

TRAFFIC IMPACT STUDY

MIDWAY BUSINESS PARK

KNOX COUNTY, TN

CCI PROJECT NO 00723-0009

REV I

PREPARED FOR

Vaughn & Melton
1909 Ailor Drive
Knoxville, TN 37921

SUBMITTED BY



JULY 19

2016

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REVISION I (7/19/16)

This report replaces the original traffic impact study report dated 11/11/15 prepared for this project in its entirety. The associated changes are associated with redistribution of trips from Phase IA and IB at the Thorngrove Pike / Midway Road intersection.

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I.0 EXECUTIVE SUMMARY

This report provides a summary of the traffic impact study that was performed for the proposed Midway Business Park in Knoxville / Knox County, Tennessee. This development is to be located on an approximate 340 acre site in extreme eastern Knox County, immediately north of the interchange of Interstate 40 and Midway Road. The proposed project site entails one of the larger undeveloped parcels of land remaining in Knox County that is available and possesses topography conducive to the development of a large business park. In addition, the site's proximity to Interstate 40 makes it attractive from an access and transportation perspective. The surrounding land uses in the project vicinity are predominantly undeveloped property and large lot single family residential. The concept plan for this project proposes primarily business park type development, as applicable within the Employment Center zoning (EC).

The purpose of this study was the evaluation of the traffic operational and safety impact of the proposed Midway Business Park upon roadways in the vicinity of the project site. Of particular interest were the intersections of Midway Road with both I-40 Eastbound and Westbound ramps, Thorngrove Pike and Midway Road, Thorngrove Pike and Carter School Road, and Thorngrove Pike at the proposed Park Road "B".

The primary conclusion of this study is that the traffic generated from the proposed Midway Business Park will have significant traffic volume related impacts at four of the five study intersections. These impacts, however, can be successfully mitigated through the implementation of a series of roadway geometric and signalization improvements. These signalization improvements include new traffic signals at the intersections of Midway Road and I-40 Eastbound Ramps and Midway Road and Thorngrove Pike. Various turn lanes will be required at the intersections of Midway Road and I-40 Eastbound, Midway Road and I-40 Westbound, Midway Road and Thorngrove Pike, and Thorngrove Pike and proposed Business Park Road "B".

With the exception of Midway Road in the vicinity of Interstate 40, the existing roadways within the area of the proposed business park possess narrow lanes and minimal shoulder. Therefore, in addition to required intersection improvements, widening to appropriate lane and shoulder standards is recommended for Midway Road, from I-40 to Thorngrove Pike, and for Thorngrove Pike, from Midway Road to at least just beyond the business park intersections. Also, as mentioned in the previous section, intersection corner sight distances are recommended to be provided at all study intersections for approach speeds of at least the posted speed limit plus ten miles per hour.

2.0 INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of the traffic impact study that was performed for the proposed Midway Business Park in Knoxville / Knox County, Tennessee. This development is to be located on an approximate 340 acre site in extreme eastern Knox County, immediately north of the interchange of Interstate 40 and Midway Road. FIGURE 1 is a project location map identifying the project site and proposed project roadways in relation to the major roadways in the vicinity of the proposed development.



**FIGURE 1
LOCATION MAP**

The proposed project site entails one of the larger undeveloped parcels of land remaining in Knox County that is available and possesses topography conducive to the development of a large business park. In addition, the site’s proximity to Interstate 40 makes it attractive from an access and transportation perspective. The surrounding land uses in the project vicinity are predominantly undeveloped property and large lot single family residential.

The concept plan for this project proposes primarily business park type development, as applicable within the Employment Center zoning (EC). FIGURE 2 is a Site Development Plan which details the proposed site configuration. This plan is broken into three distinct development phases (I, II, and III), which indicate the anticipated sequence and prioritization of project build-out.

INTRODUCTION & PURPOSE OF STUDY | SECTION 2

The purpose of this study was the evaluation of the traffic operational and safety impact of the proposed Midway Business Park upon roadways in the vicinity of the project site. Of particular interest were the intersections of Midway Road with both I-40 Eastbound and Westbound ramps, Thorngrove Pike and Midway Road, Thorngrove Pike and Carter School Road, and Thorngrove Pike at the proposed Park Road "B". FIGURE 2 provides a good perspective of these intersections and surrounding roadways.

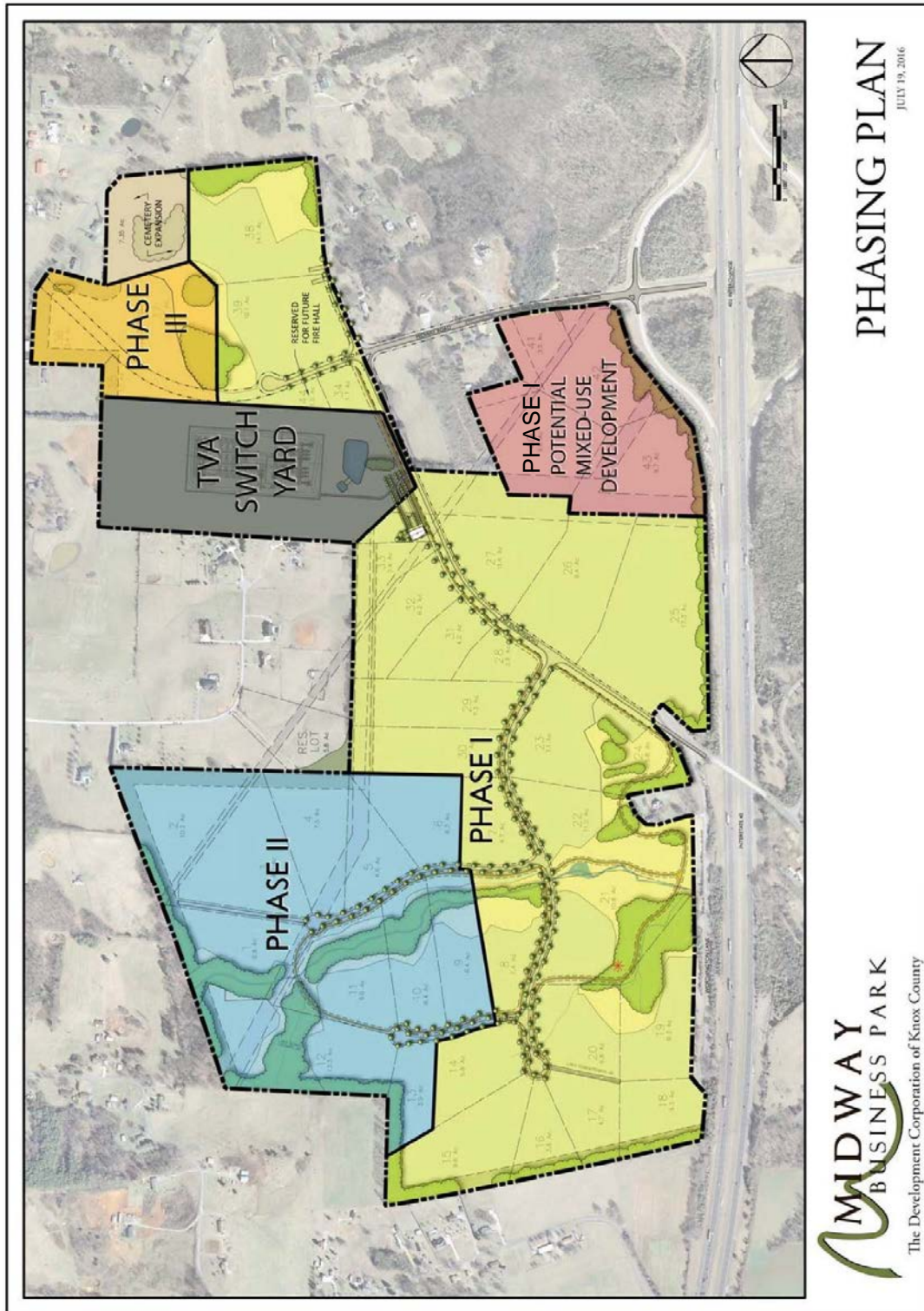


FIGURE 2
CONCEPTUAL SITE PLAN

3.0 EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

The roadways in the vicinity of the proposed Midway Business Park are two-lane facilities currently maintained by Knox County, except for Interstate 40 (I-40), which is a six-lane median divided freeway maintained by the Tennessee Department of Transportation. While I-40 is constructed to federal interstate geometric design standards, the County roadways are older facilities with ten to eleven foot traffic lanes and minimal shoulders. The exception is the section of Midway Road through the I-40 interchange area, which was reconstructed when the interstate was built and possesses two twelve-foot traffic lanes with ten-foot paved shoulders.

As far as roadway functional classification, I-40 is classified by the Knoxville-Knox County Metropolitan Planning Commission as a Freeway, Midway Road and Thorngrove Pike (west of Midway Road) are classified as Minor Arterials, and Carter School Road and Thorngrove Pike (east of Midway Road) are classified as Major Collectors. The speed limits on the county roadways are posted as 40 mph, while I-40 is posted as 65 mph for cars and 55 mph for trucks.

The I-40 and Midway Road interchange is a standard diamond type interchange with the I-40 off-ramps stopping at their respective intersections with Midway Road. Each approach to these two intersections is a single lane approach with no separate turning lanes. Midway Road continues northward from the interchange area where it stops as the stem leg of a “T” intersection with Thorngrove Pike. To the east of this intersection along Thorngrove Pike is another “T” intersection, where Carter School Road forms the stem and stop leg coming from the north.

EXISTING TRAFFIC DATA

The Tennessee Department of Transportation (TDOT) collects average daily traffic data (ADT) annually on the roadways in the study area. Three count stations are located very near the project site, and are felt to have particular relevance for this study. The most currently available data from these stations are contained in TABLE 1.

TABLE 1 ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY			
COUNT YEAR	TDOT COUNT STATION 063 CARTER SCHOOL ROAD NORTH OF THORNGROVE PIKE	TDOT COUNT STATION 064 MIDWAY ROAD SOUTH OF I-40	TDOT COUNT STATION 277 I-40 WEST OF MIDWAY ROAD
2014	1,325	1,831	62,490
2013	1,156	1,839	81,121
2012	1,244	2,042	68,013
2011	1,238	1,984	65,332
2010	1,402	2,045	80,829
2009	1,291	2,082	88,485
2008	1,212	1,873	68,028
2007	1,177	1,993	69,269
2006	1,343	2,031	66,743
2005	1,449	2,137	69,980

Turning movement traffic counts were conducted at four intersections for purposes of this study. These counts were performed for both the A.M. and P.M. peak traffic hours. Raw traffic data summaries for these counts are contained in the APPENDIX. The four existing study intersections that were counted are listed below:

1. Midway Road at I-40 Eastbound Ramps
2. Midway Road at I-40 Westbound Ramps
3. Midway Road at Thorngrove Pike
4. Thorngrove Pike at Carter School Road

The turning movement traffic counts were used to help establish trip distribution patterns for this study, as well as to develop background traffic volumes. These are estimates of future volumes that would result from a continuation of past growth patterns, assuming the proposed project does not develop. FIGURE 3 is a summary of the existing traffic volumes for the count year, 2015.

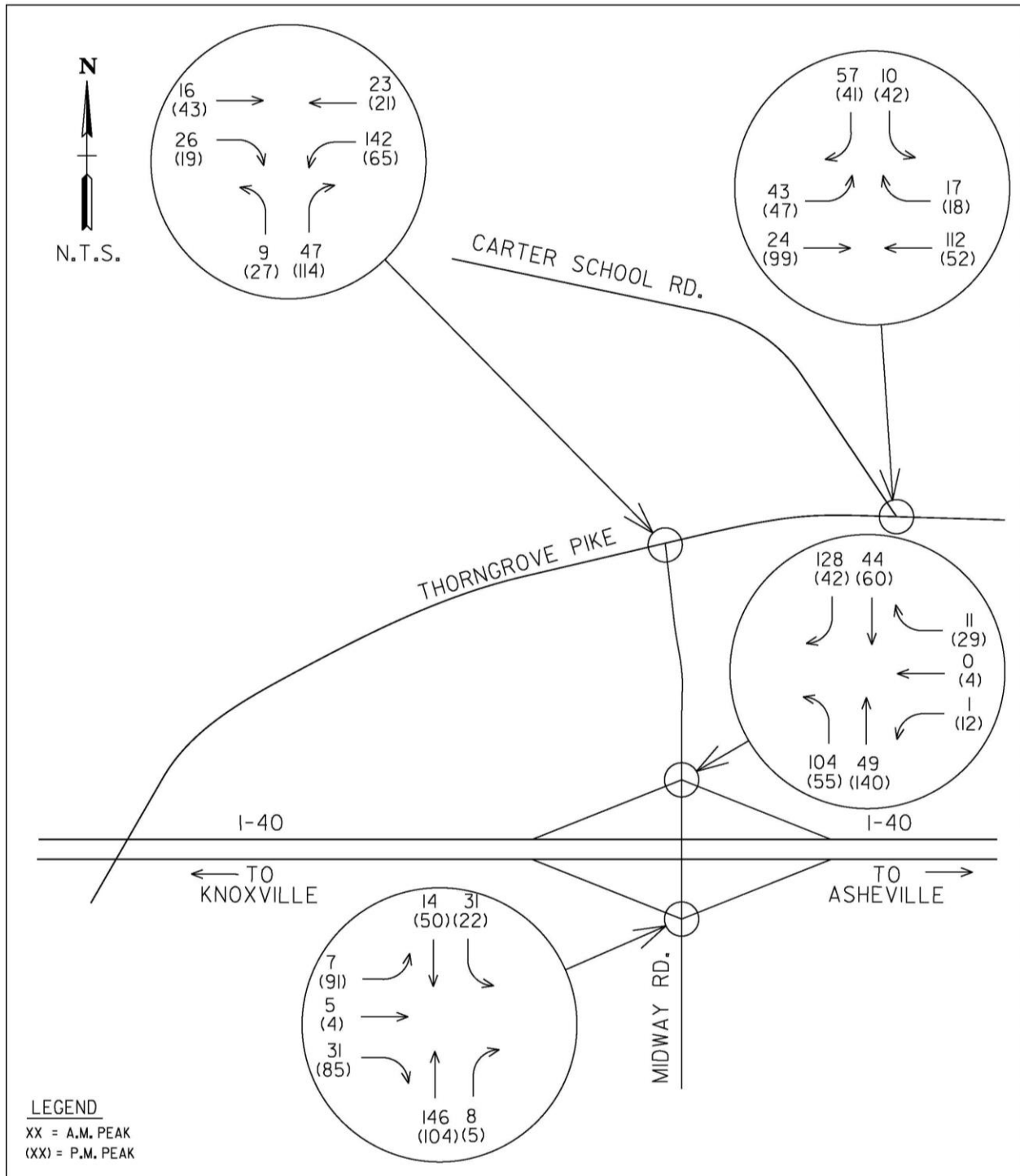


FIGURE 3
 EXISTING TRAFFIC VOLUMES (2015)

4.0 BACKGROUND CONDITIONS

BACKGROUND TRAFFIC GROWTH

It is believed that it will take approximately 20 years to fully build-out the proposed business park, with initial development expected to begin in 2018. Therefore, a four step project build-out sequence has been developed, which is tied to the previously discussed park development phases (see FIGURE 2). This sequence assumes completion of one step every five years. In order to provide a baseline for comparing build versus no-build scenarios, background traffic volumes were developed for the assumed completion year for each project phase. These were years 2023 (Phase IA), 2028 (Phase IB), 2033 (Phase II), and 2038 (Phase III). The AADT traffic volumes previously presented in TABLE 1 indicate that growth over the past ten years has been somewhat up and down. This historical data, as well as knowledge of the area, were used to determine applicable annual growth rates. Based on the available data, a background annual growth rate of one and one-half percent was assumed for the first ten years and two and one-half percent for the next ten. The resulting volumes are summarized on FIGURE 4A, FIGURE 4B, FIGURE 4C and FIGURE 4D and represent anticipated traffic volumes if the business park is not developed.

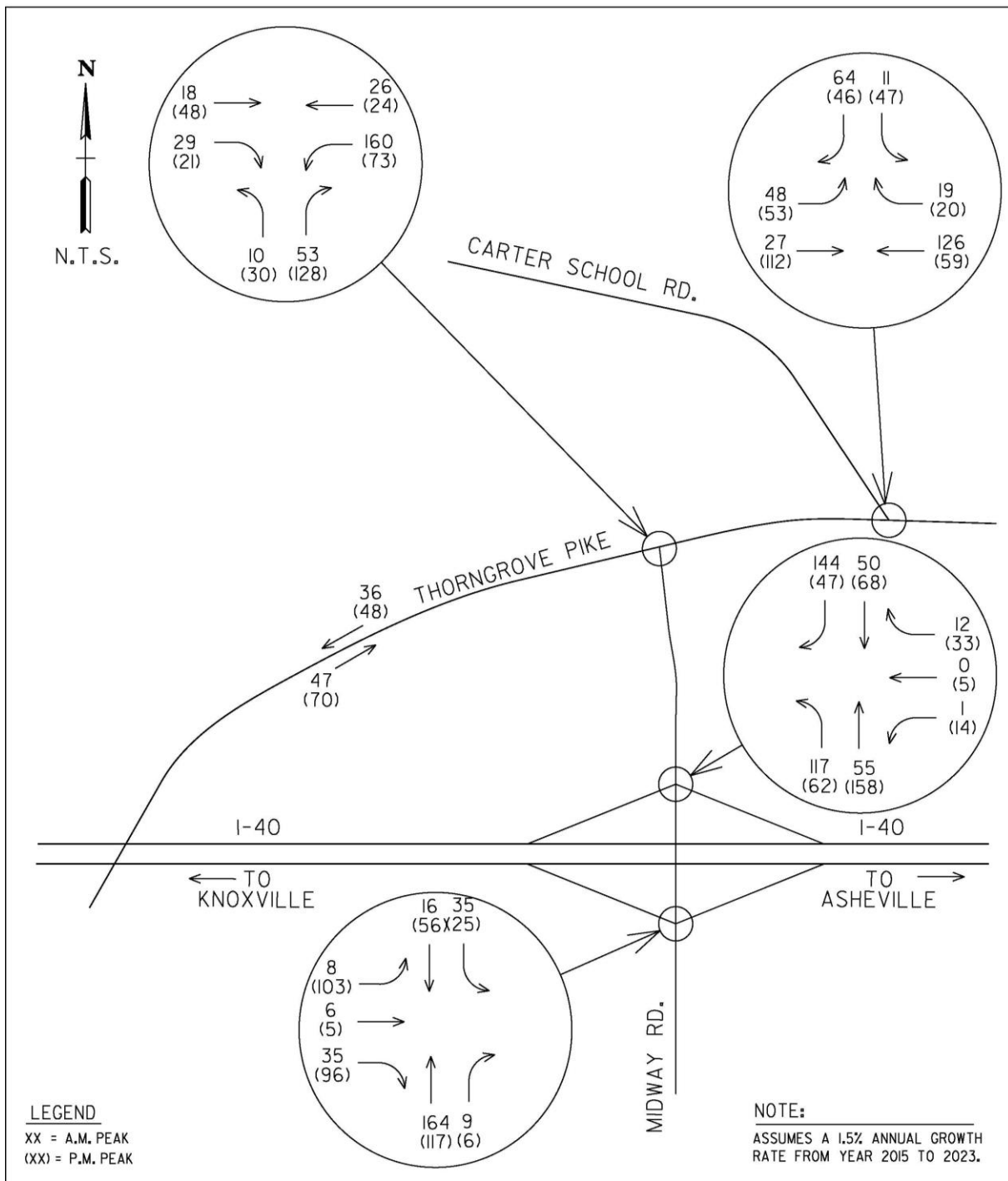


FIGURE 4A
 PHASE IA BACKGROUND TRAFFIC VOLUMES (2023)

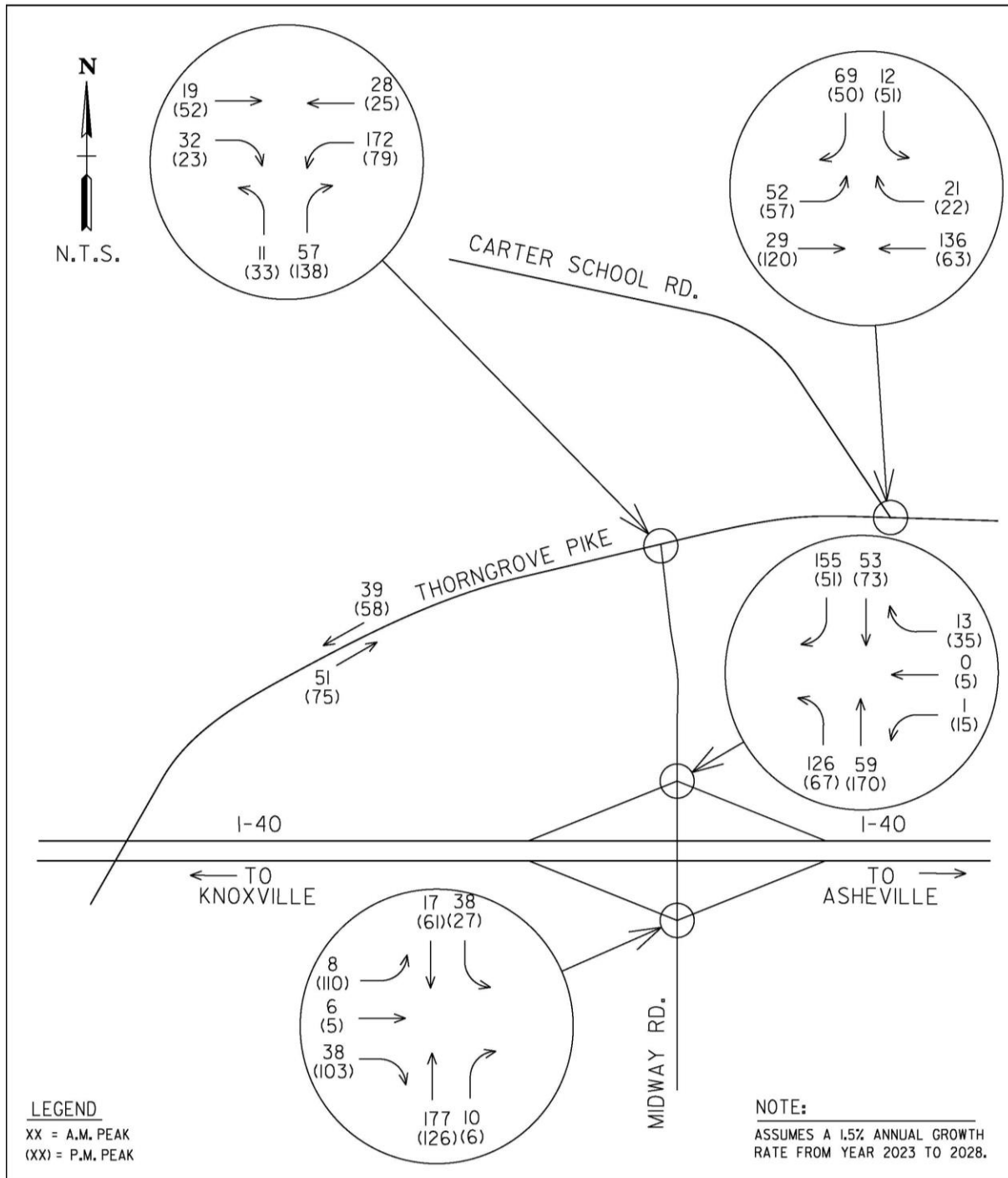


FIGURE 4B
 PHASE IB BACKGROUND TRAFFIC VOLUMES (2028)

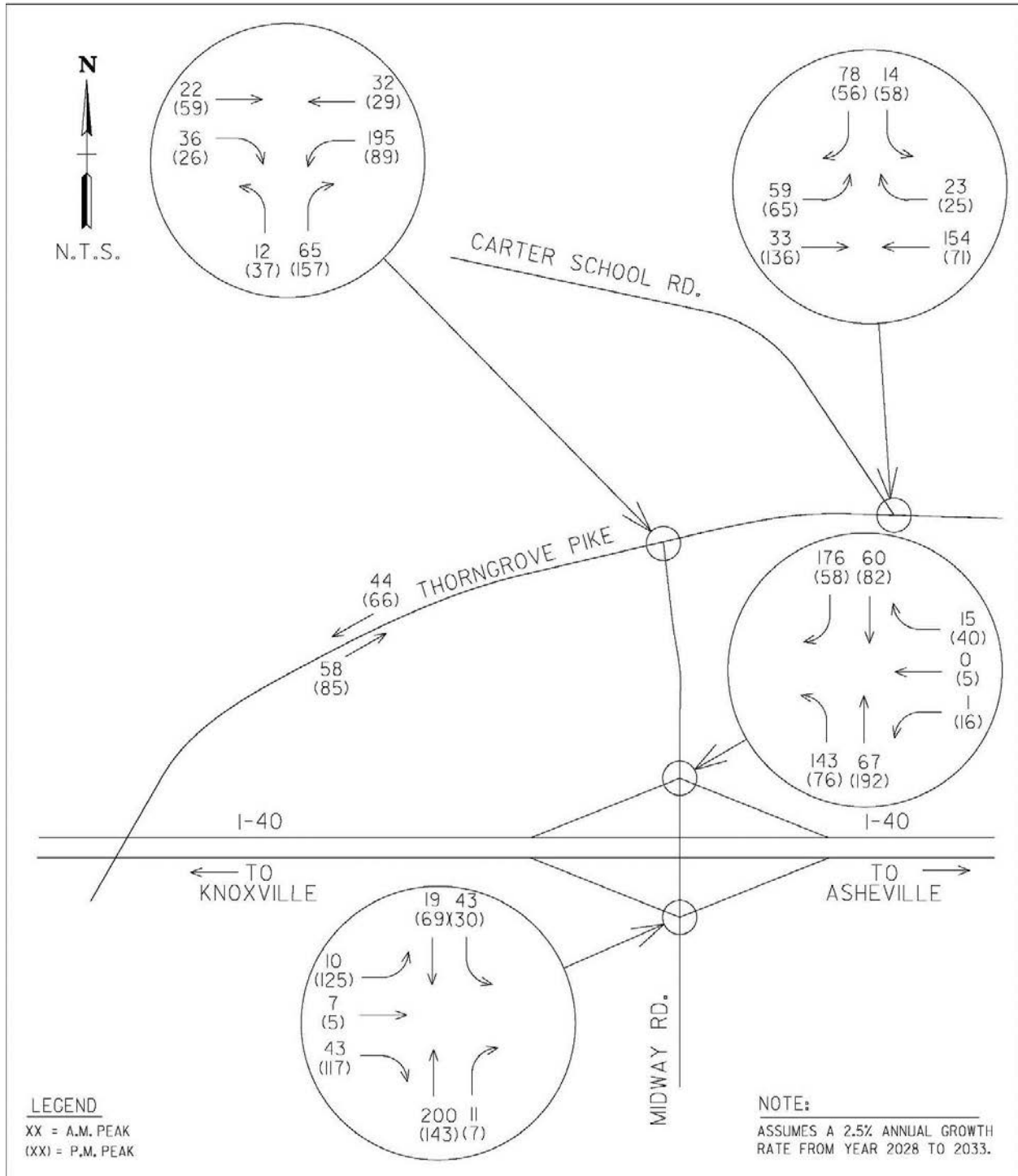


FIGURE 4C
 PHASE II BACKGROUND TRAFFIC VOLUMES (2033)

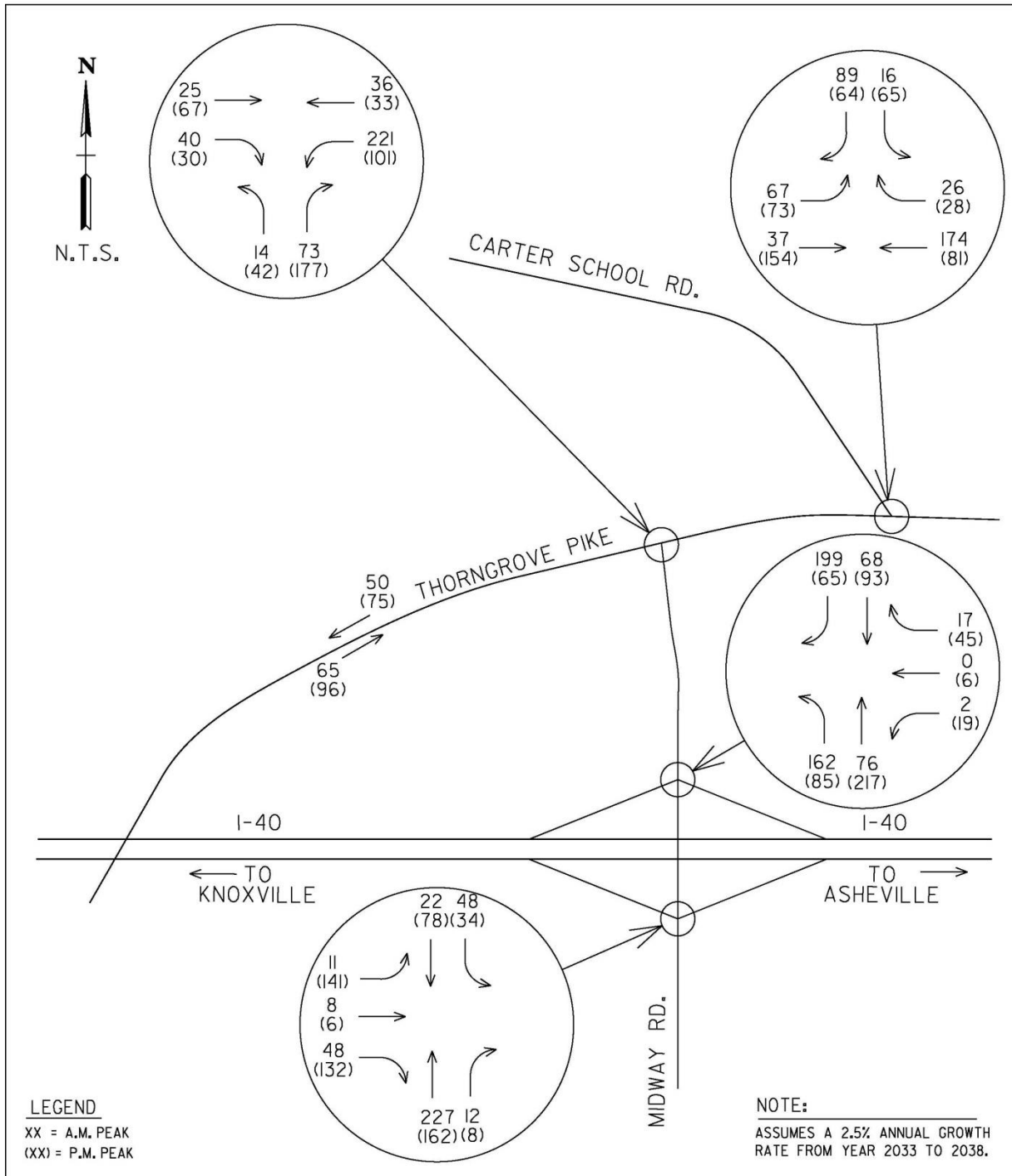


FIGURE 4D
 PHASE III BACKGROUND TRAFFIC VOLUMES (2038)

5.0 FUTURE CONDITIONS

TRIP GENERATION

Estimates of the expected traffic volumes to be generated by build-out of the proposed business park were developed by utilizing the data and procedures of Trip Generation, Ninth Edition (Institute of Transportation Engineers, 2012). These methods were applied to each proposed phase of the business park development. Trip generation volumes were derived from I.T.E. land use code 770 (Business Park) based on the proposed number of employees anticipated to be associated with each phase of the development. The generated traffic volumes were determined based on the data for the weekday, AM peak hour and PM peak hour. TABLE 2 is a trip generation summary providing a detailed breakdown of the expected newly generated traffic. More detailed information is contained in the APPENDIX.

TABLE 2 TRIP GENERATION SUMMARY						
LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)	
Phase IA Business Park	770	868 employees	3,698	441	412	
			Entering Trips	1,849	375	91
			Exiting Trips	1,849	66	321
Phase IB Business Park	770	868 employees	3,698	441	412	
			Entering Trips	1,849	375	91
			Exiting Trips	1,849	66	321
Phase II Business Park	770	430 employees	2,300	241	233	
			Entering Trips	1,150	205	51
			Exiting Trips	1,150	36	182
Phase III Business Park	770	100 employees	1,248	68	72	
			Entering Trips	624	58	16
			Exiting Trips	624	10	56
GRAND TOTAL All Phases			10,944	1,191	1,129	
			Entering Trips	5,472	1,013	249
			Existing Trips	5,472	178	880

As shown in FIGURE 2, a portion of Phase I has been identified for potential mixed-use development. This area was included in the Phase IA and Phase IB trip generation using the Business Park land use code. The ITE description of the Business Park land use type indicates this land use may include offices and retail uses within the Business Park development.

TRIP DISTRIBUTION AND ASSIGNMENT

FIGURE 5 provides a summary of the trip distribution pattern utilized for the proposed project. This pattern was developed in consideration of the existing traffic volume patterns and knowledge of the local area. The generated traffic was assigned to the study roadways and intersections in accordance with these distribution patterns, and assuming the proposed phasing discussed above. Detailed worksheets showing distribution percentages of individual movements are located in the APPENDIX. These assignments of generated trips are reflected on FIGURE 6A for Phase IA, FIGURE 6B for Phase IB, FIGURE 6C for Phase II and FIGURE 6D for Phase III.

The generated trips shown on FIGURES 6A through 6D were added to the background volumes for each phase of the development (FIGURES 4A-4D) in order to develop anticipated future traffic volumes. FIGURES 7A, 7B, 7C and 7D are the combined volumes for the evaluation years, which reflect the existing traffic, the background traffic growth, and the newly generated traffic. These combined volumes will be used during the evaluation portion of this study.

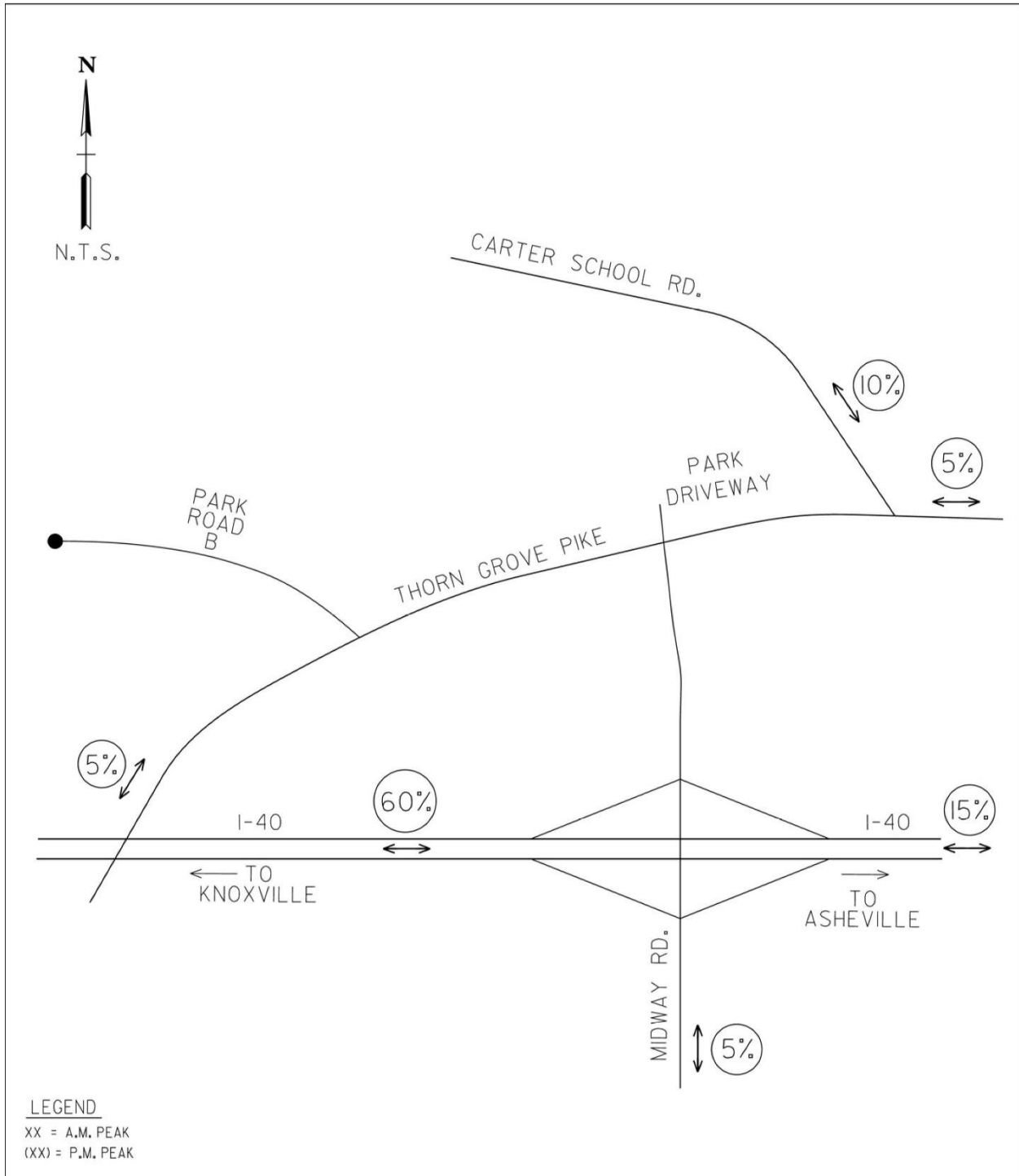


FIGURE 5
TRIP DISTRIBUTION PERCENTAGES

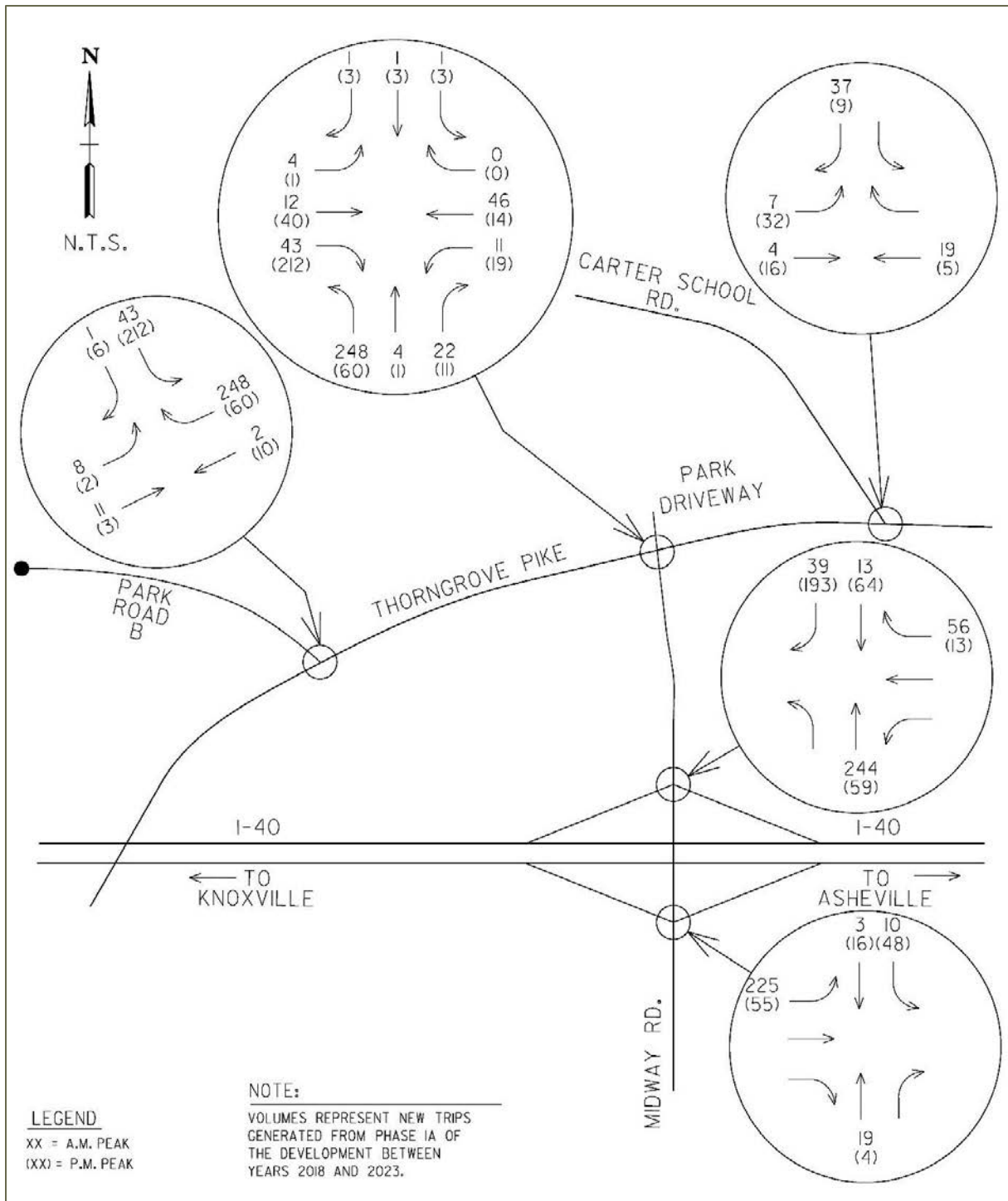


FIGURE 6A
 TRIPS FROM PHASE IA (2023)

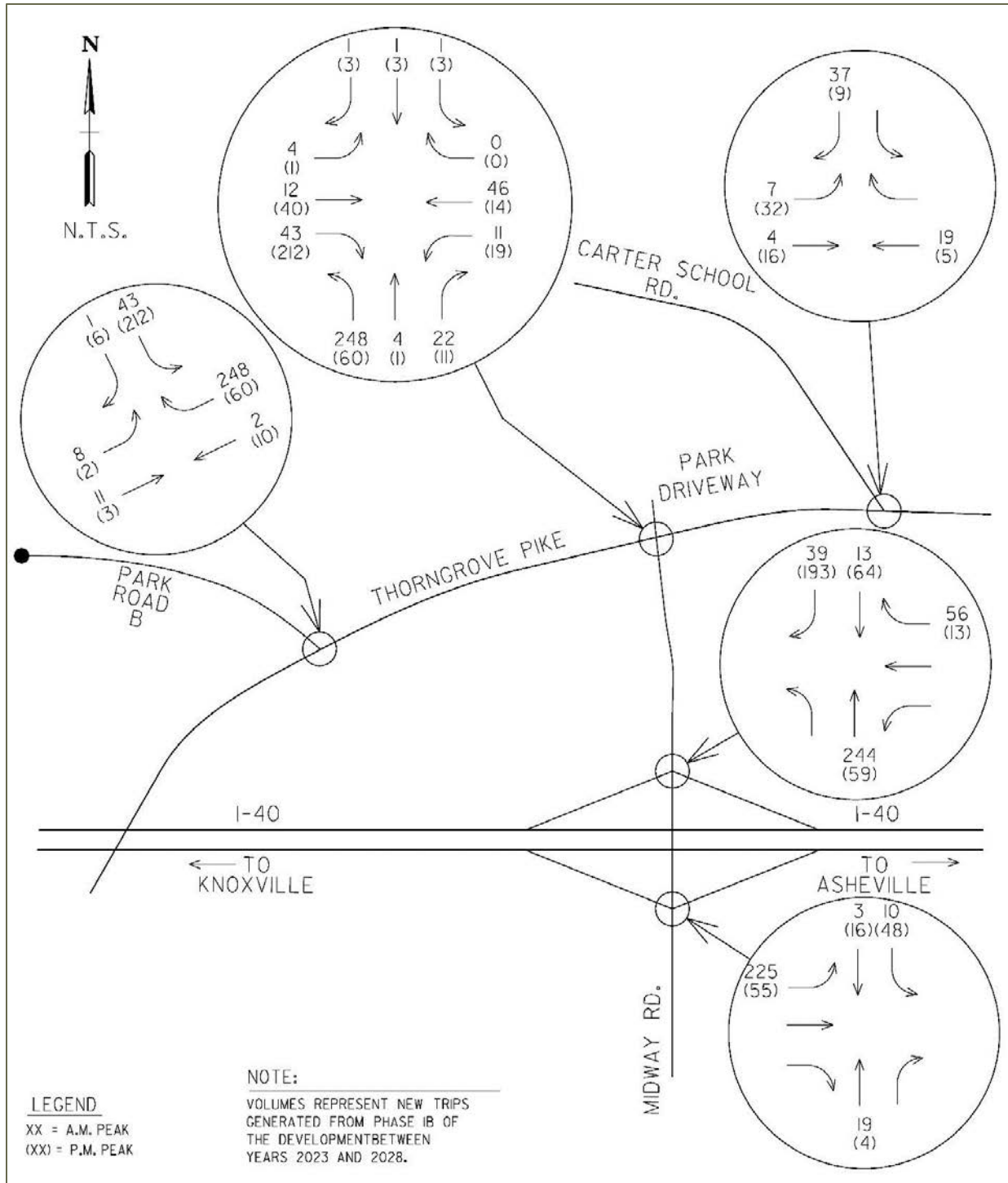


FIGURE 6B
TRIPS FROM PHASE IB (2028)

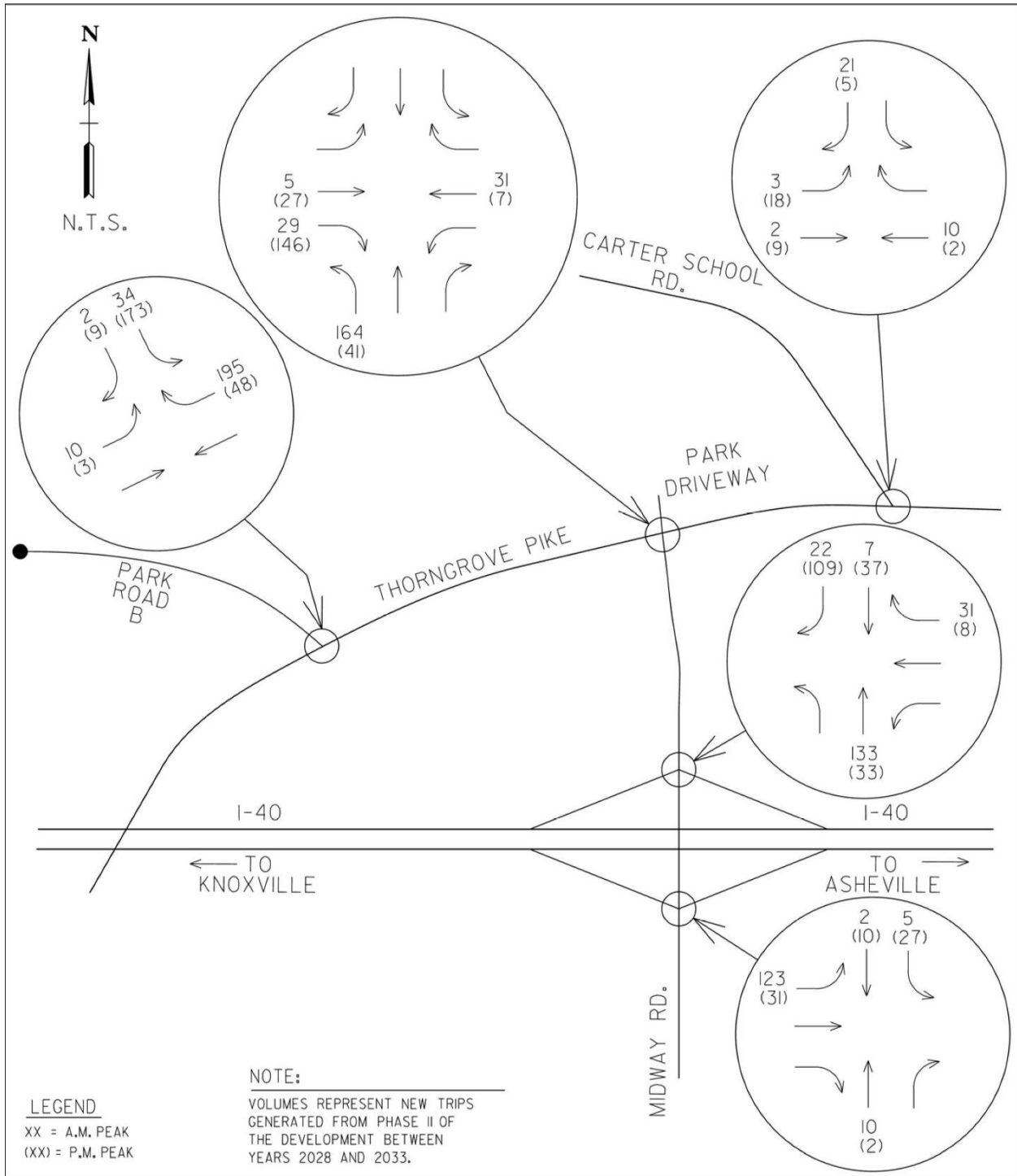


FIGURE 6C
TRIPS FROM PHASE II (2033)

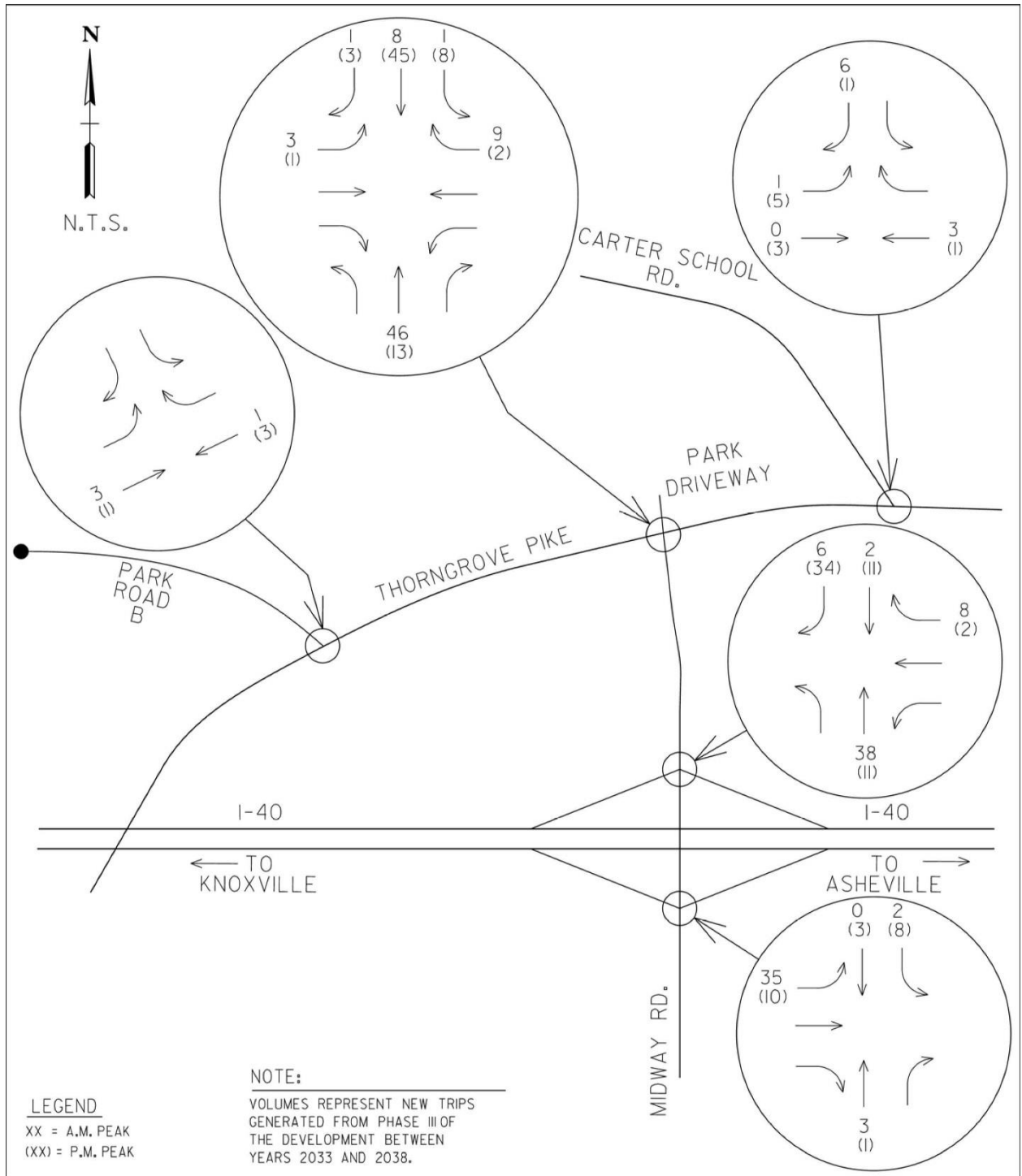


FIGURE 6D
TRIPS FROM PHASE III (2038)

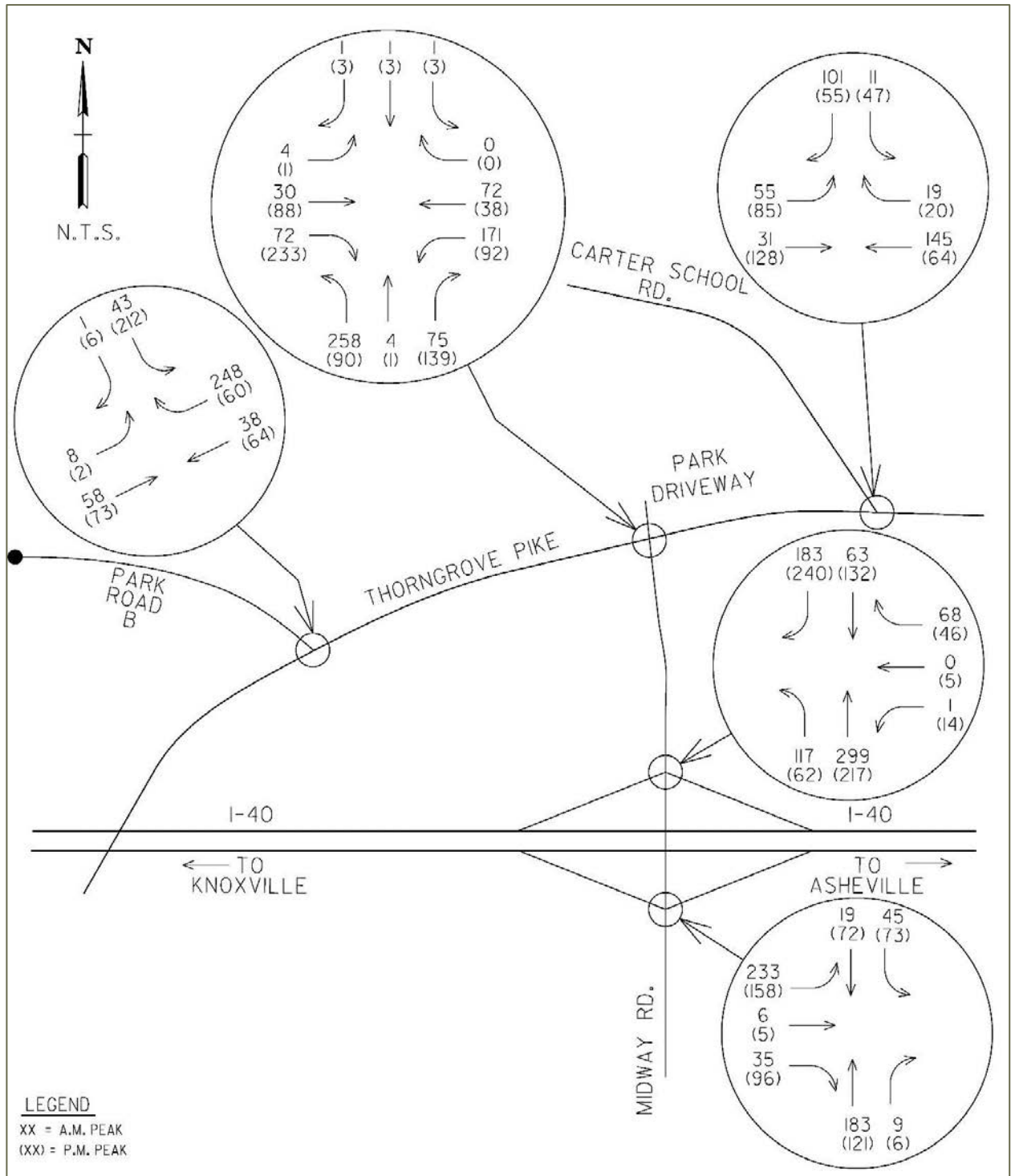


FIGURE 7A
 COMBINED VOLUMES PHASE IA (2023)

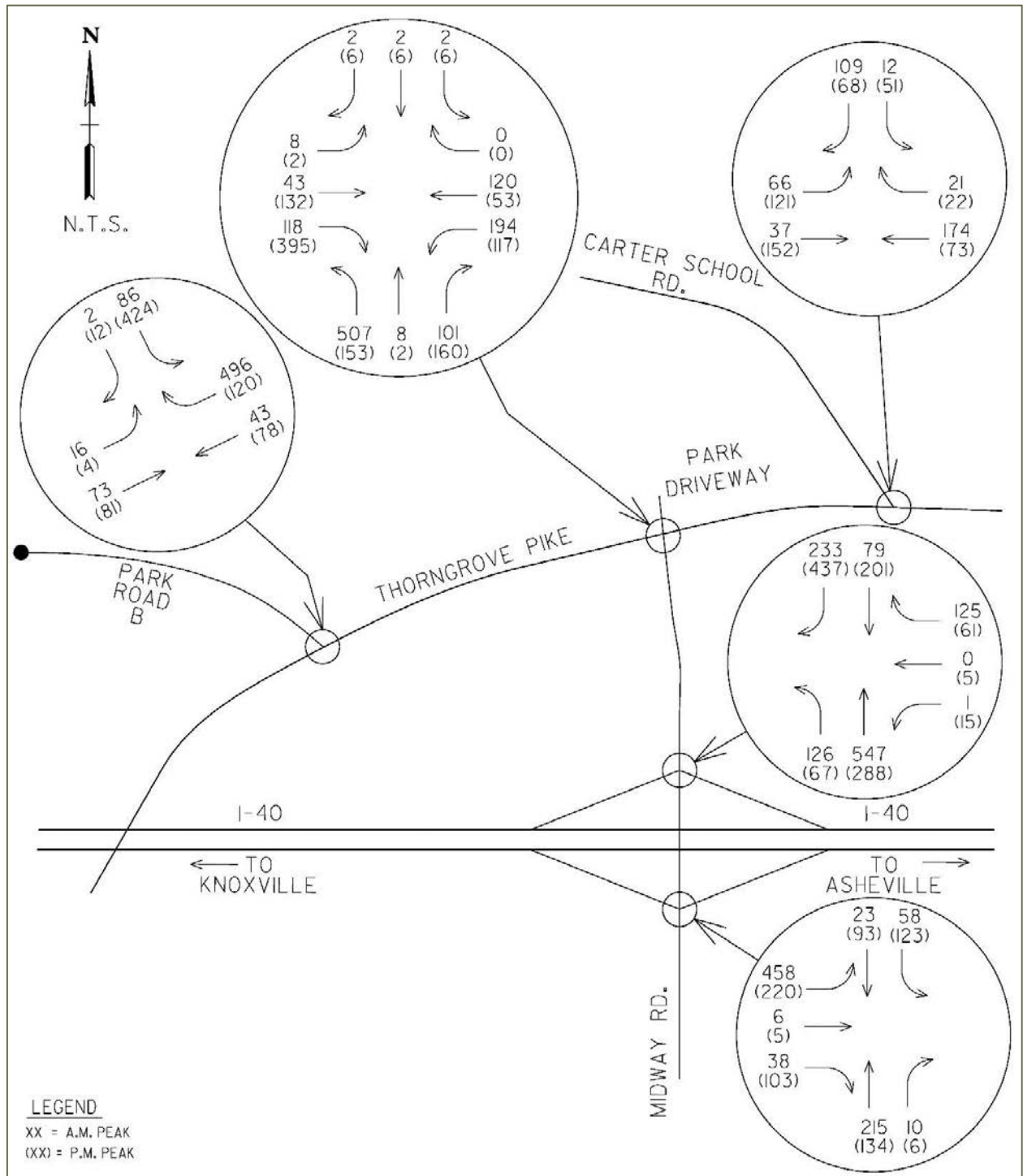


FIGURE 7B
 COMBINED VOLUMES PHASE IB (2028)

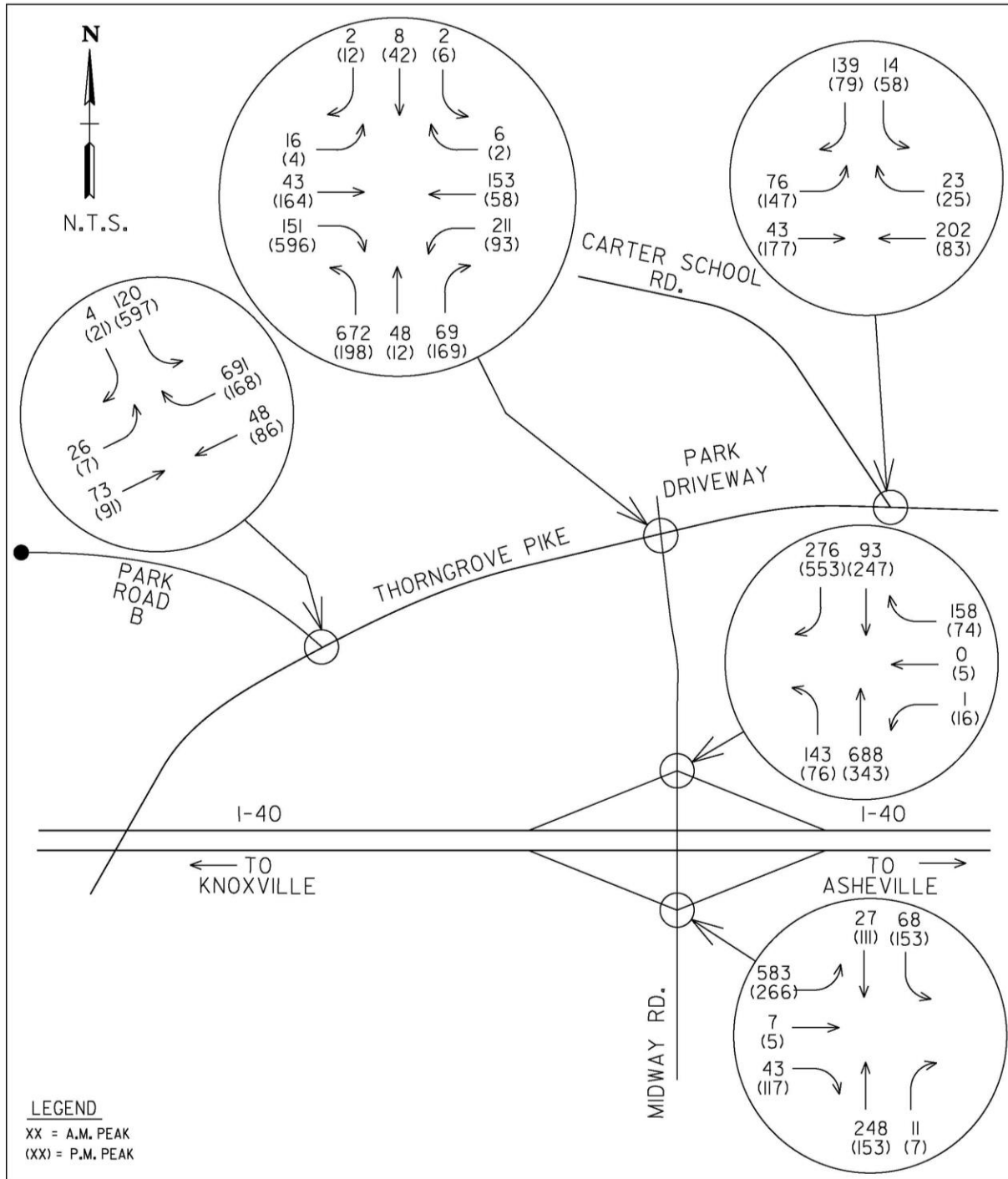


FIGURE 7C
 COMBINED VOLUMES PHASE II (2033)

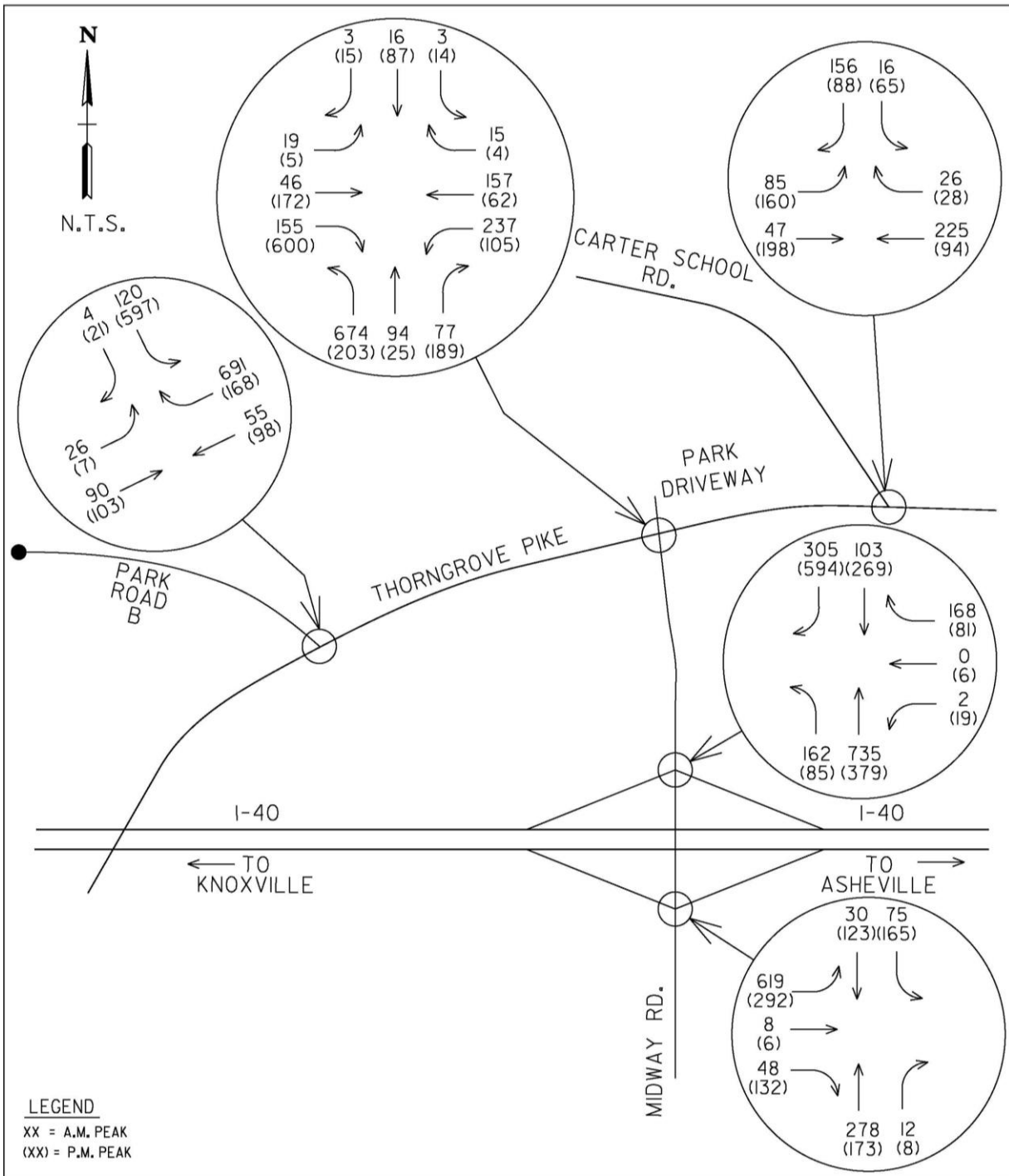


FIGURE 7D
 COMBINED VOLUMES PHASE III (2038)

6.0 EVALUATIONS

INTERSECTION CAPACITY ANALYSES AND TURN LANE ASSESSMENTS

Intersection capacity analyses and turn lane assessments were performed for the study intersections as appropriate. The capacity analyses employed the procedures of the Highway Capacity Manual (Transportation Research Board 2010) as contained in the Highway Capacity Software (HCS 2010). A description of the fundamentals of these procedures is contained in the APPENDIX, in the section entitled "Capacity and Level-of-Service Concepts." Regarding the turn lane evaluations, the methods employed were those developed by M.D. Harmelink, as provided on a series of tables from the Knox County publication, "Access Control and Driveway Design Policy."

The above discussed evaluations were performed for the study intersections for all project study phases, IA (2023), IB (2028), II (2033), and III (2038). These included scenarios for both background and future combined traffic. These are the years previously discussed where the various project development phases are expected to conclude. The background conditions models evaluated conditions if the proposed business park were not to develop, and thus were used for purposes of comparison to assess the impacts attributable to the business park generated traffic which is included in the combined traffic scenarios. The following sections with associated tables summarize the evaluation results and conclusions for each study intersection.

Midway Road and I-40 Eastbound:

In consideration of the intersection capacity and turn lane analyses summarized in Table 3A, it is concluded that the intersection of Midway Road and I-40 Eastbound will operate with acceptable levels-of-service in its current lane and traffic control configuration until some point in time after Phase IB build-out, and prior to Phase II build-out. When the existing lane and traffic control configuration is no longer acceptable, the anticipated improvements include a traffic signal with a southbound left-turn lane and an eastbound right-turn lane. These recommendations constitute sufficient improvements for this intersection through full build-out of the Midway Business Park. TABLE 4 may be referenced for a recommended employee threshold for implementation.

**TABLE 3A
MIDWAY/I-40 EASTBOUND EVALUATION SUMMARY**

ANALYSIS PHASE AND TRAFFIC CONDITION	INTERSECTION LANES AND TRAFFIC CONTROL	LEVEL OF SERVICE / DELAY (S)		TURN LANE THRESHOLD
		AM PEAK	PM PEAK	
2015 Existing	Existing	A 7.6	A 8.1	None Met
Phase IA Background	Existing	A 7.6	B 8.4	None Met
Phase IA Combined	Existing	B 12.9	B 12.5	None Met
Phase IB Background	Existing	A 7.6	A 8.5	None Met
Phase IB Combined	Existing	D 30.6	C 23.8	None Met
Phase II Background	Existing	A 7.5	B 10.2	None Met
Phase II Combined	Existing	F 101.9	F 65.9	None Met
Phase II Combined	Signal w/ SB LT & EB RT Lanes	B 17.7	B 13.3	*
Phase III Background	Existing	A 7.6	B 11.0	None Met
Phase III Combined	Signal w/ SB LT & EB RT Lanes	B 18.7	B 13.0	*

* Turn lanes justified to accompany traffic signal control.

Midway Road and I-40 Westbound:

In consideration of the intersection capacity and turn lane analyses summarized in Table 3B, it is concluded that the intersection of Midway Road and I-40 Westbound will operate with acceptable levels-of-service throughout the various project phases. Turn lanes are anticipated to be justified, however, with a northbound left-turn lane being justified prior to Phase IA build-out and a southbound right-turn lane prior to Phase IB build-out. These recommendations constitute sufficient improvements for this intersection through full build-out of the Midway Business Park. TABLE 4 may be referenced for a recommended employee threshold for implementation.

**TABLE 3B
MIDWAY/I-40 WESTBOUND EVALUATION SUMMARY**

ANALYSIS PHASE AND TRAFFIC CONDITION	INTERSECTION LANES AND TRAFFIC CONTROL	LEVEL OF SERVICE / DELAY (S)		TURN LANE THRESHOLD
		AM PEAK	PM PEAK	
2015 Existing	Existing	A 8.3	A 7.8	None Met
Phase IA Background	Existing	A 8.4	A 7.9	None Met
Phase IA Combined	Existing	B 10.7	A 8.6	Met for NBLT
Phase IB Background	Existing	A 8.4	A 7.9	None Met
Phase IB Combined	NB LT and SB RT Lanes	C 15.3	A 9.4	Met for NBLT and SBRT
Phase II Background	Existing	A 8.5	A 8.1	None Met
Phase II Combined	NB LT and SB RT Lanes	C 21.3	B 10.2	Met for NBLT and SBRT
Phase III Background	Existing	A 8.4	A 8.3	None Met
Phase III Combined	NB LT and SB RT Lanes	C 24.6	B 10.6	Met for NBLT and SBRT

Midway Road and Thorngrove Pike:

In consideration of the intersection capacity and turn lane analyses summarized in Table 3C, it is concluded that the intersection of Midway Road and Thorngrove Pike will be the intersection most significantly impacted by development of the proposed business park. This impact will begin as soon as new vehicular trips are produced, and the result will be that some improvements will be required fairly early in the development process. The anticipated first improvement would be a simple conversion of the intersection to all-way stop traffic control, which is anticipated to be necessary prior to Phase IA build-out. Then, prior to Phase IB build-out, a complete reconstruction of the intersection, including construction of a traffic signal is anticipated to be required. The additional turn lanes anticipated include eastbound left-turn and right-turn lanes, a westbound left-turn lane, a northbound left-turn lane, and a southbound left-turn lane. These recommendations constitute sufficient improvements for this intersection through the full build-out of the Midway Business Park. TABLE 4 may be referenced for a recommended employee threshold for implementation.

TABLE 3C MIDWAY/THORNGROVE EVALUATION SUMMARY				
ANALYSIS PHASE AND TRAFFIC CONDITION	INTERSECTION LANES AND TRAFFIC CONTROL	LEVEL OF SERVICE / DELAY (S)		TURN LANE THRESHOLD
		AM PEAK	PM PEAK	
2015 Existing	Existing	A 9.4	A 9.7	None Met
Phase IA Background	Existing	A 9.6	A 9.9	None Met
Phase IA Combined	Existing w/ Southbound Approach	F 69.8	B 14.5	None Met
Phase IA Combined	All Way STOP w/ Southbound Approach	B 13.3	B 11.2	None Met
Phase IB Background	Existing	A 9.7	B 10.1	None Met
Phase IB Combined	All Way STOP w/ Southbound Approach	F 85.8	F 152.6	None Met
Phase IB Combined	Signal & Turn Lanes*	B 18.4	B 14.9	**
Phase II Background	Existing w/ Southbound Approach	B 10.1	B 10.5	None Met
Phase II Combined	Signal & Turn Lanes*	C 23.1	C 21.5	**
Phase III Background	Existing	B 10.5	B 11.0	None Met
Phase III Combined	Signal & Turn Lanes*	C 25.0	C 23.7	**
* Turn lanes for signal evaluation included eastbound left-turn and right-turn, westbound left-turn, northbound left-turn, and southbound left-turn, in addition to a single through lane on all approaches. ** Turn lanes justified to accompany traffic signal control.				

Thorngrove Pike and Carter School Road:

In consideration of the intersection capacity and turn lane analyses summarized in Table 3D, it is concluded that the intersection of Thorngrove Pike and Carter School Road will likely not be significantly impacted by development of the proposed business park. No capacity deficiencies were identified and no turn lane or traffic control improvements are recommended for this intersection. It is recommended, however, that the southbound approach be provided with a STOP sign placed on the right side Carter School Road, at the required stopping location. This may require construction of any island or some other measure to protect the sign from turning traffic.

TABLE 3D THORNGROVE/CARTER SCHOOL EVALUATION SUMMARY				
ANALYSIS PHASE AND TRAFFIC CONDITION	INTERSECTION LANES AND TRAFFIC CONTROL	LEVEL OF SERVICE		TURN LANE THRESHOLD
		AM PEAK	PM PEAK	
2015 Existing	Existing	A 9.5	B 10.0	None Met
Phase IA Background	Existing	A 9.7	B 10.3	None Met
Phase IA Combined	Existing	B 10.1	B 10.9	None Met
Phase IB Background	Existing	A 9.9	B 10.5	None Met
Phase IB Combined	Existing	B 10.5	B 11.8	None Met
Phase II Background	Existing	B 10.2	B 11.0	None Met
Phase II Combined	Existing	B 11.2	B 13.1	None Met
Phase III Background	Existing	B 10.5	B 11.5	None Met
Phase III Combined	Existing	B 11.8	B 14.2	None Met

Thorngrove Pike and Proposed Park Road "B":

In consideration of the intersection capacity and turn lane analyses summarized in Table 3E, it is concluded that the proposed intersection of Thorngrove Pike and Park Road "B" is anticipated to operate adequately as a two-way stop without separate turn lanes until some point in time after Phase IB build-out and prior to Phase II build-out. At this time a westbound right-turn lane on Thorngrove Pike and a southbound right-turn lane on Park Road B will likely be justified. This intersection configuration would likely result in some level-of-service "E" operation during the PM peak hour. Such a situation would likely be tolerable for a short duration business park type of scenario. Therefore, these recommendations constitute sufficient improvements for this intersection through full build-out of the Midway Business Park. TABLE 4 may be referenced for a recommended employee threshold for implementation.

TABLE 3E
THORNGROVE/PARK ROAD "B" EVALUATION SUMMARY

ANALYSIS PHASE AND TRAFFIC CONDITION	INTERSECTION LANES AND TRAFFIC CONTROL	LEVEL OF SERVICE / DELAY (S)		TURN LANE THRESHOLD
		AM PEAK	PM PEAK	
Existing & Background	Not Applicable*	-	-	-
Phase IA Combined	Two-Way Stop	B 10.6	B 11.6	None Met
Phase IB Combined	Two-Way Stop	B 13.5	C 20.3	None Met
Phase II Combined	Two-Way Stop	C 18.0	F 73.6	Met for WBRT
Phase II Combined	Two-Way Stop With WBRT lane and SBRT lane	B 11.0	E 35.8	Met for WBRT
Phase III Combined	Two-Way Stop With WBRT lane and SBRT lane	B 11.3	E 41.8	Met for WBRT

* Intersection does not currently exist.

TRAFFIC SIGNAL WARRANT ASSESSMENTS

The applicability of the official traffic signal warrants from the Manual on Uniform Traffic Control Devices was evaluated for the two intersections where future traffic signals are recommended. These intersections, Midway Road / I-40 Eastbound and Midway Road / Thorngrove Pike, were both found to be very likely to meet Warrant 3 (Peak Hour) for the employee thresholds when installation is recommended. Although only two peak hours of data is available for these assessments, the degree to which this data satisfied warrant requirements suggests that it is likely that Warrant 2 (Four Hour) would also be satisfied. Associated analysis spreadsheets are contained in the APPENDIX.

SIGHT DISTANCE ASSESSMENT

Corner sight distance is an important safety issue for any intersection, especially for roadway approaches that must stop or yield to opposing traffic. The study intersections that currently exist were field reviewed and found to possess adequate sight distances. Regarding the intersection of Thorngrove Pike and Park Road "B", which is proposed but does not currently exist, there are no significant roadway geometry issues such as extreme horizontal or vertical alignments that would preclude adequate sight distances being provided when the intersection is constructed. It is considered prudent that, if at all possible, corner sight distances be provided for speeds based on at least the posted speed limit plus ten miles per hour. As an example, an intersection with a main street speed limit of 40 mph would require a minimum sight distance of 500 feet.

7.0 CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that the traffic generated from the proposed Midway Business Park will have significant traffic volume related impacts at four of the five study intersections. These impacts, however, can be successfully mitigated through the implementation of a series of roadway geometric and signalization improvements, which are discussed below.

FIGURE 8A shows the existing traffic lanes at each of the intersections included in this study. As the proposed business park develops over time, more and more of the improvements identified in the preceding section will become justified. A park build-out plan has been developed which involves three distinct phases that will lead to full build-out. Phase I is anticipated to take ten years to fully develop, beginning in 2018 and ending in 2028. Phases II and III are anticipated to take five years each, ending in 2033 and 2038 respectively. FIGURE 8B displays the traffic lane and traffic control changes anticipated to be required after build-out of the first half of Phase I (2023), FIGURE 8C for the second half of Phase I (2028), FIGURE 8D for Phase II (2033), and FIGURE 8E for Phase III (2038). The actual sequence and schedule for the required improvements will likely vary somewhat depending on a number of factors, but the above phase sequence and schedule provides a logical framework that can be adjusted as needed. TABLE 4 provides a summary of all recommended intersection improvements, with associated information on turn lane storage length, bay taper length, and anticipated time frame based on the current planned development phase sequence.

With the exception of Midway Road in the vicinity of Interstate 40, the existing roadways within the area of the proposed business park possess narrow lanes and minimal shoulder. Therefore, in addition to required intersection improvements, widening to appropriate lane and shoulder standards is recommended for Midway Road, from I-40 to Thorngrove Pike, and for Thorngrove Pike, from Midway Road to at least just beyond the business park intersections. Also, as mentioned in the previous section, intersection corner sight distances are recommended to be provided at all study intersections for approach speeds of at least the posted speed limit plus ten miles per hour.

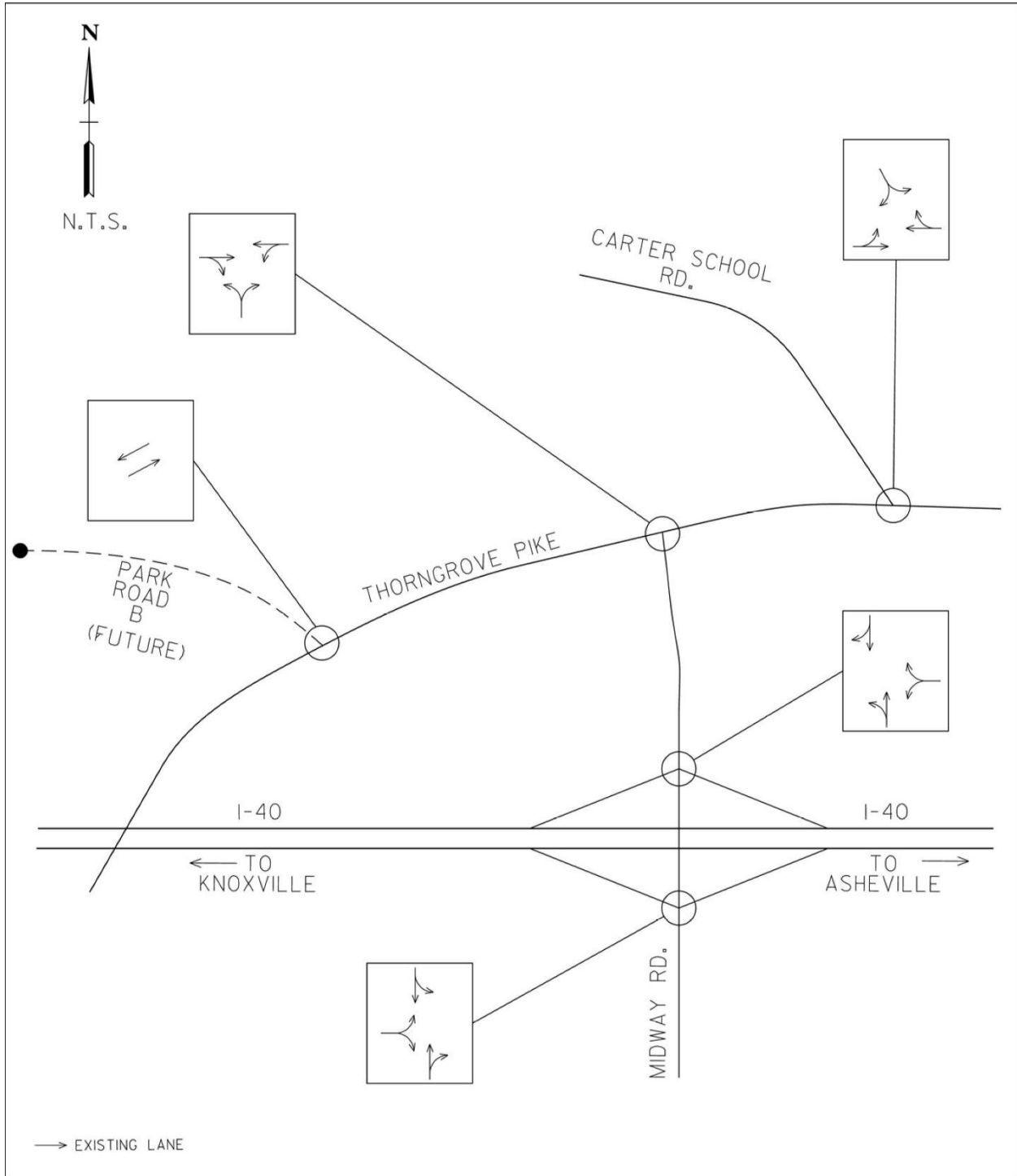


FIGURE 8A
EXISTING TRAFFIC LANES AT STUDY INTERSECTIONS

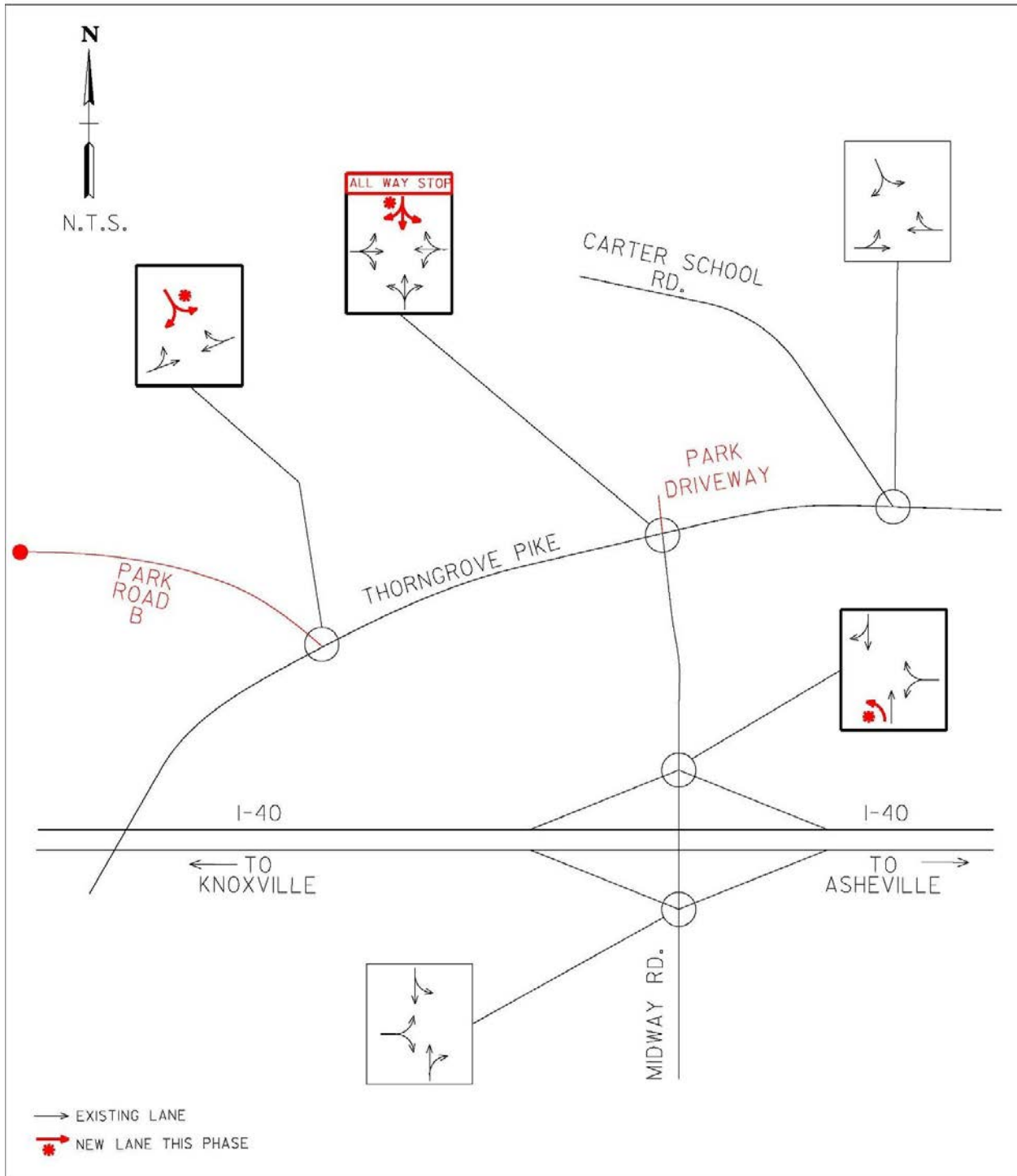


FIGURE 8B
RECOMMENDED PHASE IA INTERSECTION LANES AND TRAFFIC CONTROL

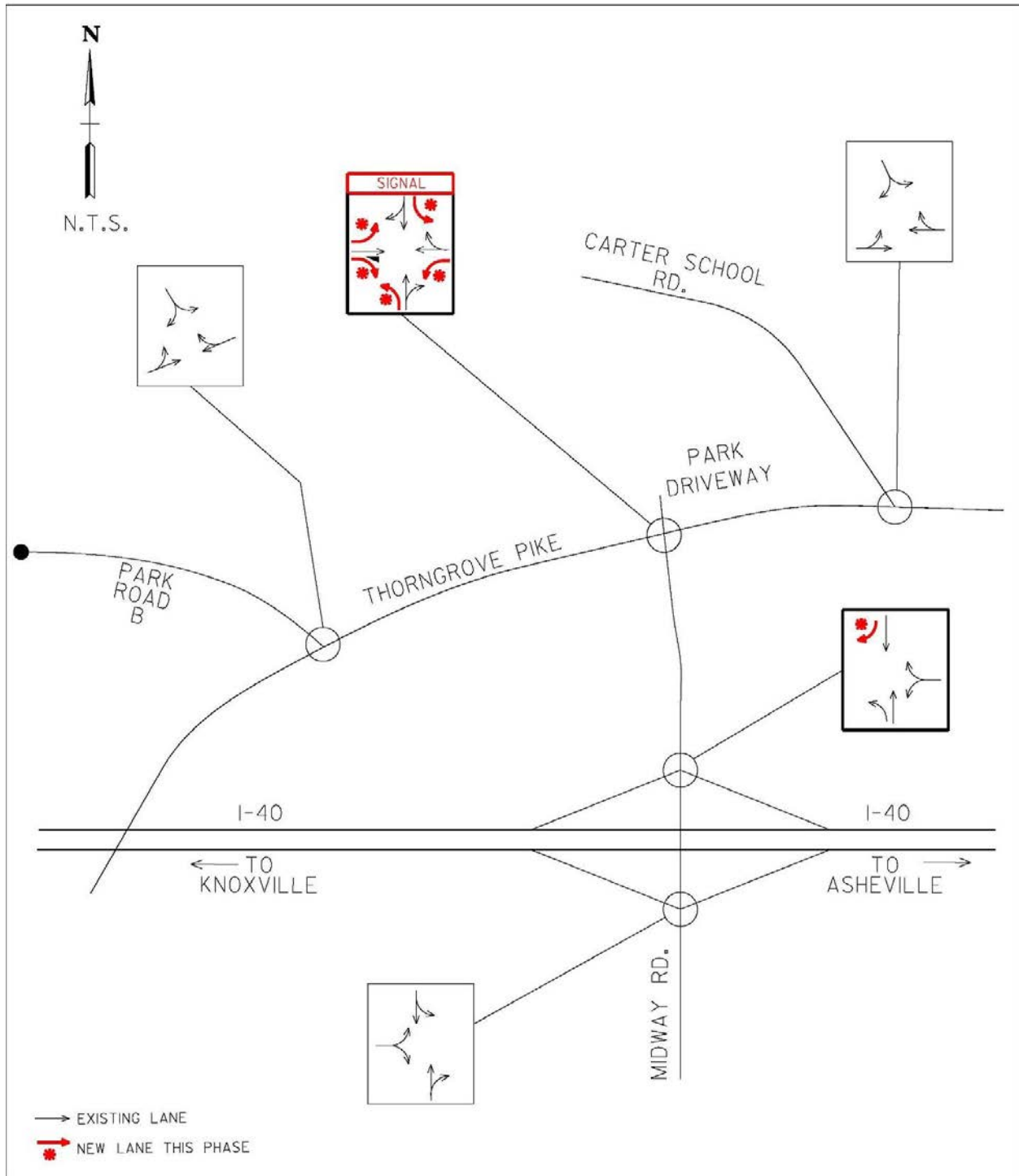


FIGURE 8C
RECOMMENDED PHASE IB INTERSECTION LANES AND TRAFFIC CONTROL

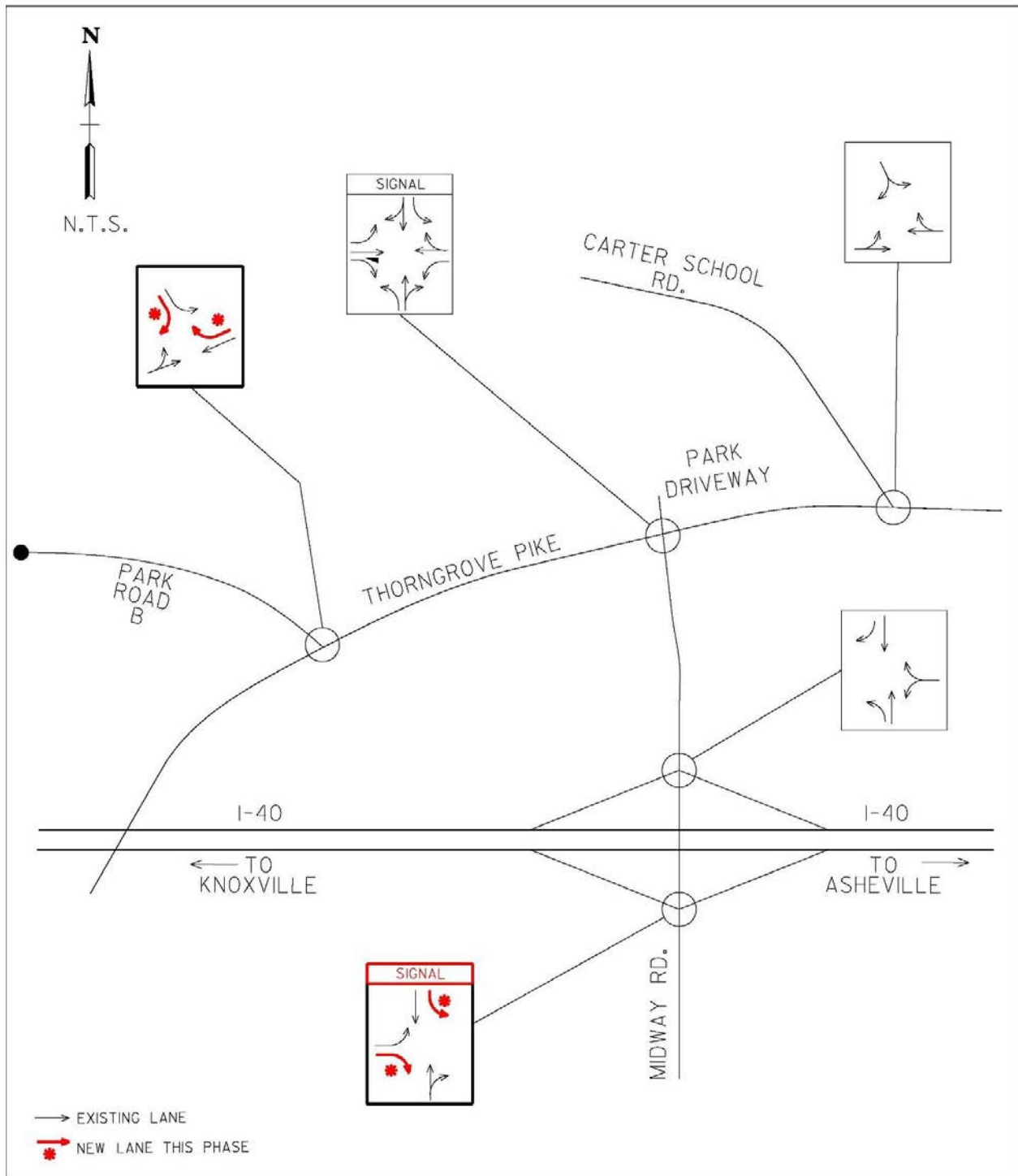


FIGURE 8D
RECOMMENDED PHASE II INTERSECTION LANES AND TRAFFIC CONTROL

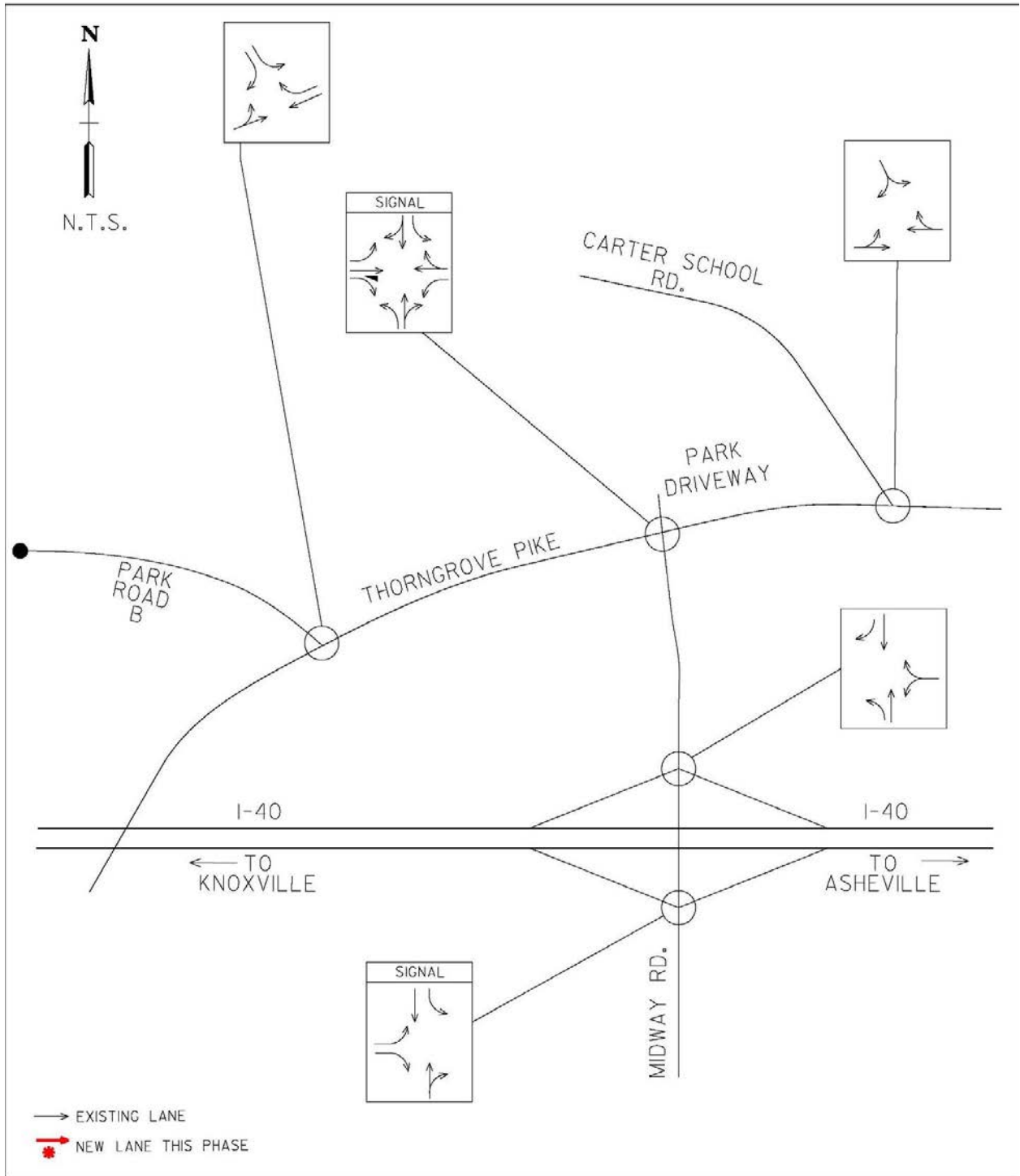


FIGURE 8E
RECOMMENDED PHASE III INTERSECTION LANES AND TRAFFIC CONTROL

CONCLUSIONS & RECOMMENDATIONS | SECTION 7

TABLE 4
SUMMARY OF RECOMMENDED INTERSECTION IMPROVEMENTS

INTERSECTION	RECOMMENDED IMPROVEMENT	MINIMUM LENGTH OF STORAGE LANE*	IMPROVEMENT** THRESHOLD
Midway/I-40 Eastbound	Traffic Signal	---	1,800 employees
	Southbound left-turn lane	75 feet	1,800 employees
	Eastbound right-turn lane	450 feet	1,800 employees
Midway/I-40 Westbound	Northbound left-turn lane	75 feet	500 employees
	Southbound right-turn lane***	300 feet	1,100 employees
Midway/Thorngrove	All-Way Stop	---	500 employees
	Traffic Signal	---	1,100 employees
	Eastbound left-turn lane	75 feet	1,100 employees
	Eastbound right-turn lane	200 feet	1,100 employees
	Westbound left-turn lane	225 feet	1,100 employees
	Northbound left-turn lane	500 feet	1,100 employees
Thorngrove/Carter School	Southbound left-turn lane	125 feet	1,100 employees
	None		
Thorngrove/Park Road "B"	Westbound right-turn lane	300 feet	1,800 employees
	Southbound right-turn lane	350 feet	1,800 employees
<p>* Bay tapers for turn lanes shall be minimum length of 120 feet, and shall be in addition to the "Minimum Length of Storage Lane."</p> <p>** Implement associated improvement by the time the threshold number of employees are working at the Midway Business Park.</p> <p>*** Proposed lane design to include right-turn channelization lane with triangular island and yield control.</p>			

8.0 APPENDIX

APPENDIX A | TRAFFIC DATA

APPENDIX B | TRIP GENERATION AND FUTURE VOLUMES

APPENDIX C | ANALYSES

APPENDIX A | TRAFFIC DATA

APPENDIX B | TRIP GENERATION AND FUTURE VOLUMES

APPENDIX C | ANALYSES