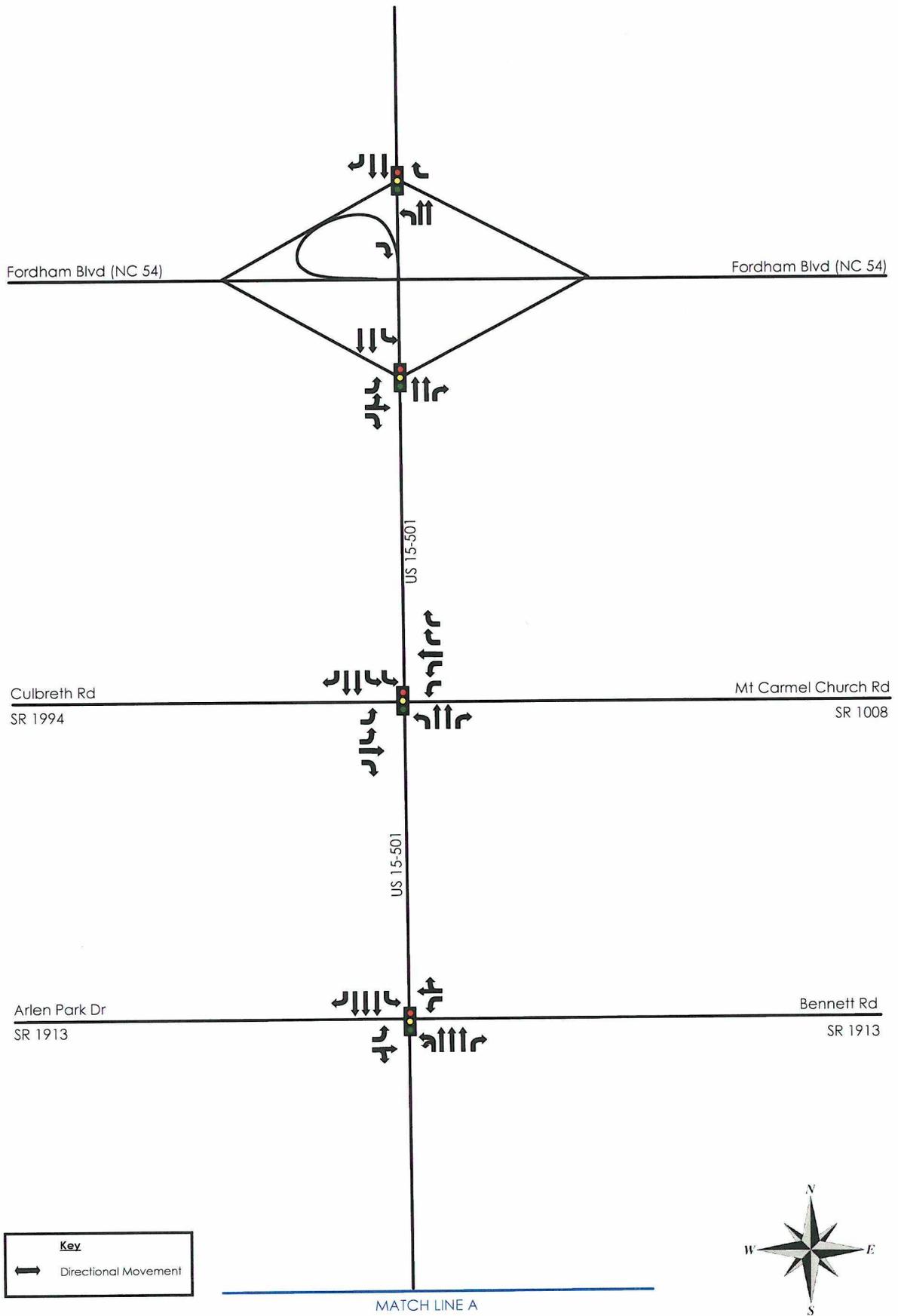
Key

← Directional Movement

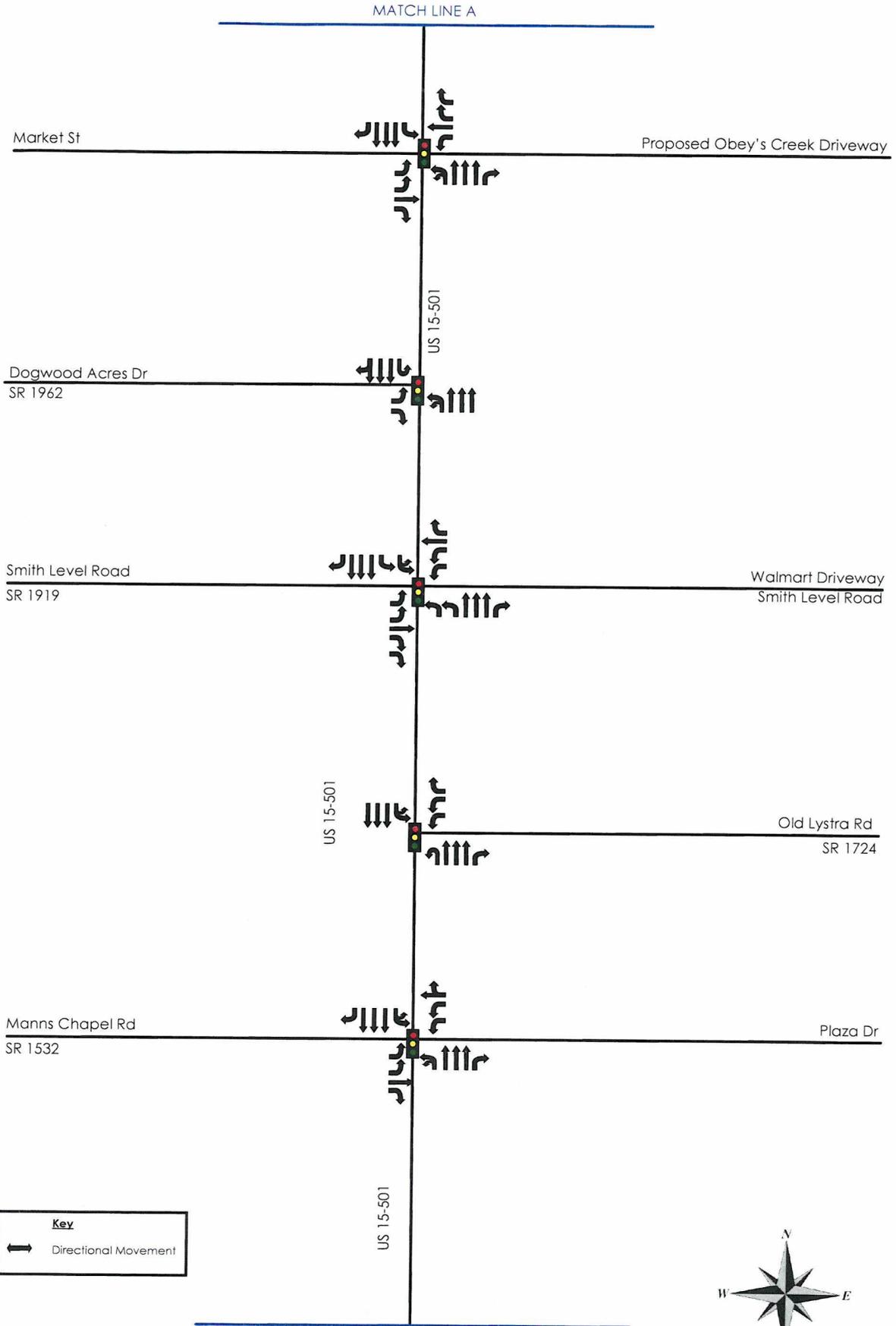


*Laneage Matches Appendix A3 from this Point to US 64

Appendix A4: Future Scenario 1B
Laneage

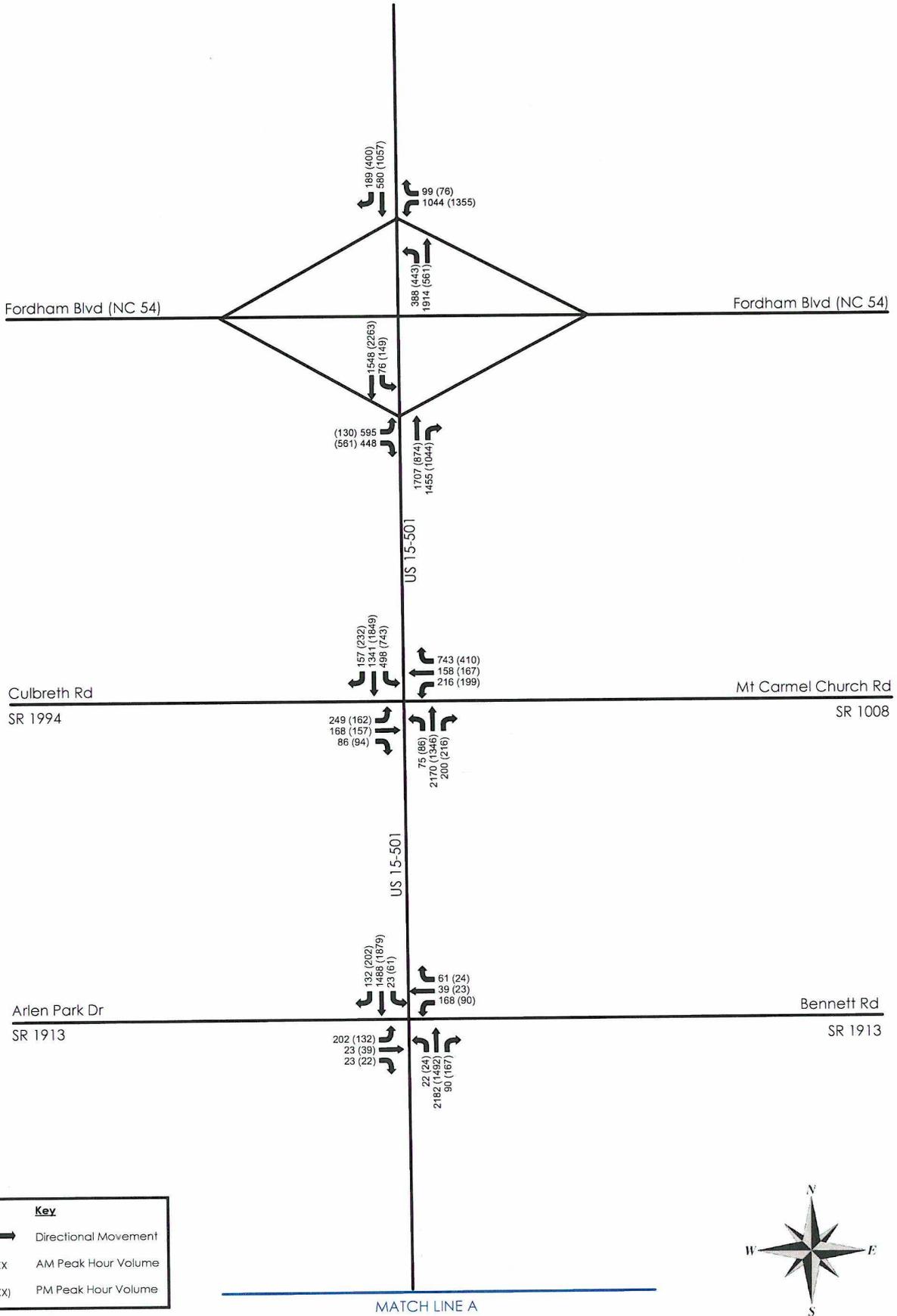


Appendix A5: Future Scenario 1C
Laneage

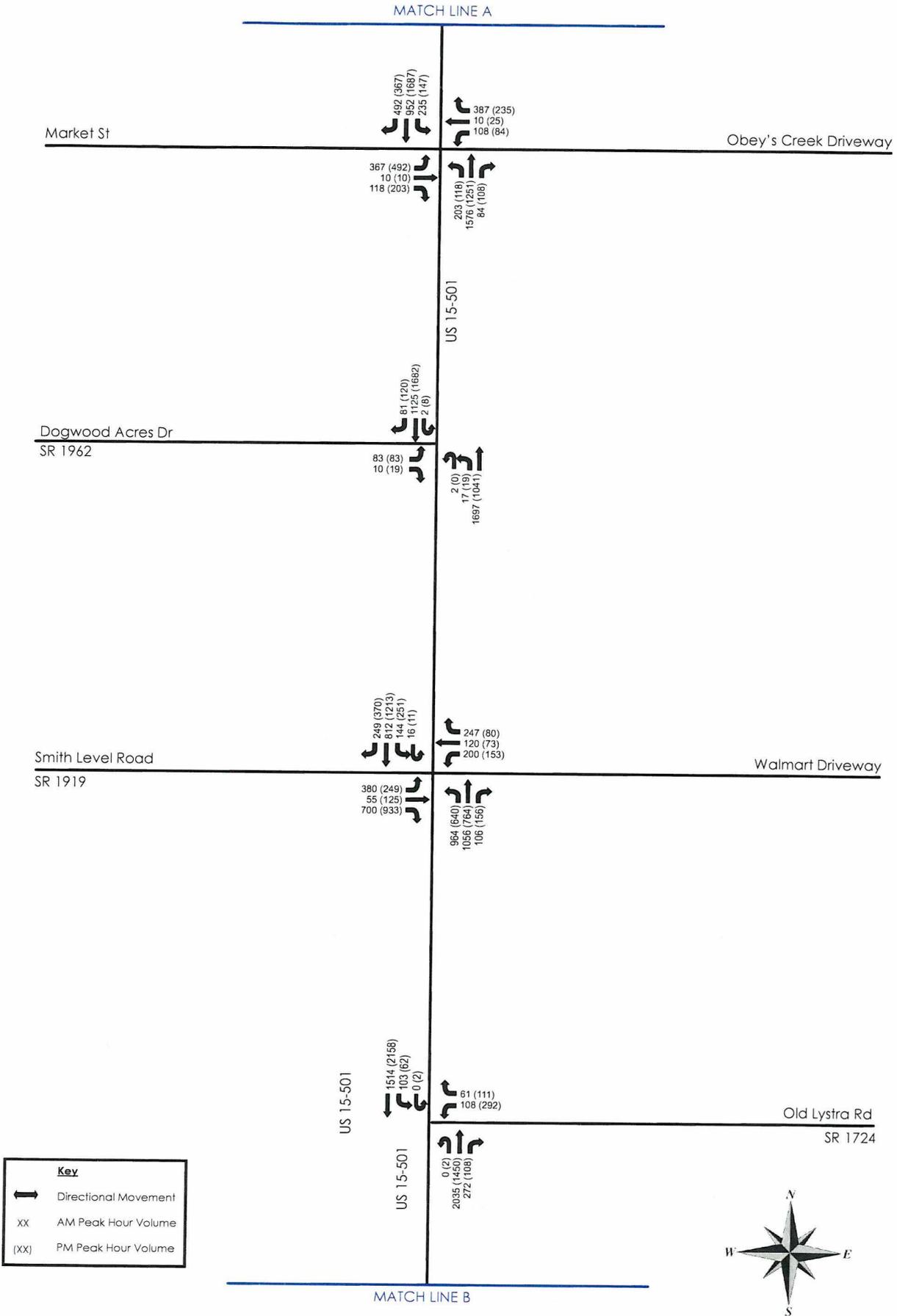


*Laneage Matches Appendix A3 from this Point to US 64

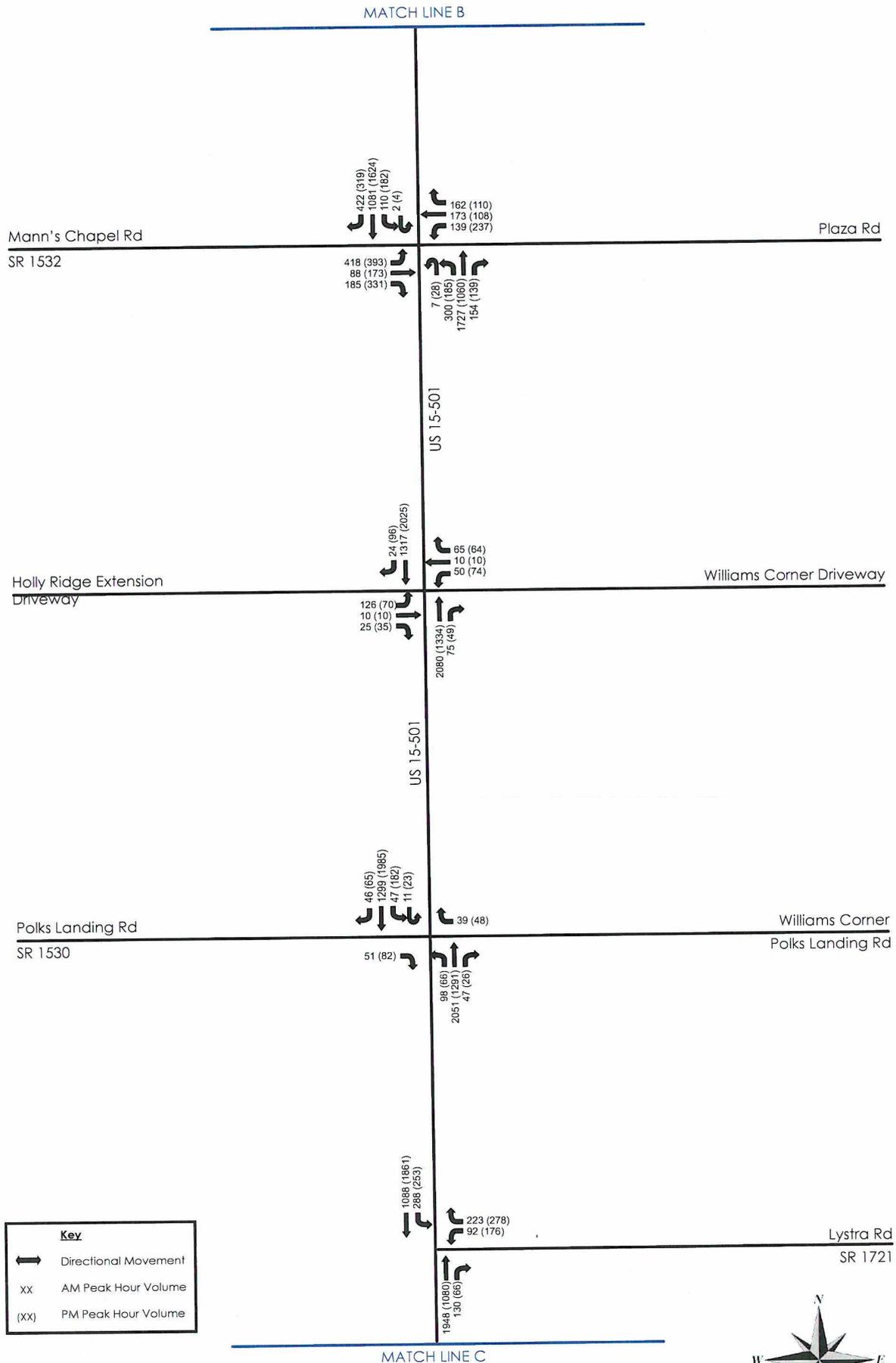
Appendix A5: Future Scenario 1C
Laneage



Appendix A6: Future Scenario
1A - 1C Traffic Volumes

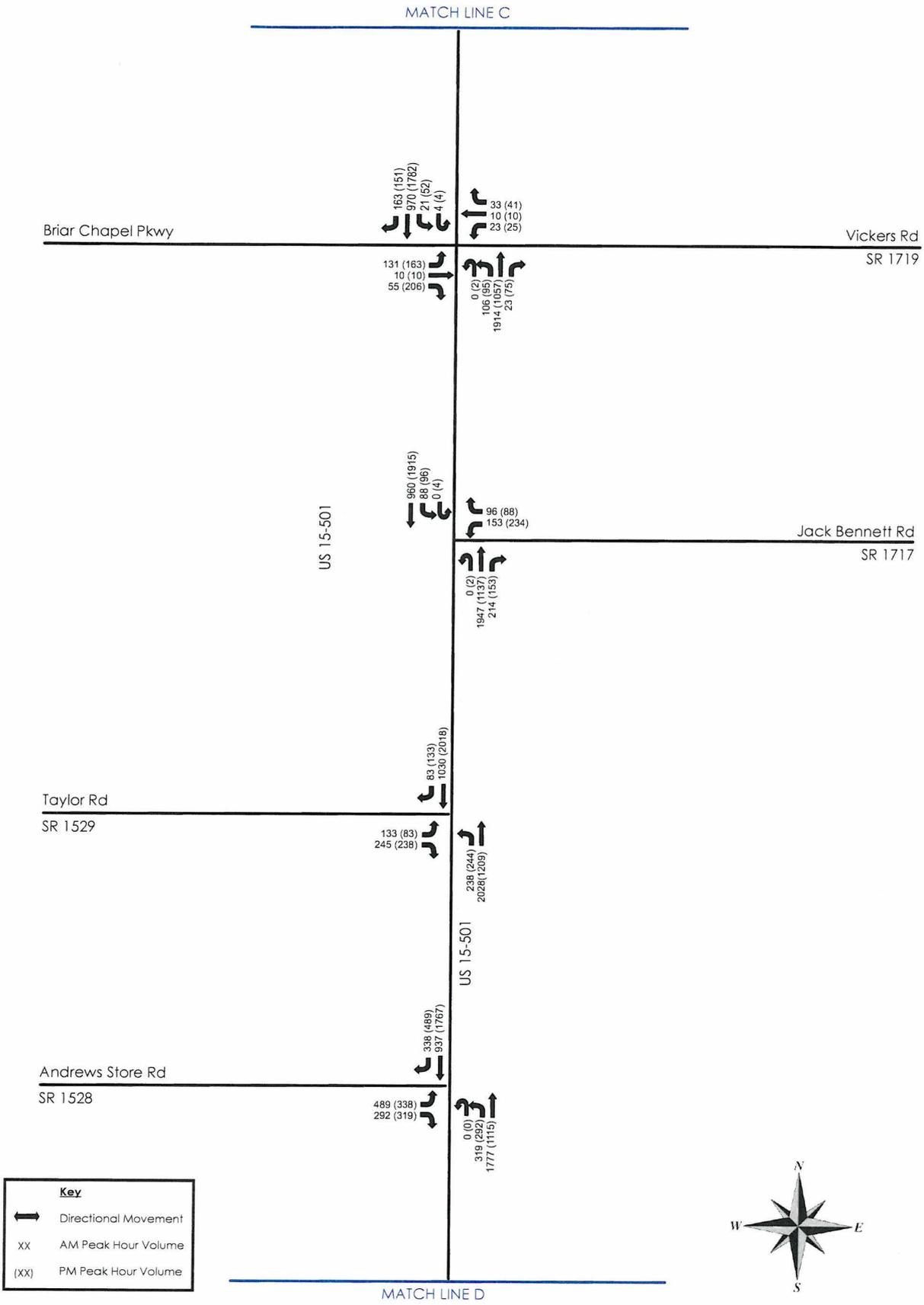


Appendix A6: Future Scenario
1A - 1C Traffic Volumes

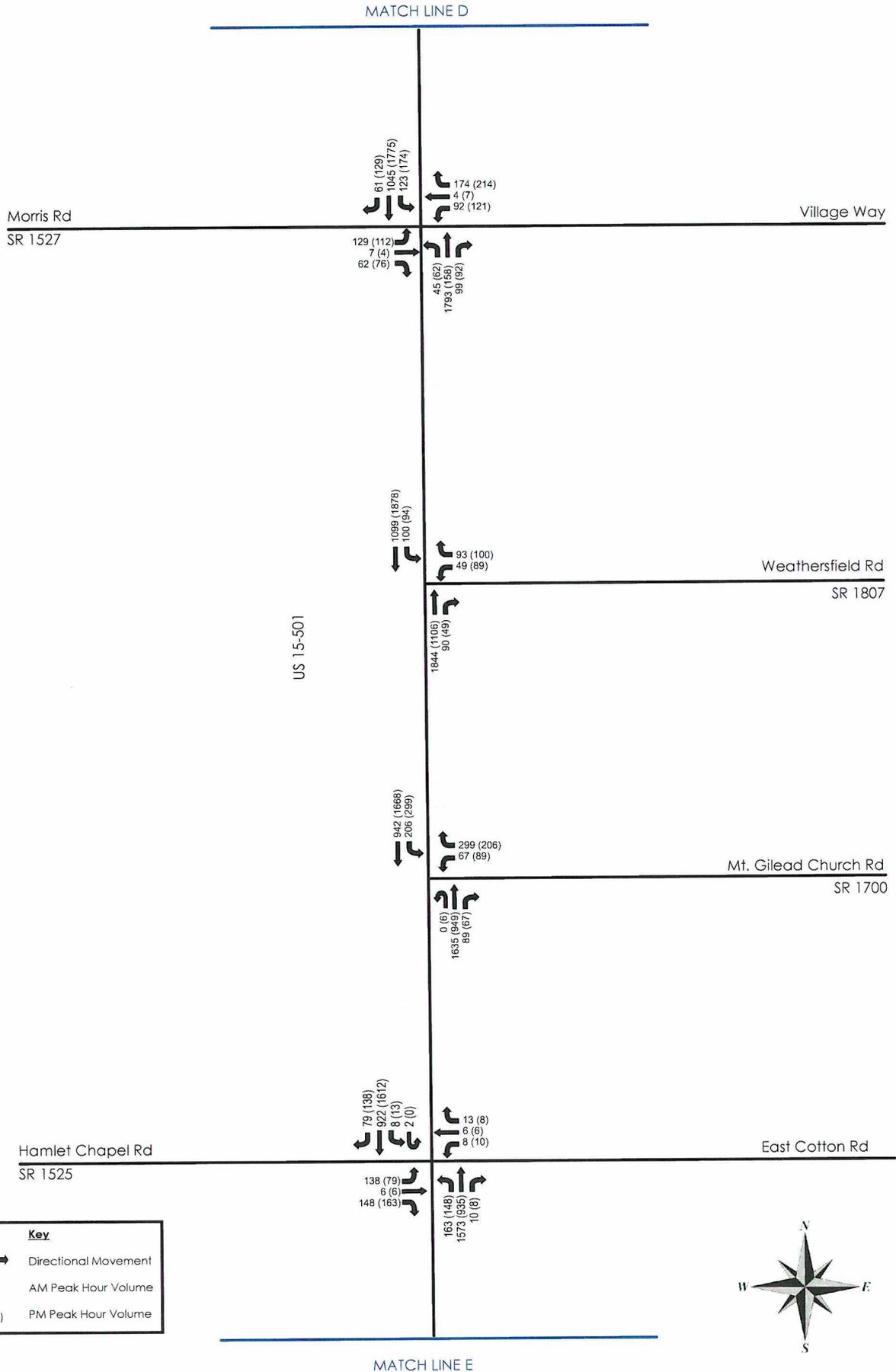


Appendix A6: Future Scenario
1A - 1C Traffic Volumes

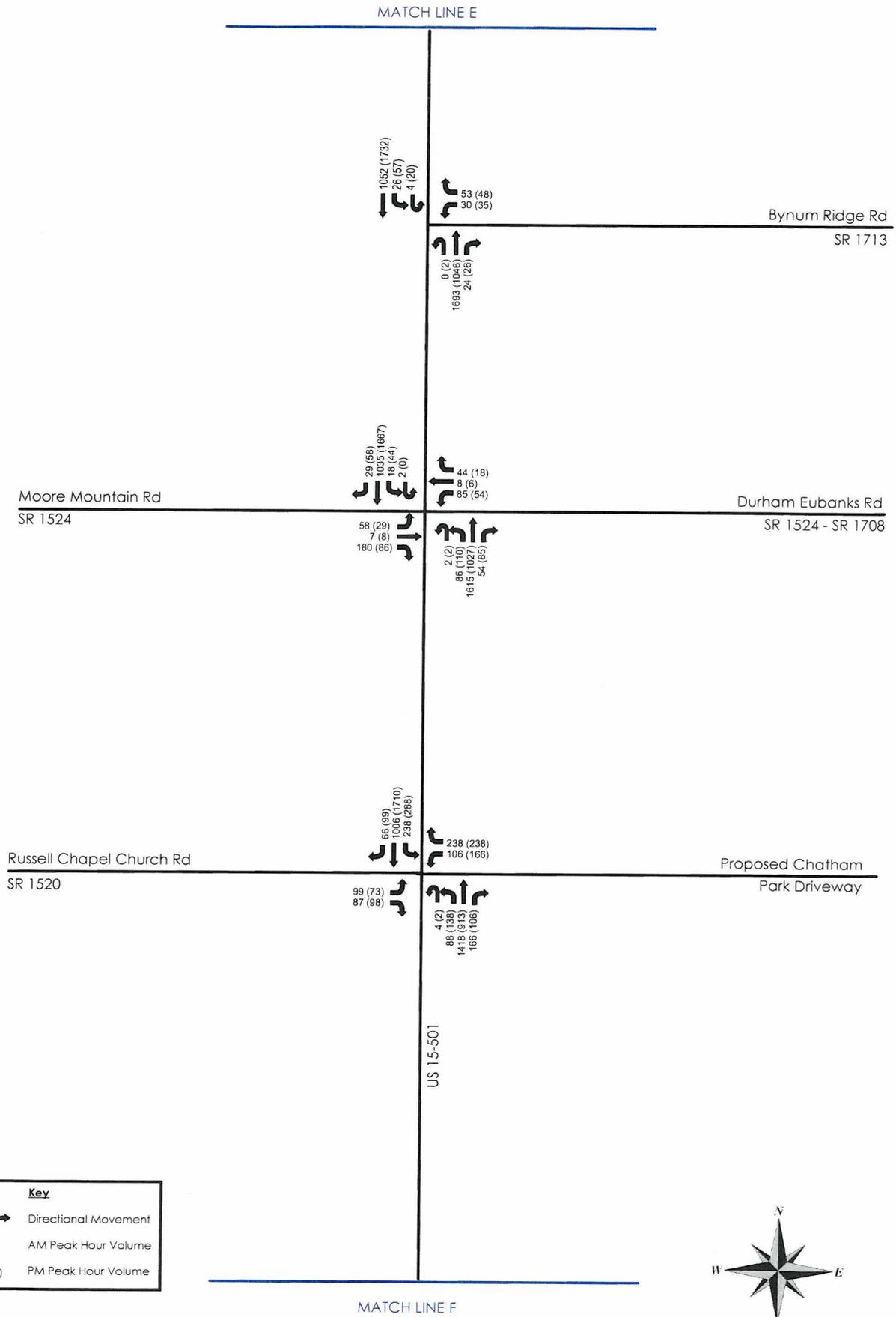




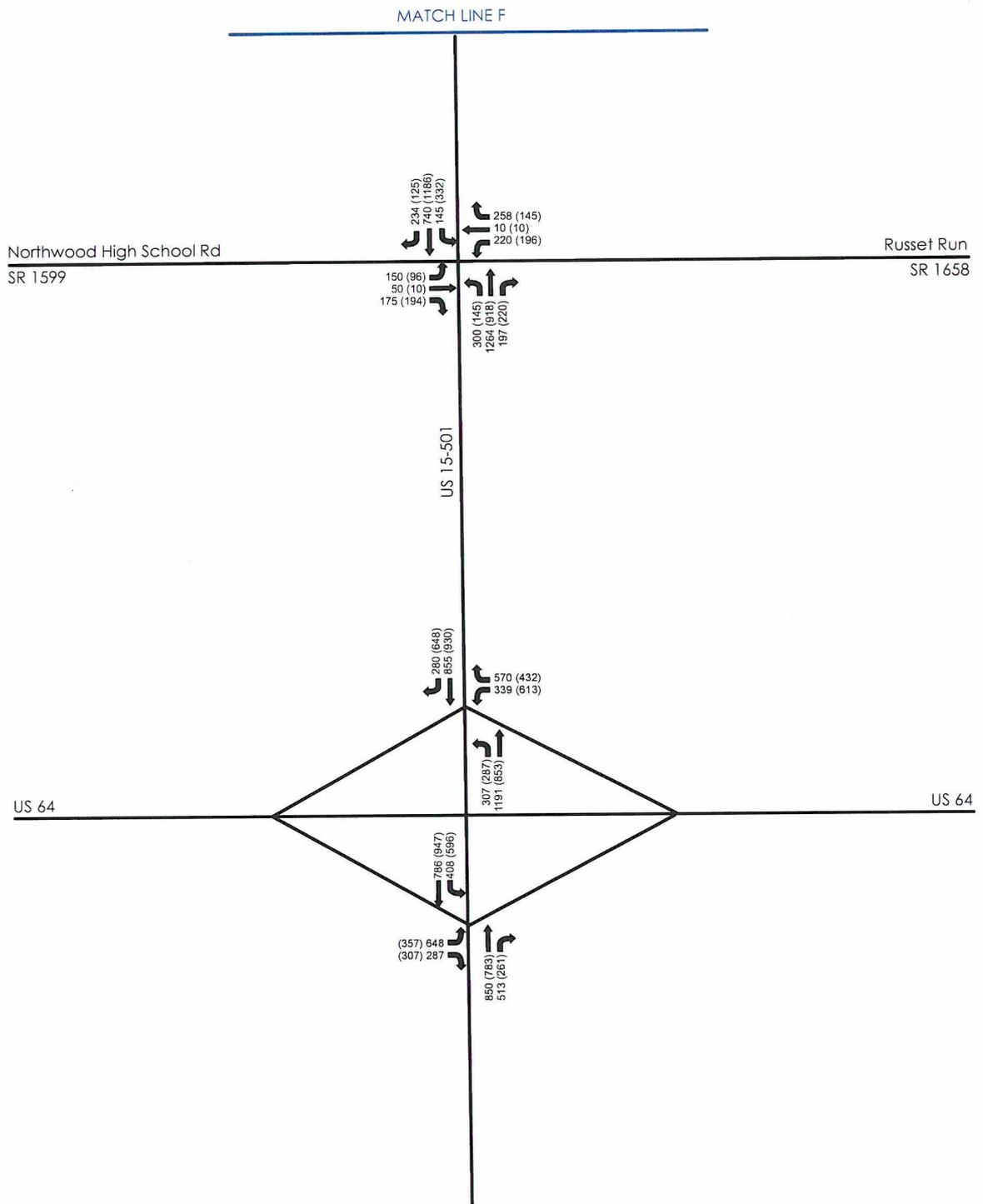
Appendix A6: Future Scenario
1A - 1C Traffic Volumes



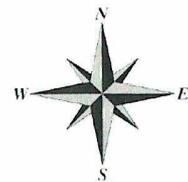
Appendix A6: Future Scenario
1A - 1C Traffic Volumes



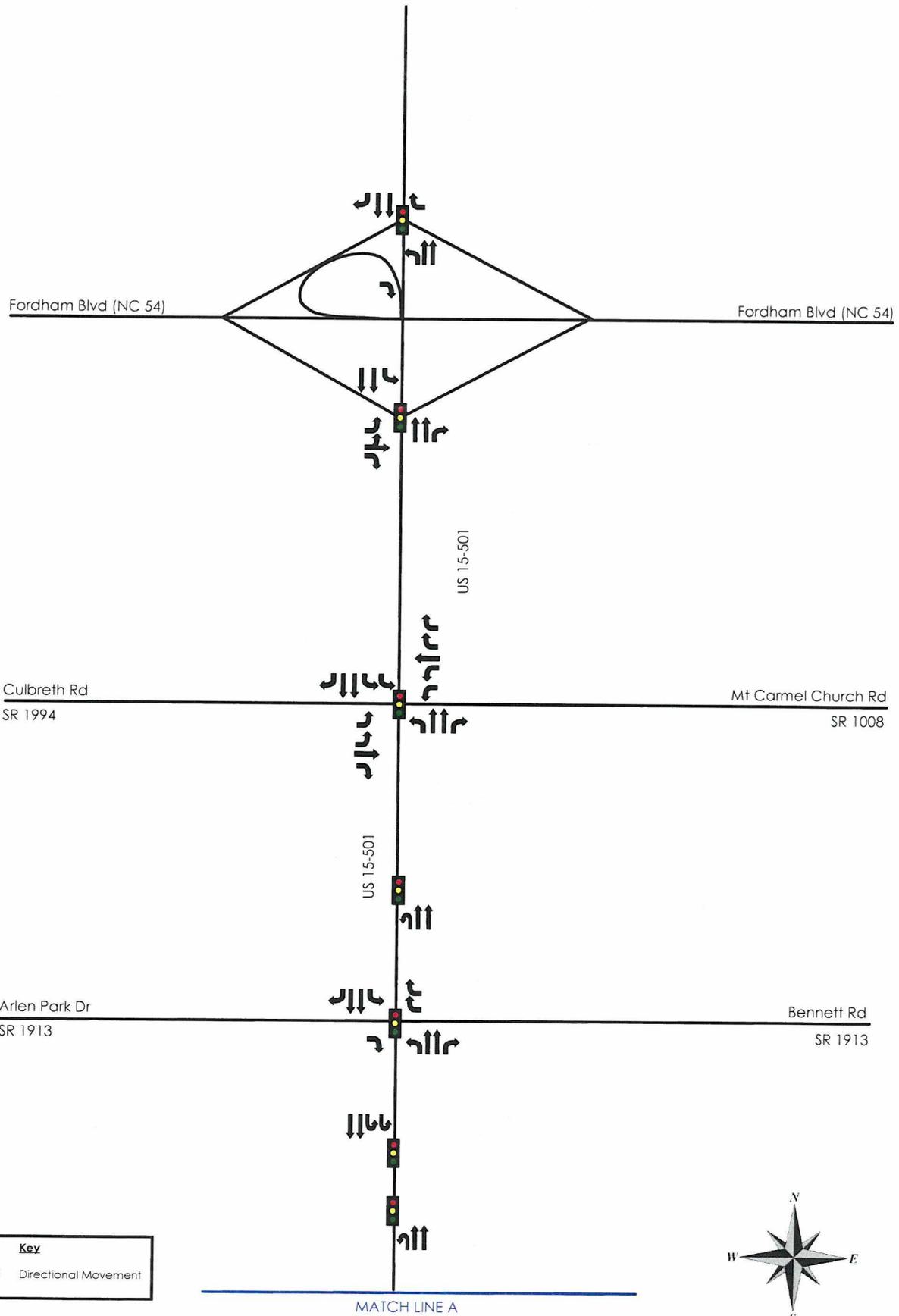
Appendix A6: Future Scenario
1A - 1C Traffic Volumes



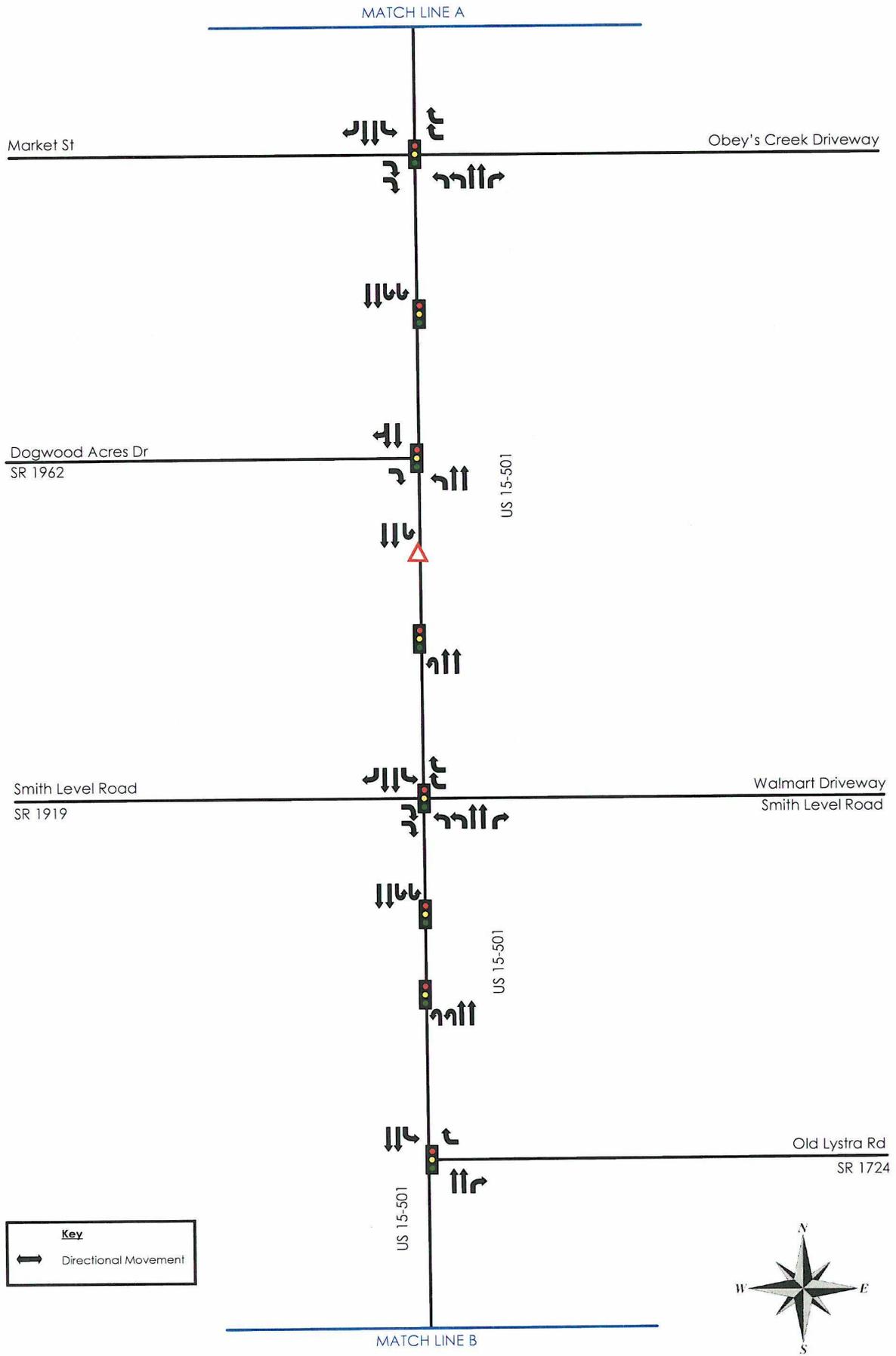
Key	
→	Directional Movement
xx	AM Peak Hour Volume
(xx)	PM Peak Hour Volume



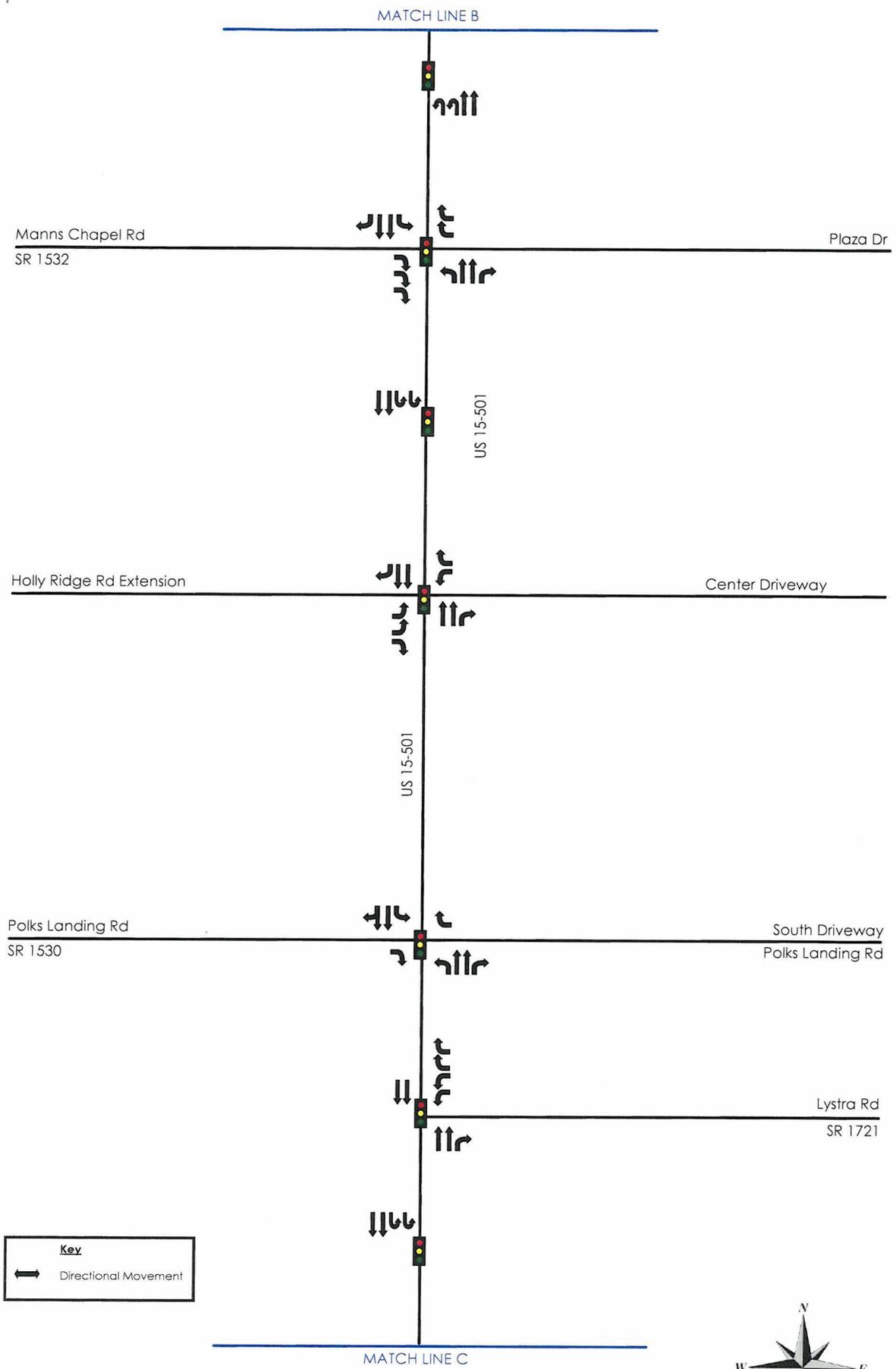
Appendix A6: Future Scenario
1A - 1C Traffic Volumes



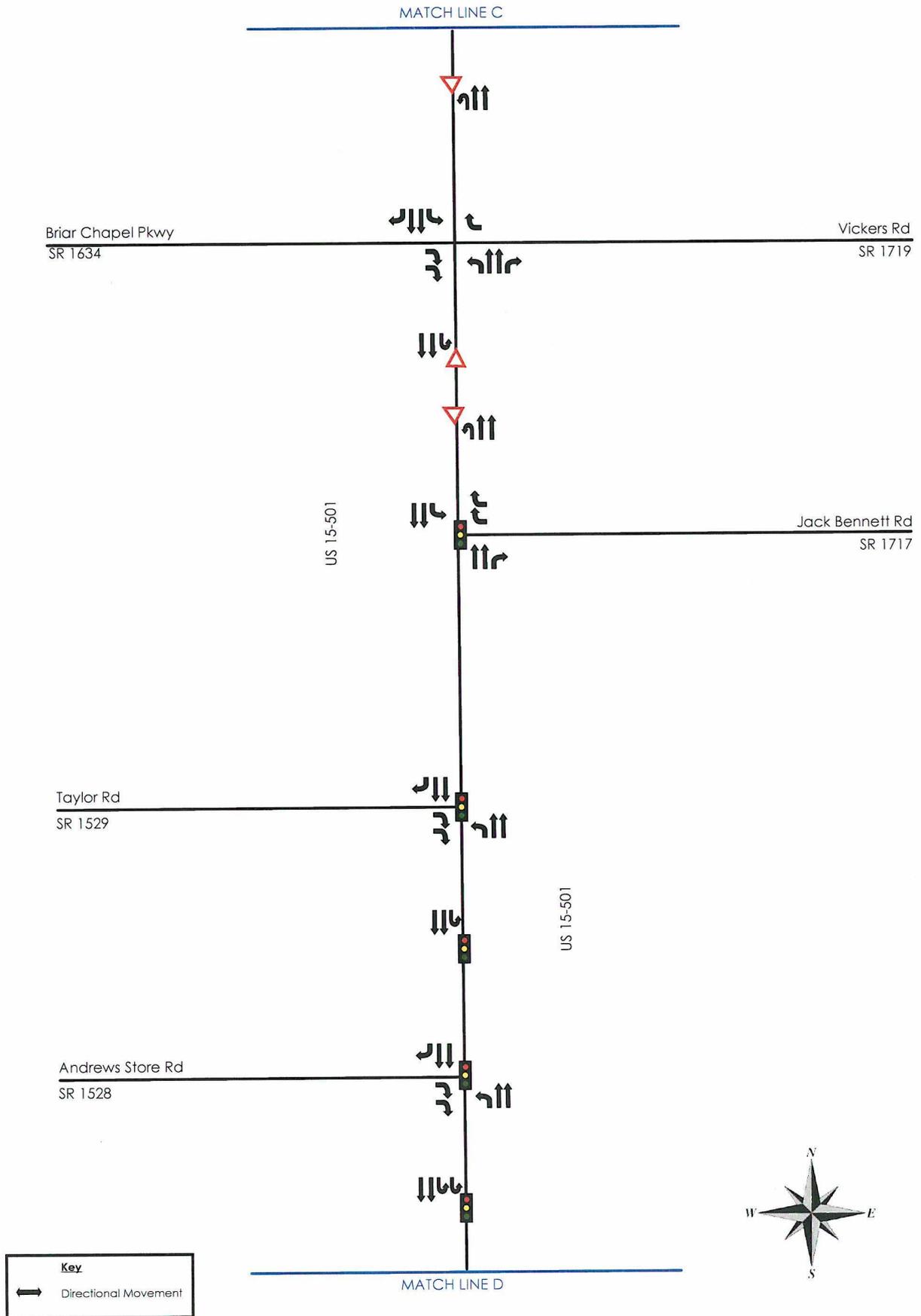
Appendix A7 : Future Scenario 2 Laneage



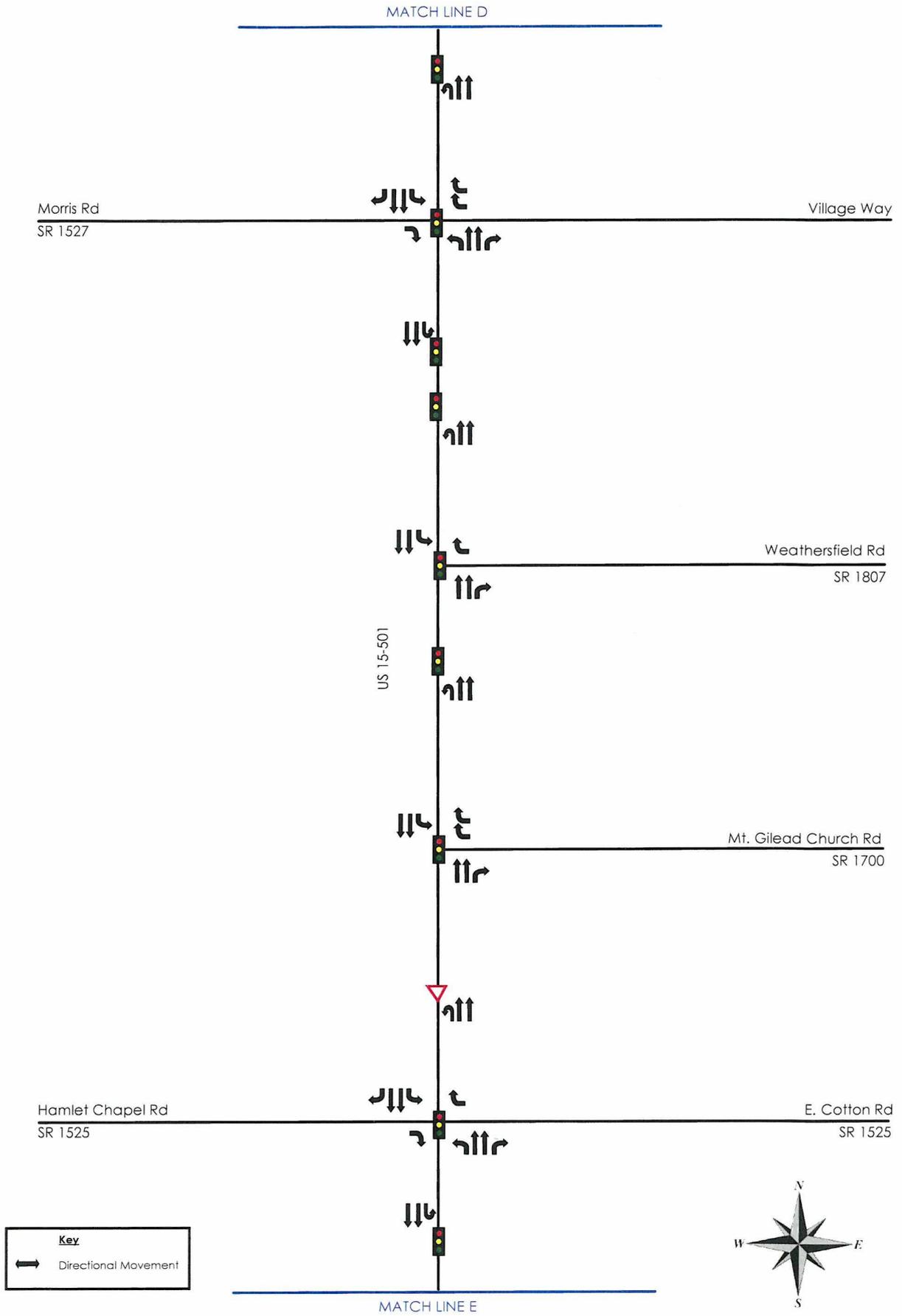
Appendix A7 : Future Scenario 2 Laneage



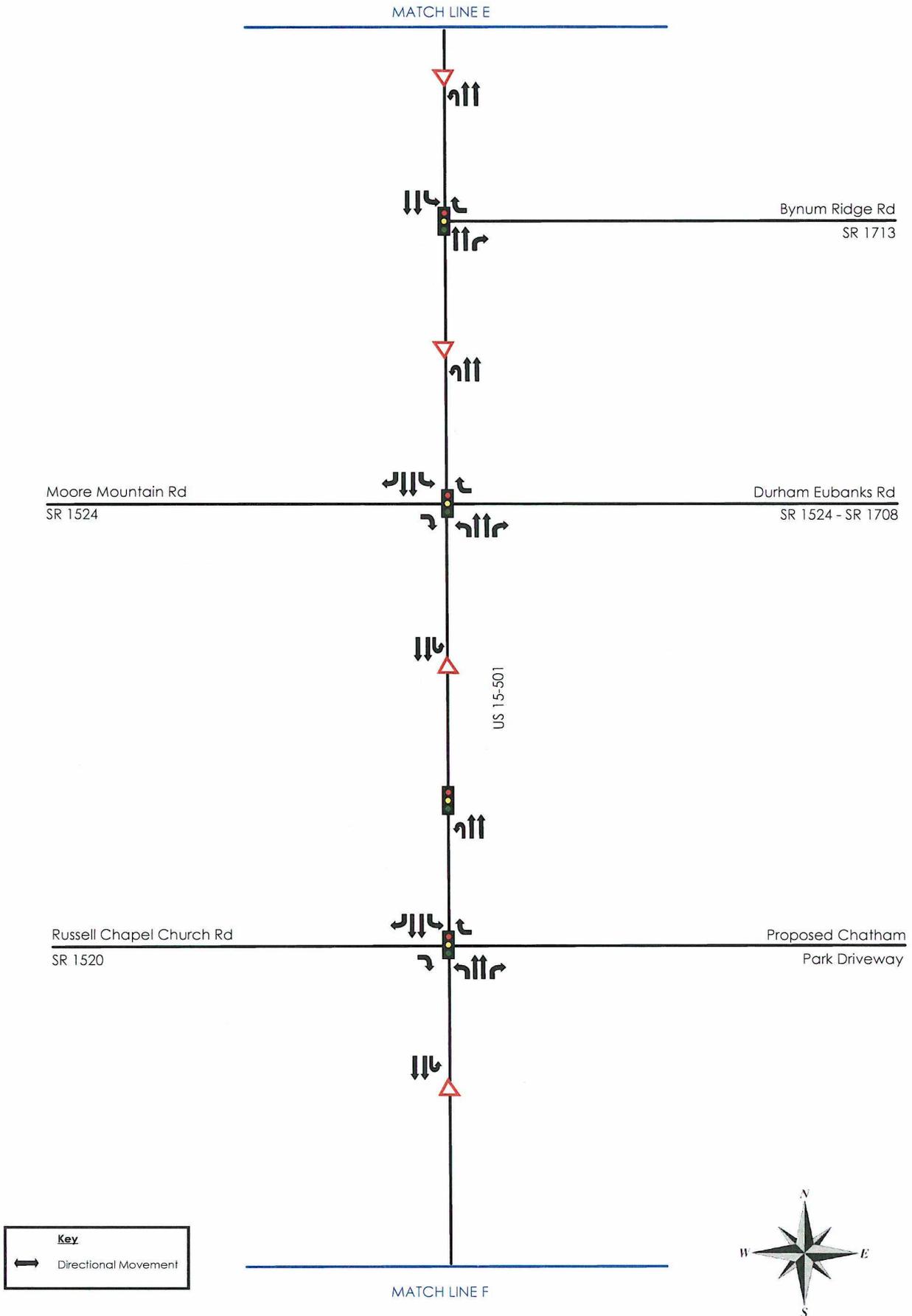
Appendix A7 : Future Scenario 2 Laneage



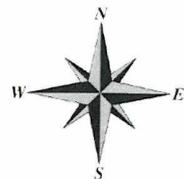
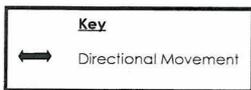
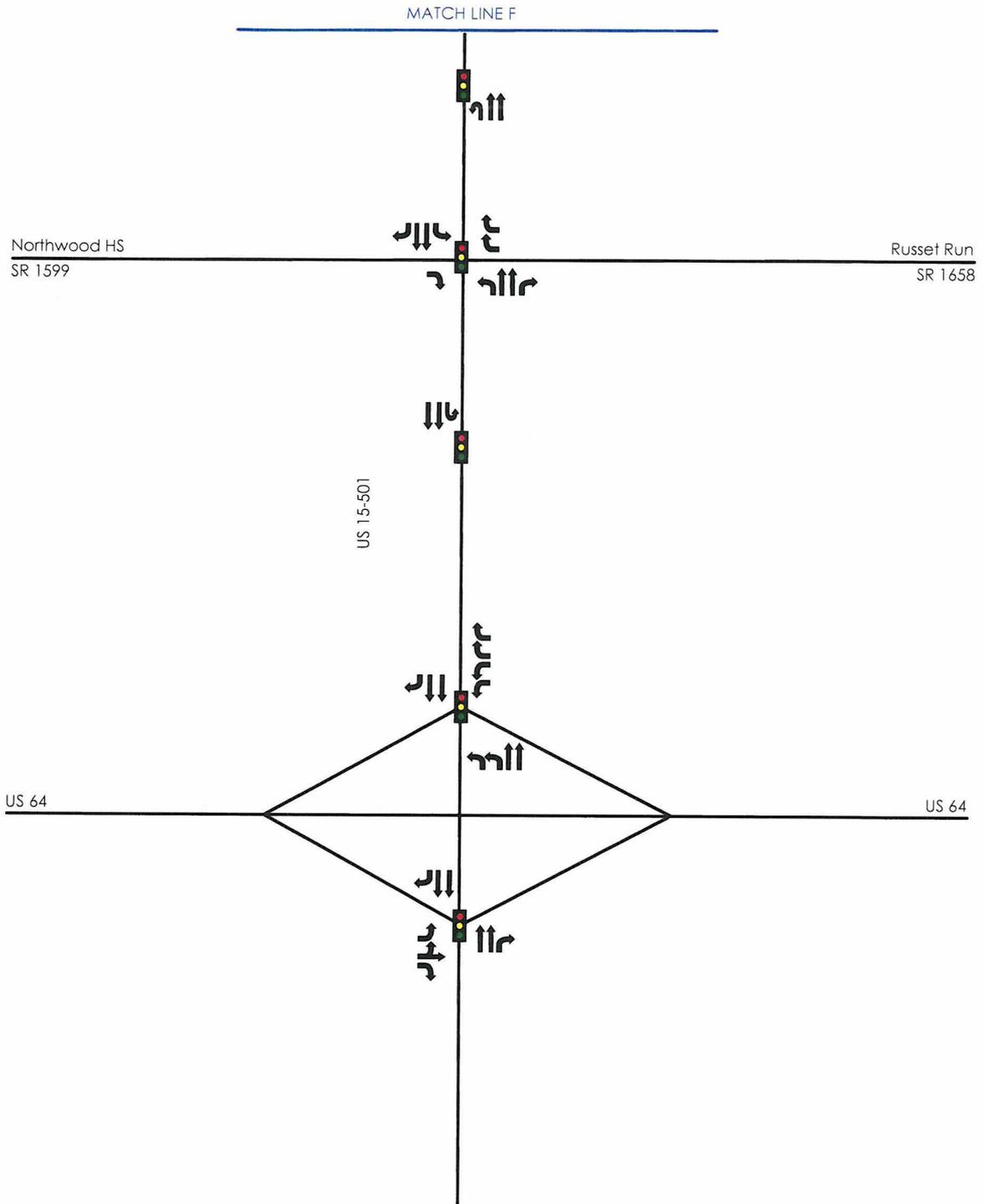
Appendix A7 : Future Scenario 2 Laneage



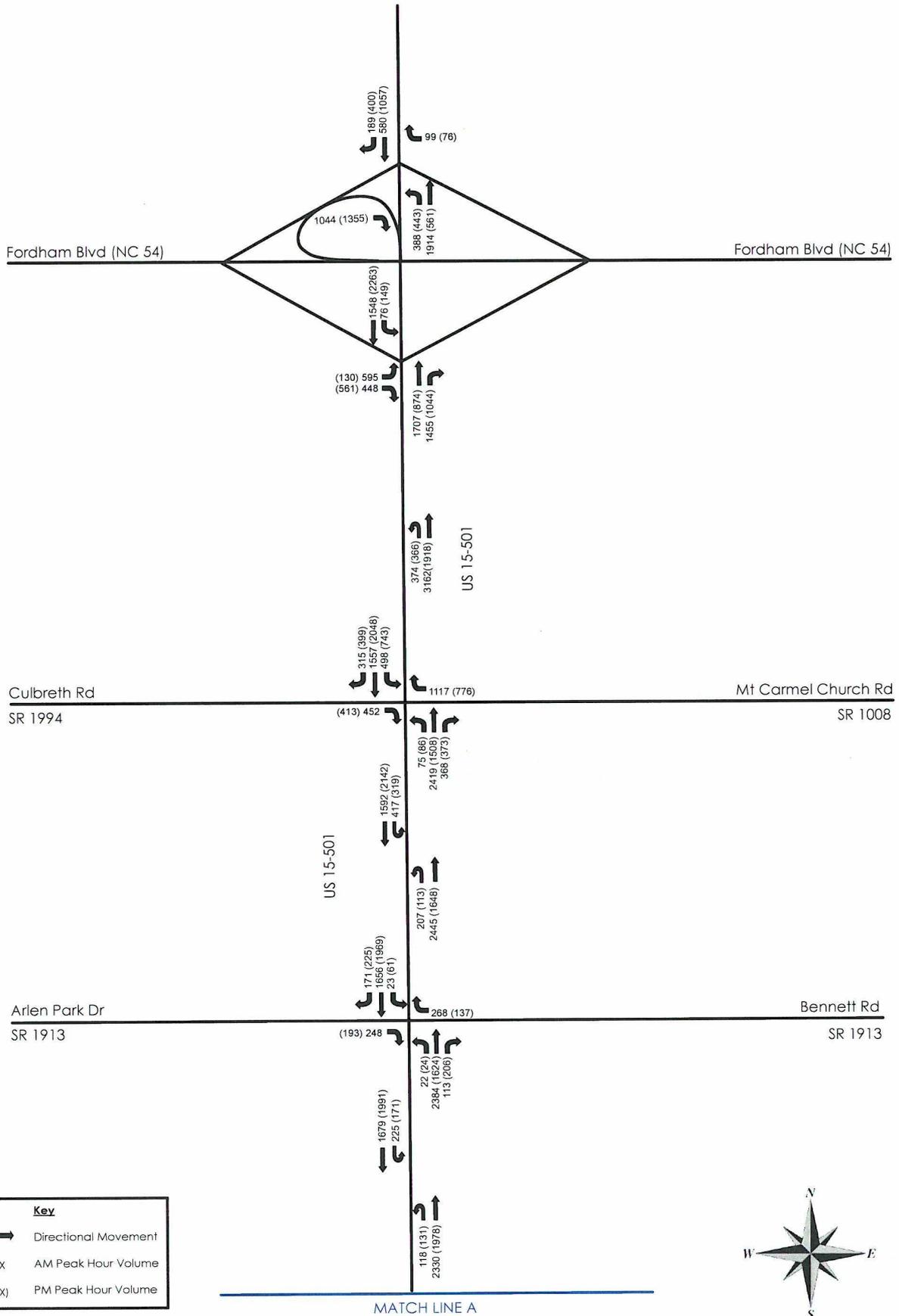
Appendix A7 : Future Scenario 2 Laneage



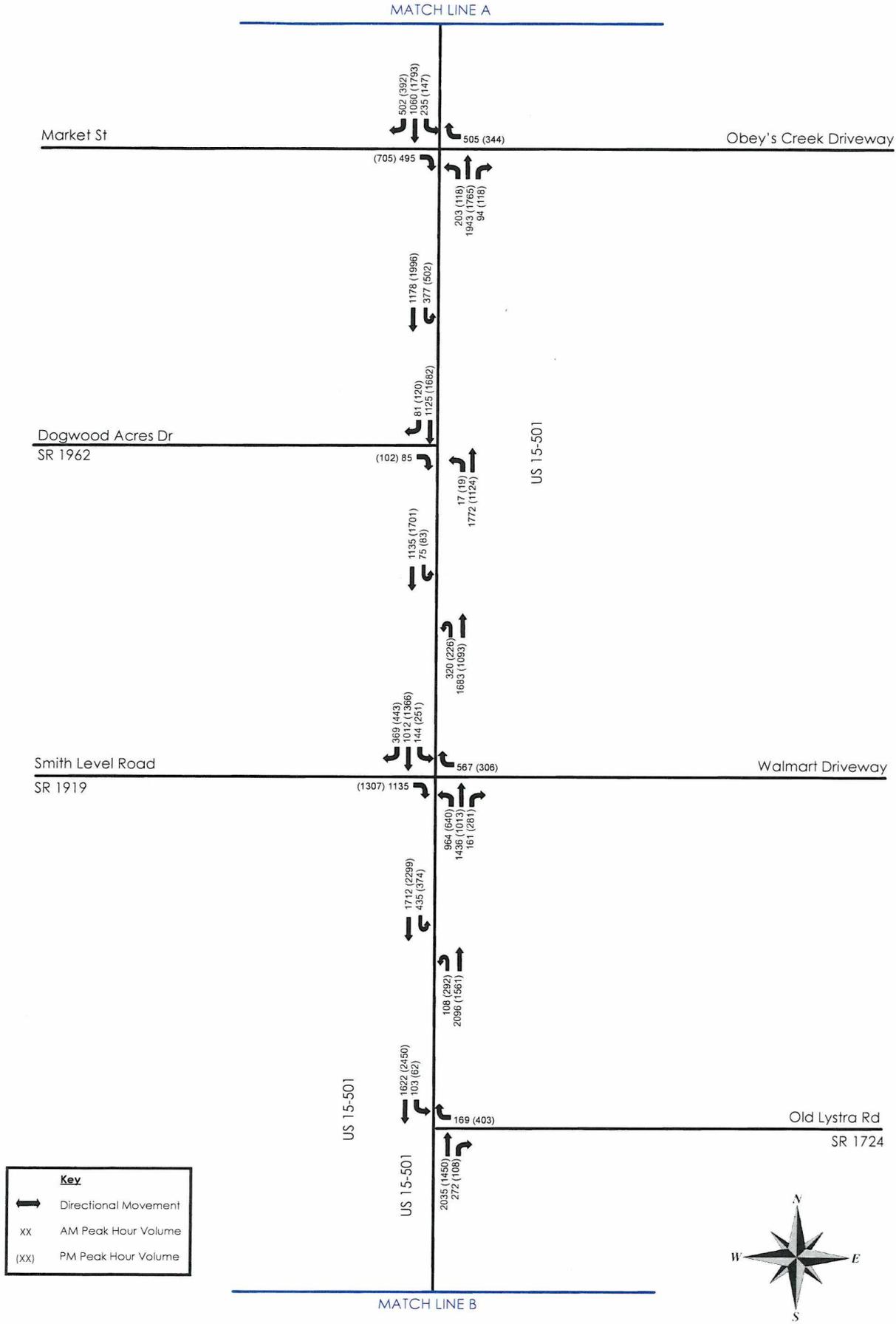
Appendix A7 : Future Scenario 2 Laneage



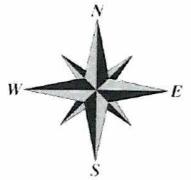
Appendix A7 : Future Scenario 2 Laneage

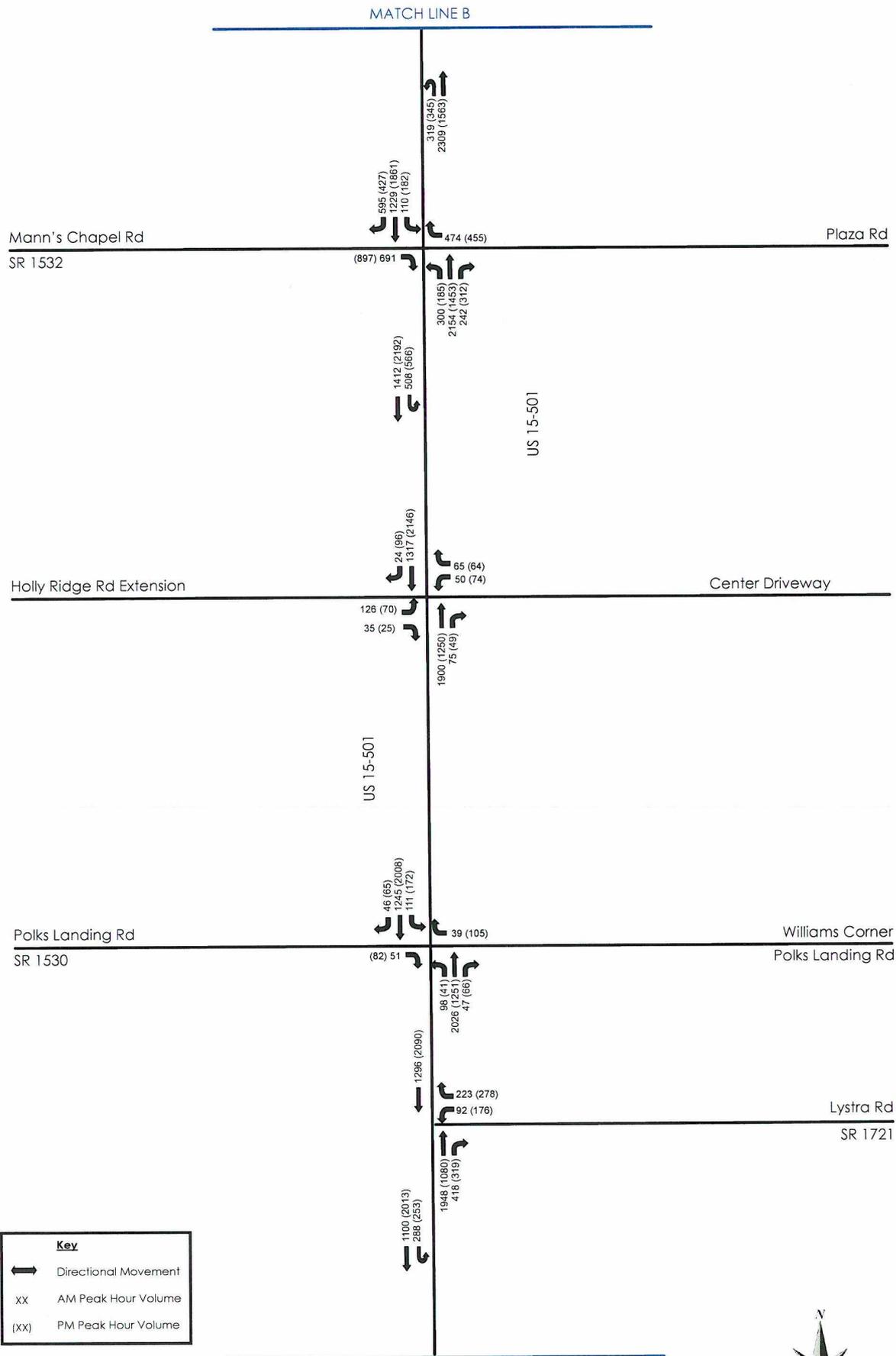


Appendix A8 : Future Scenario 2
Traffic Volumes

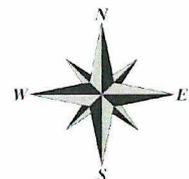


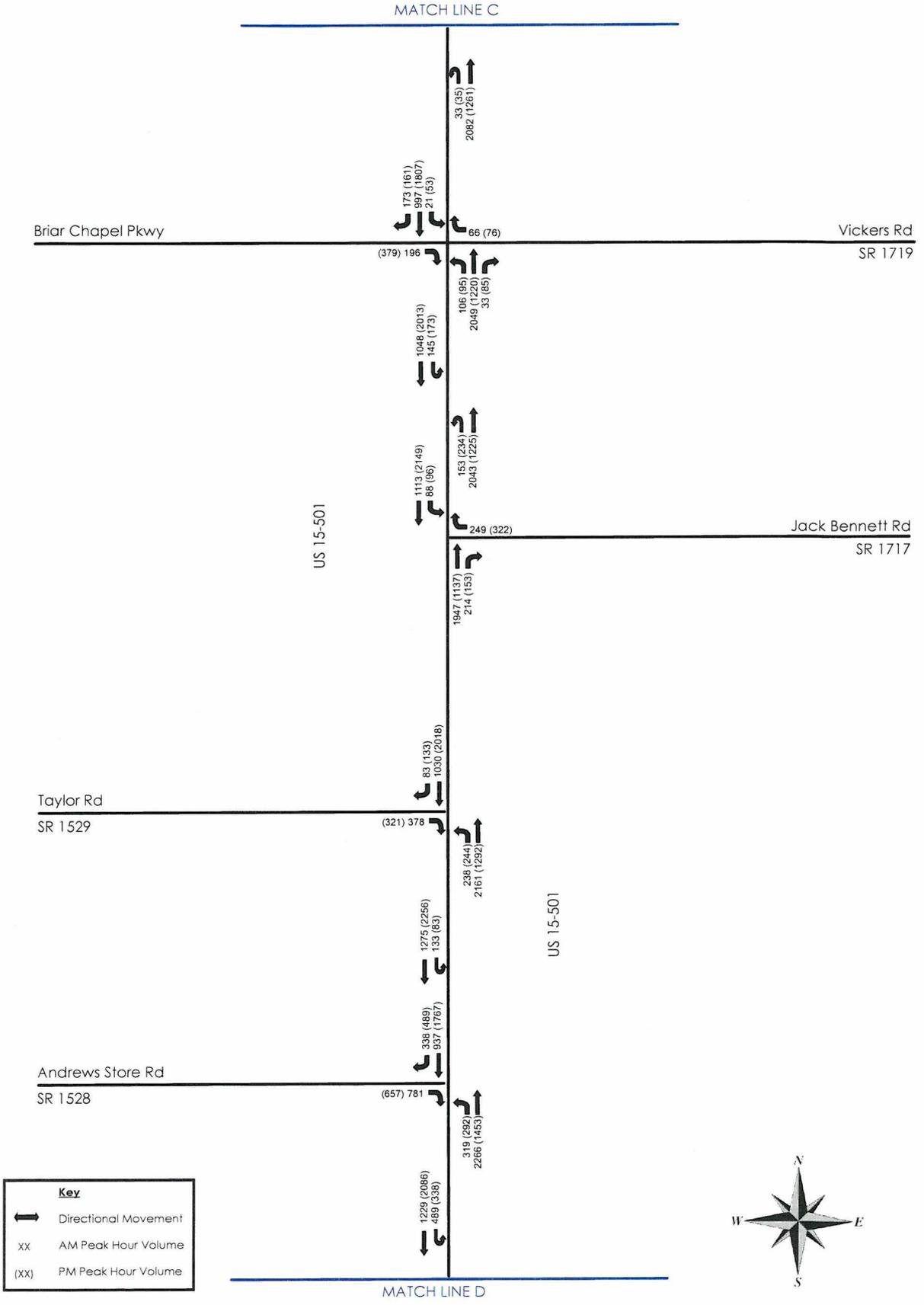
Appendix A8 : Future Scenario 2
Traffic Volumes





Appendix A8 : Future Scenario 2
Traffic Volumes





Appendix A8 : Future Scenario 2
Traffic Volumes

MATCH LINE D

Morris Rd
SR 1527

Village Way

65 (136)
1137 (1896)
123 (174)
270 (342)
(192) 198

96 (128)
2086 (1384)

1199 (1972)
138 (116)

45 (62)
1927 (170)
106 (96)

1148 (1967)
100 (94)

49 (89)
1937 (1206)

142 (189)

Weathersfield Rd
SR 1807

US 15-501

1844 (1106)
90 (49)

1009 (1757)
206 (299)

67 (89)
1934 (1155)

366 (295)

Mt. Gilead Church Rd
SR 1700

1635 (949)
89 (67)

85 (144)
932 (1622)
8 (13)

14 (16)
1726 (1022)

Hamlet Chapel Rd
SR 1525

E Cotton Rd
SR 1525

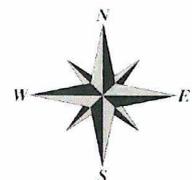
(248) 292
27 (24)

163 (148)
1713 (1014)
16 (14)

1078 (1785)
146 (65)

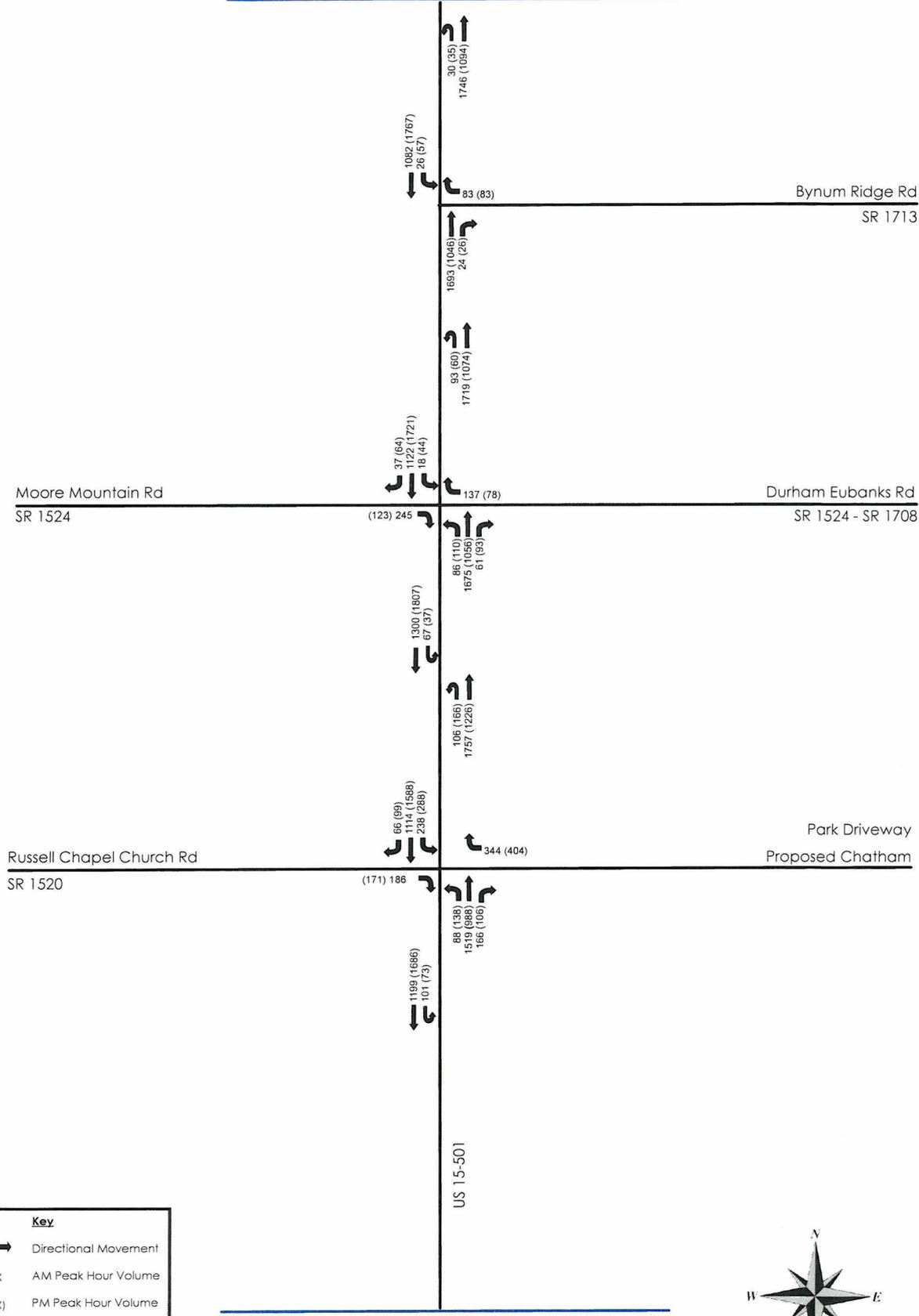
MATCH LINE E

Key	
	Directional Movement
XX	AM Peak Hour Volume
(XX)	PM Peak Hour Volume

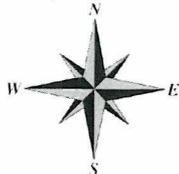


Appendix A8 : Future Scenario 2
Traffic Volumes

MATCH LINE E

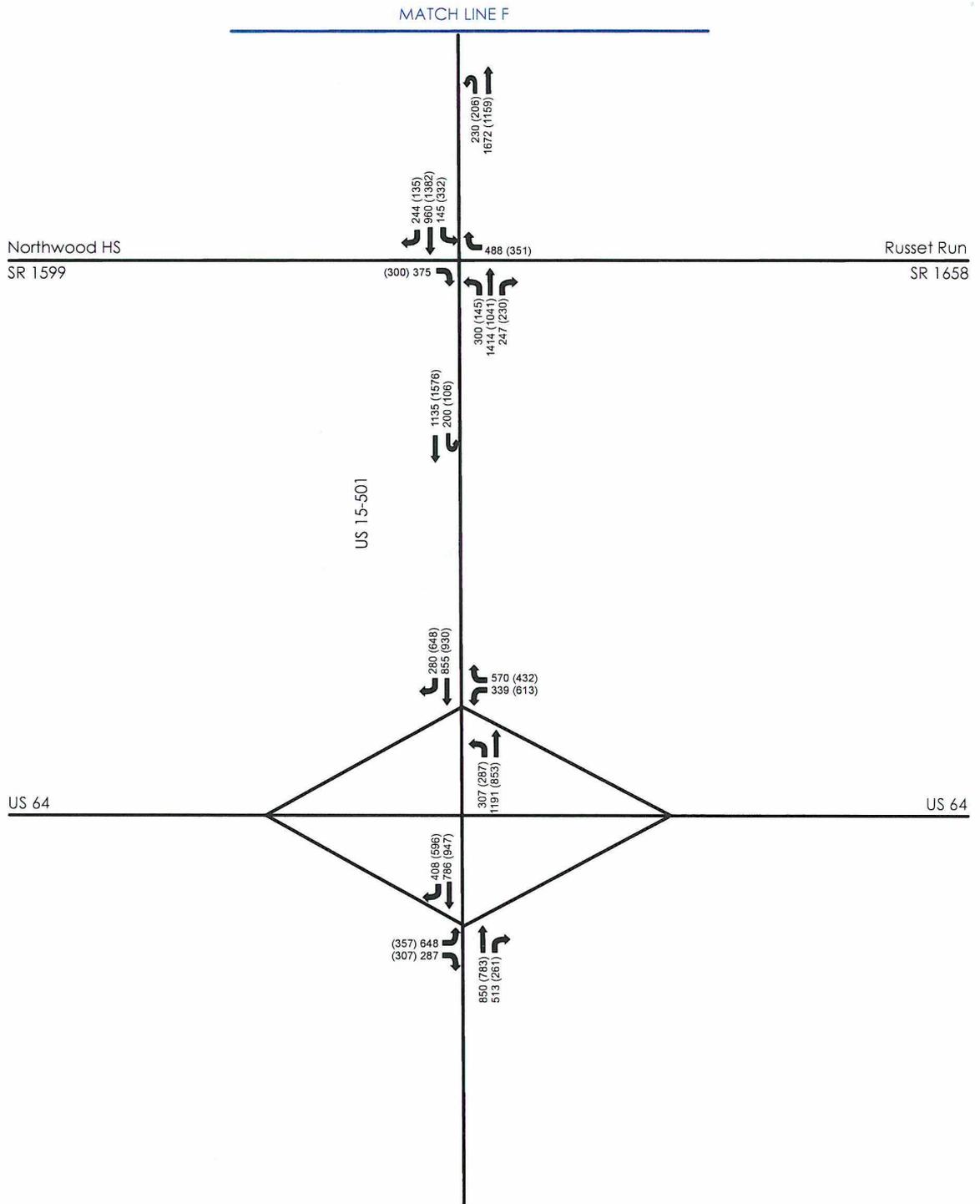


Key	
	Directional Movement
XX	AM Peak Hour Volume
(XX)	PM Peak Hour Volume

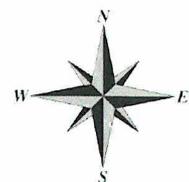


MATCH LINE F

Appendix A8 : Future Scenario 2
Traffic Volumes



Key	
↔	Directional Movement
XX	AM Peak Hour Volume
[XX]	PM Peak Hour Volume



Appendix A8 : Future Scenario 2
Traffic Volumes

A9 – Strategic Corridor Documentation



Vision Plan Division 8

Adopted by The North Carolina Board of Transportation

Plan Date: September 2, 2004

Revised: July 10, 2008



LEGEND

Strategic Highway Corridors

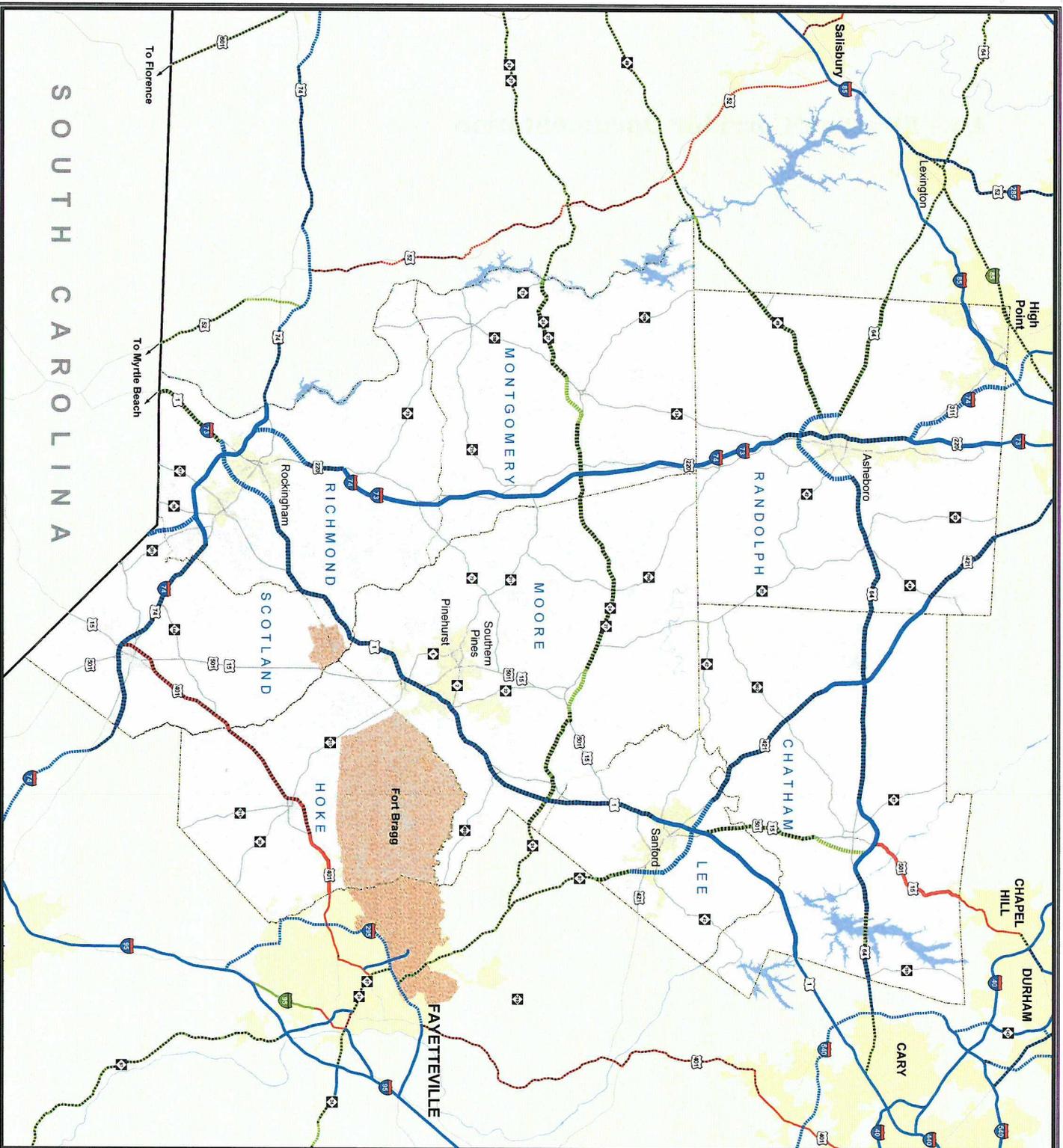
- Freeways**
 - Existing
 - Needs Upgrade
 - Recommended
- Expressways**
 - Existing
 - Needs Upgrade
 - Recommended
- Boulevards**
 - Existing
 - Needs Upgrade
 - Recommended

- Thoroughfares**
 - Existing
 - Needs Upgrade
 - Recommended

- US/Other Major Route
- Division Primary Routes
- Division Secondary Routes
- State Port
- Intermodal Connector
- Coast Guard Station
- Major Military Base
- Urban Area
- County Boundaries
- Water Features



Prepared by
The North Carolina Department of Transportation
Transportation Planning Branch
Map Date: March 29, 2004



SOUTH CAROLINA

To Florence

To Myrtle Beach

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION FACILITY TYPES

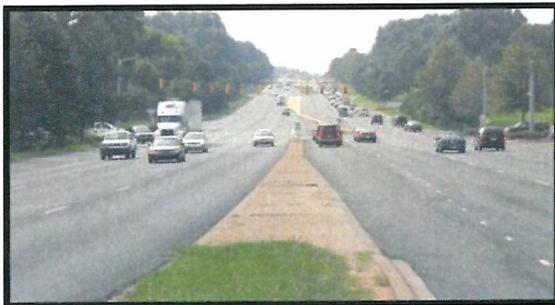
Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

Boulevards



US 70 east of Clayton



NC 24 (Harris Boulevard) in Charlotte



US 74 near Ranger



Cary Parkway

- **Functional Purpose:** Moderate Mobility, Low to Moderate Access
- **AASHTO Design Classification:** Arterial or Collector
- **Posted Speed Limit:** 30 mph to 55 mph
- **Control of Access:** Limited, Partial, or None
- **Traffic Signals:** Allowed
- **Driveways:**
 - Limited Control of Access** - Not Allowed
 - Partial Control of Access** - One Driveway Connection per Parcel; Consolidate and/or Share Driveways and Limit Access to Connecting Streets or Service Roads; Restrict to Right-in/Right-out
- **Cross-Section:** Minimum 2 Lanes with a Median
- **Connections:** At-Grade Intersections for Major and Minor Cross Streets (Occasional Interchange at Major Crossing); Use of Acceleration and Deceleration Lanes
- **Median Crossovers:** Allowed; Minimum Spacing between All-Movement Crossovers is 2000 feet (posted speed limit of greater than 45 mph) or 1200 feet (posted speed limit of 45 mph or less)
- **Examples:** *US 70 between Clayton and Smithfield, NC 55 (Holly Springs Bypass), NC 11 (Kenansville Bypass), NC 87 (Elizabethtown Bypass), US 158 (Murfreesboro Bypass), US 70 near Havelock, NC 24 (Harris Boulevard) in Charlotte, US 1 (Capital Blvd) in Raleigh, US 74 through Monroe, US 117 south of Goldsboro, US 70 east of Goldsboro, Cary Parkway, NC 132 (College Road) in Wilmington, Lochmere Drive in Cary, US 74 in Ranger*

A10 – Approved Development Concept Map

US HWY 15/501
 EXISTING/PROPOSED SPEED LIMIT:
 NORTH OF DRIVEWAY 2 = 45 MPH
 SOUTH OF DRIVEWAY 2 = 55MPH
 SITE FRONTAGE = 2260 LF

 LYSTRA RD (SR 1724)
 EXISTING/PROPOSED SPEED LIMIT = 35 MPH
 SITE FRONTAGE = 1350 LF



**WILLIAMS CORNER
 AND POLKS LANDING**
 CHATHAM COUNTY, NORTH CAROLINA

N
 E
 S
 W

GRAPHIC SCALE
 1 INCH = 100 FT

LEGEND

- █ EXISTING ROAD
- █ EXISTING ROAD TO BE DEMOLISHED
- █ PROPOSED WIDENING
- PROPOSED CONCRETE ISLAND
- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL

US 15-501 Corridor Study
2040 Superstreet Conditions Level-of-Service Summary
Overall LOS (Delay in Seconds)

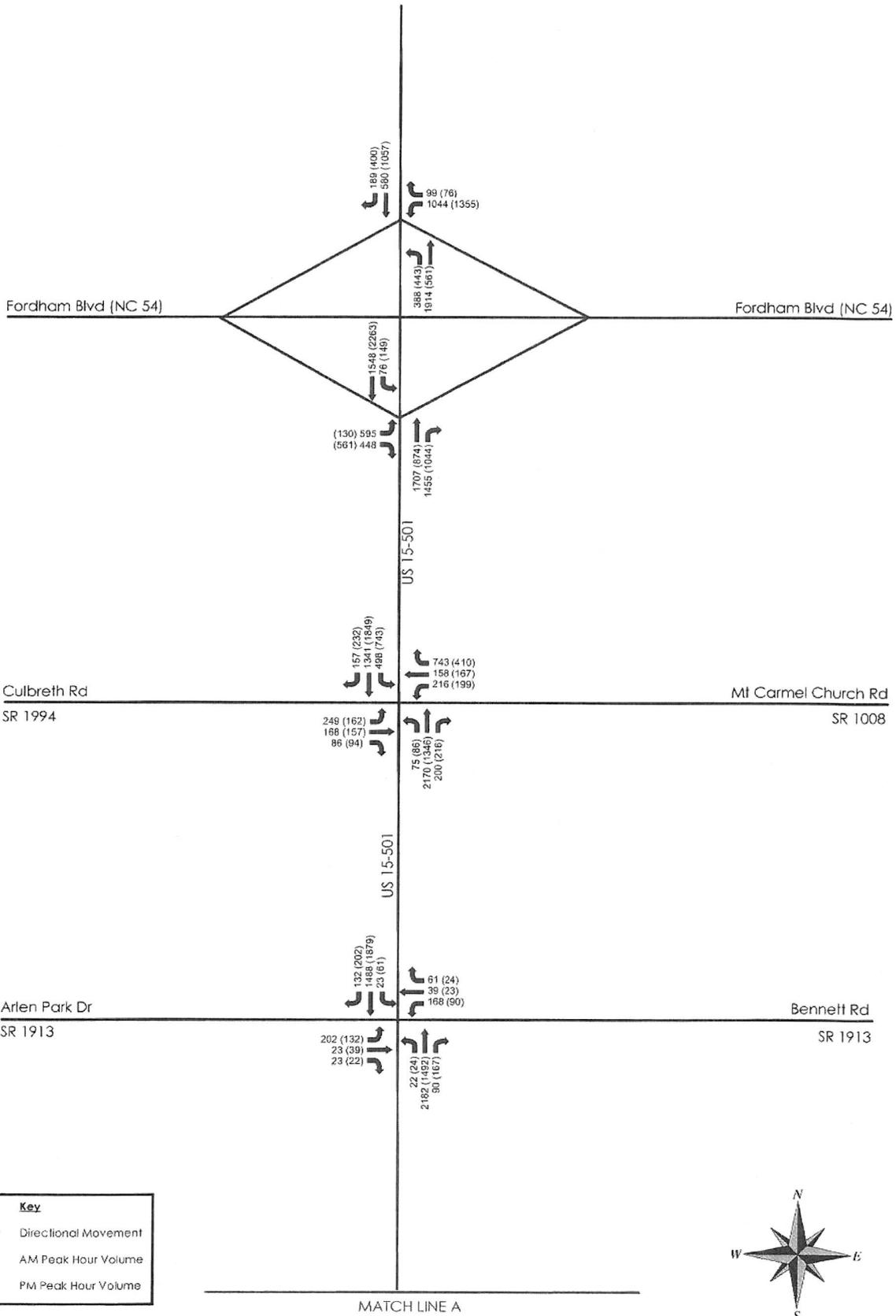
Intersection	2040 Superstreet AM		2040 Superstreet PM	
	Intersection	U-Turn	Intersection	U-Turn
US 15-501 at NC 54 WB Ramps	F (110.6)	-	F (117.8)	-
US 15-501 at NC 54 EB Ramps	F (165.9)	-	D (44.0)*	-
US 15-501 at Mt. Carmel Church Rd	F (137.8)	C (29.5)	C (24.6)	F (99.6)
US 15-501 at Culbreth Rd.	C (22.1)*	C (29.2)*	D (49.9)	B (11.9)
US 15-501 at Bennett Rd.	C (20.2)*	B (14.7)	A (6.8)	B (18.1)
US 15-501 at Arlen Park Dr.	B (15.7)	B (12.6)*	C (24.1)*	B (11.9)
US 15-501 at Proposed Obey's Creek Driveway	C (33.0)*	B (12.4)	C (23.2)*	C (21.9)
US 15-501 at Market St.	C (26.5)*	B (16.7)	C (29.2)*	B (17.8)
US 15-501 at Dogwood Acres Dr.	A (7.1)	# (1.1)	B (12.9)	# (1.1)
US 15-501 at Wal-Mart Driveway.	B (19.8)	B (18.0)	B (19.3)	B (18.3)
US 15-501 at Smith Level Rd.	C (25.0)	B (16.4)	D (48.8)*	B (10.7)
US 15-501 at Old Lystra Rd.	B (11.6)	A (7.3)	B (18.9)	C (26.4)
US 15-501 at Plaza Dr.	D (41.8)*	B (11.7)	B (14.2)	B (15.9)
US 15-501 at Manns Chapel Rd.	B (19.7)	C (26.9)*	D (44.5)*	B (15.1)
US 15-501 at Holly Ridge Rd Ext. / Center Driveway.	A (4.4)	-	A (8.3)	-
US 15-501 at Polks Landing Rd.	B (12.2)	-	B (13.5)	-
US 15-501 at South Driveway.	A (7.6)	-	B (10.5)	-
US 15-501 at Lystra Rd.	B (11.0)	B (12.6)	B (11.3)	B (11.0)
US 15-501 at Vickers Rd.	A (5.1)	# (0.4)	B (11.5)	# (0.5)
US 15-501 at Briar Chapel Pkwy.	B (12.1)	# (1.9)	B (13.8)	# (1.5)
US 15-501 at Jack Bennett Rd.	B (11.0)	# (1.8)	B (11.8)	# (2.0)
US 15-501 at Taylor Rd.	C (21.0)	B (10.8)	C (25.3)	A (7.8)
US 15-501 at Andrews Store Rd.	C (26.1)	C (20.1)	C (26.4)	B (14.9)
US 15-501 at Village Way	B (11.0)	B (11.9)	B (19.9)	B (13.1)
US 15-501 at Morris Rd.	B (10.8)	B (13.7)	B (17.1)	B (11.9)
US 15-501 at Weathersfield Rd.	B (14.7)	A (4.7)	A (8.5)	B (16.0)
US 15-501 at Mt. Gilead Church Rd.	B (17.0)	A (5.2)	B (16.2)	B (12.5)
US 15-501 at East Cotton Rd.	A (3.3)	# (0.2)	A (2.0)	# (0.2)
US 15-501 at Hamlet Chapel Rd.	B (15.3)	B (14.3)	C (20.4)	A (7.6)
US 15-501 at Bynum Rd.	A (7.9)	# (0.4)	A (6.6)	# (0.4)
US 15-501 at Durham Eubanks Rd.	A (2.7)	# (1.3)	A (8.0)	# (0.8)
US 15-501 at Moore Mountain Rd.	A (5.2)	# (0.9)	B (18.0)	# (0.5)
US 15-501 at Russell Chapel Church Rd.	B (12.6)	# (1.7)	B (18.3)	# (0.9)
US 15-501 at Proposed Chatham Park Driveway	B (18.8)	A (8.6)	C (21.8)	B (17.0)
US 15-501 at Russet Run	B (13.4)	B (10.0)	B (13.1)	C (20.0)
US 15-501 at Northwood High School Rd.	B (14.0)	B (15.3)	B (14.3)	A (7.5)
US 15-501 at US 64 Bypass WB Ramps	C (22.7)	-	C (23.5)	-
US 15-501 at US 64 Bypass EB Ramps	B (17.6)	-	B (15.1)	-

* Indicates that an intersection leg is predicted to operate at an undesirable Level of Service

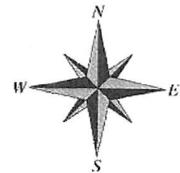
US 15-501 Corridor Study
2040 Standard Intersection Conditions Level-of-Service Summary
Overall LOS (Delay in Seconds)

Intersection	2040 Standard Intersections		2040 Standard Intersections, 6 Lanes	
	AM	PM	AM	PM
US 15-501 at NC 54 WB Ramps	D (54.0)*	F (145.1)	E (74.5)	D (46.1)*
US 15-501 at NC 54 EB Ramps	F (125.0)	F (86.8)	F (161.0)	D (46.1)*
US 15-501 at Mt. Carmel Church Rd. / Culbreth Rd.	F (162.6)	E (75.0)	E (62.1)	D (39.1)*
US 15-501 at Bennett Rd. / Arlen Park Dr.	D (42.3)*	B (16.7)*	C (26.3)*	B (13.0)*
US 15-501 at Market St.	D (54.8)*	E (57.7)	D (41.8)*	D (42.3)*
US 15-501 at Dogwood Acres Dr.	A (5.4)*	A (7.4)*	A (7.3)*	A (4.3)*
US 15-501 at Smith Level Rd.	D (48.3)*	D (42.3)*	D (40.7)*	C (34.1)*
US 15-501 at Old Lystra Rd.	A (8.2)*	D (48.0)*	A (6.5)*	D (43.3)*
US 15-501 at Manns Chapel Rd. / Plaza Dr.	E (79.0)	E (69.6)	D (50.2)*	D (51.9)*
US 15-501 at Holly Ridge Rd. Ext. / Center Driveway.	A (5.6)*	A (6.2)*		
US 15-501 at Polks Landing Rd. / South Driveway	B (13.2)*	C (22.7)*		
US 15-501 at Lystra Rd.	C (25.4)*	B (18.2)*		
US 15-501 at Vickers Rd. / Briar Chapel Pkwy.	C (21.2)*	D (35.7)*		
US 15-501 at Jack Bennett Rd.	B (12.4)*	B (12.0)*		
US 15-501 at Taylor Rd.	C (24.0)*	C (29.2)*		
US 15-501 at Andrews Store Rd.	C (21.5)*	C (21.2)*		
US 15-501 at Village Way / Morris Rd.	D (46.0)*	D (39.5)*		
US 15-501 at Weathersfield Rd.	C (29.7)	B (13.6)		
US 15-501 at Mt. Gilead Church Rd.	D (38.5)*	B (18.2)		
US 15-501 at East Cotton Rd. / Hamlet Chapel Rd.	C (28.3)*	D (51.8)*		
US 15-501 at Bynum Rd.	A (3.7)*	A (7.6)*		
US 15-501 at Moore Mountain Rd. / Durham Eubanks Rd.	C (20.6)*	B (14.0)*		
US 15-501 at Russell Chapel Church Rd.	B (10.9)*	B (19.8)*		
US 15-501 at Proposed Chatham Park Driveway.	C (23.7)*	C (20.7)*		
US 15-501 at Northwood High School Rd. / Russet Run	D (41.3)*	D (38.8)*		
US 15-501 at US 64 Bypass WB Ramps	C (25.9)*	D (40.5)*		
US 15-501 at US 64 Bypass EB Ramps	B (19.3)	B (14.8)		

* Indicates that an intersection leg is predicted to operate at an undesirable Level of Service

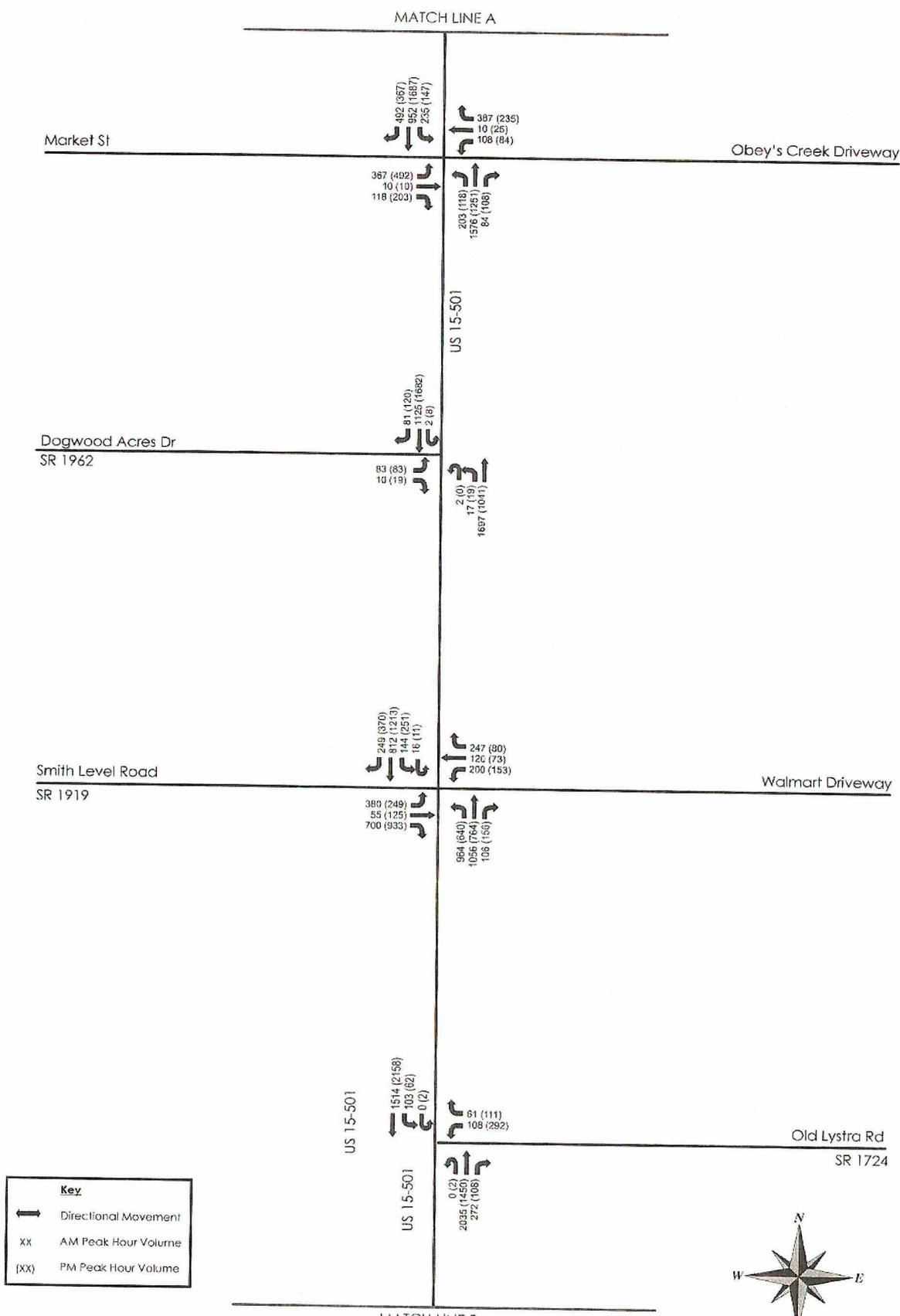


Key	
←	Directional Movement
XX	AM Peak Hour Volume
[XX]	PM Peak Hour Volume

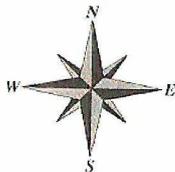


MATCH LINE A

Draft : 2040 Standard Peak Hour Volumes



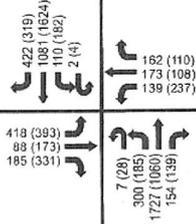
Draft : 2040 Standard
Peak Hour Volumes



MATCH LINE B

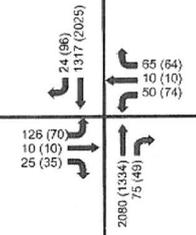
Mann's Chapel Rd
SR 1532

Plaza Rd



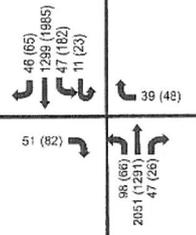
Holly Ridge Extension
SR 1532

Williams Corner Driveway



Polks Landing Rd
SR 1530

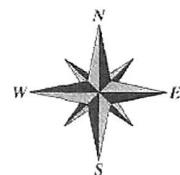
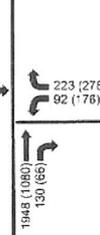
Williams Corner
Polks Landing Rd



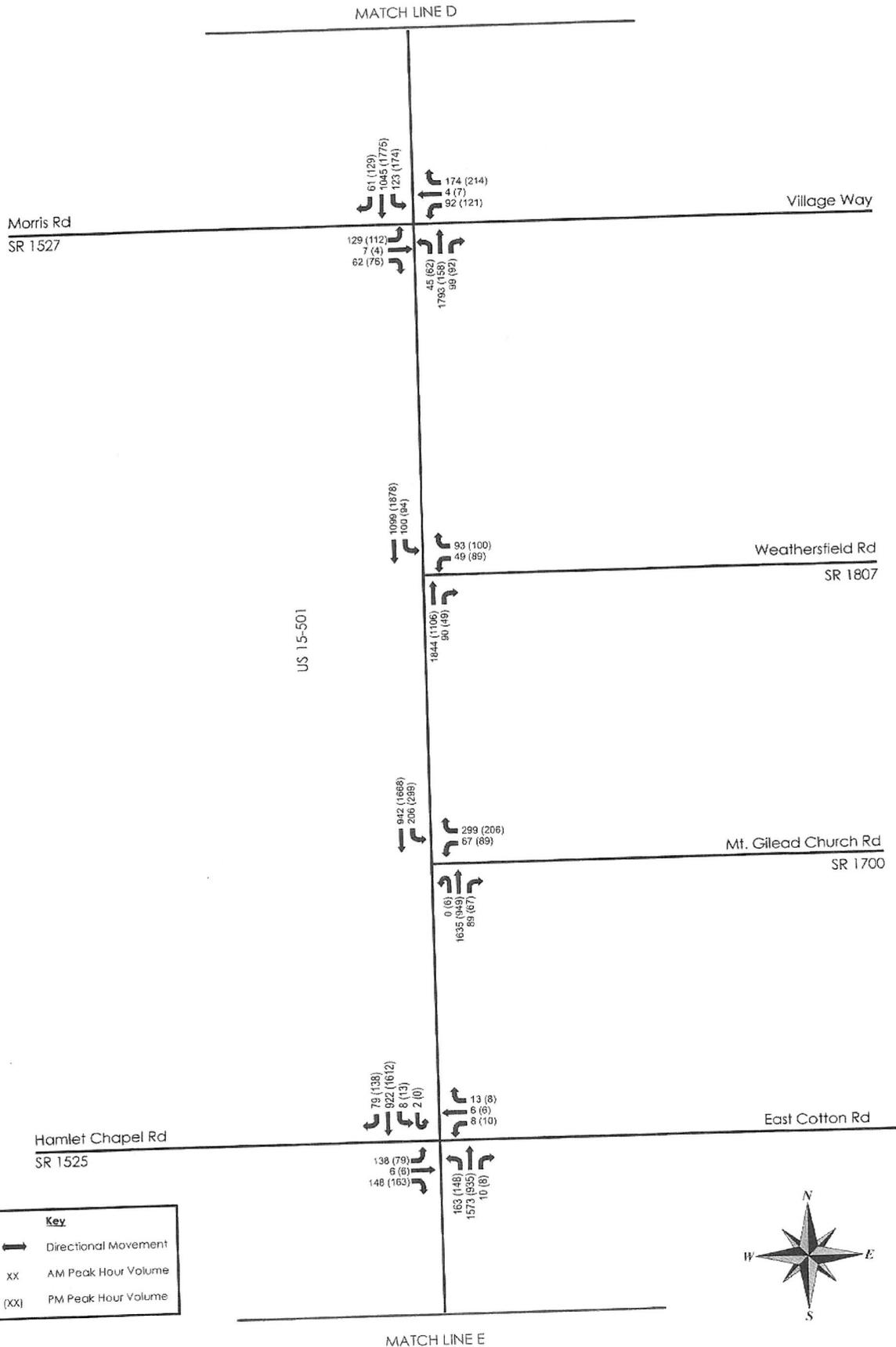
Key	
	Directional Movement
XX	AM Peak Hour Volume
{XX}	PM Peak Hour Volume

MATCH LINE C

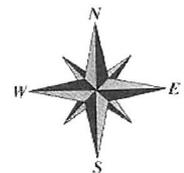
Lysra Rd
SR 1721



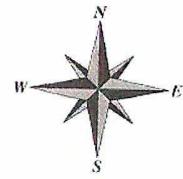
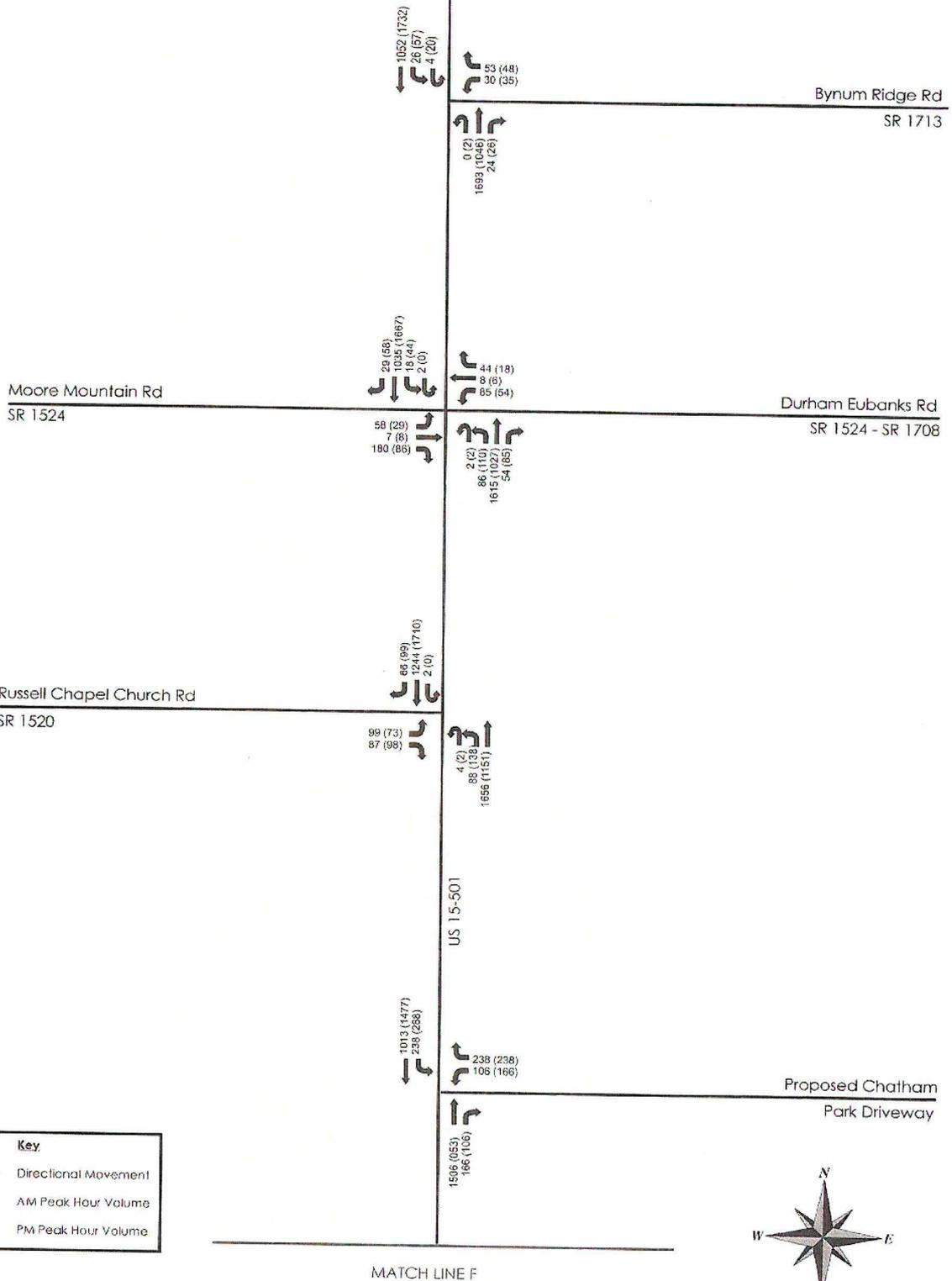
Draft : 2040 Standard
Peak Hour Volumes



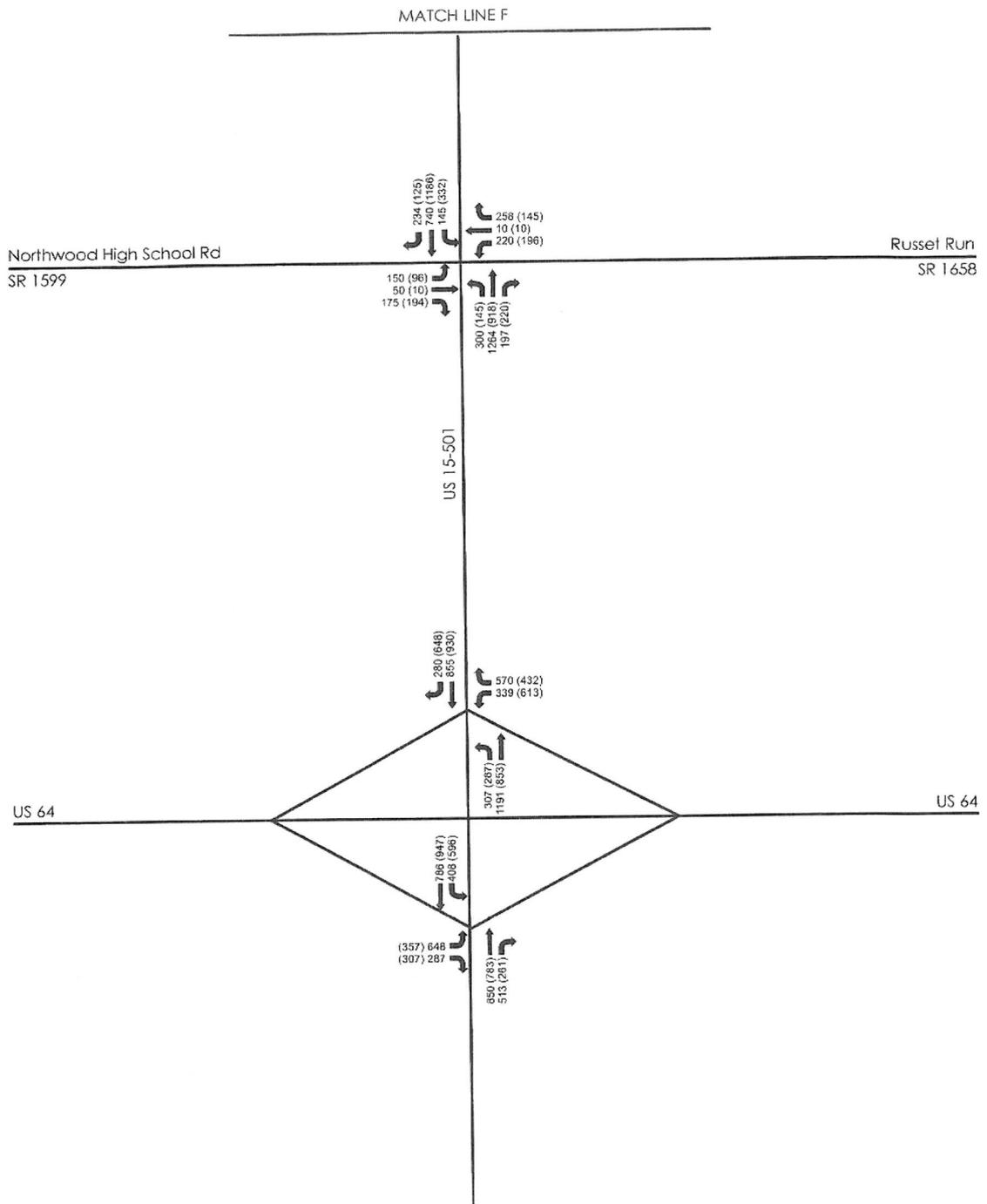
Draft : 2040 Standard Peak Hour Volumes



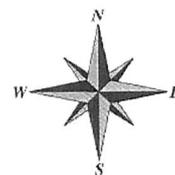
MATCH LINE E



Draft : 2040 Standard
Peak Hour Volumes



Key	
→	Directional Movement
XX	AM Peak Hour Volume
(XX)	PM Peak Hour Volume



Draft : 2040 Standard
Peak Hour Volumes

