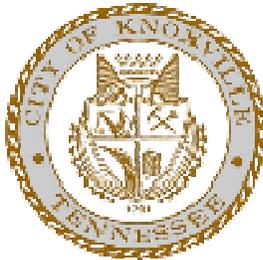


# OPERATIONAL IMPROVEMENT RECOMMENDATIONS LONG RANGE TRANSPORTATION PLAN

## I-640/Millertown Pike/Washington Pike Interchange Area to I-640/Broadway Interchange Area



*Prepared for:*



*Prepared By:*



**Wilbur Smith Associates**

**December 10, 2001**

# TABLE OF CONTENTS

<b>CHAPTER</b>	<b>TITLE</b>	<b>PAGE</b>
1	INTRODUCTION	1-1
	Purpose of Study	1-2
	Study Location	1-2
	Local and Regional Access	1-2
2	EXISTING TRAFFIC CONDITONS	2-1
	Existing Traffic Volumes	2-1
	Existing Capacity and Level of Service	2-1
3	PROJECTED TRAFFIC CONDITIONS	3-1
	Traffic Growth Rate	3-1
	Baseline Traffic Volumes	3-1
	Baseline Capacity and Level of Service	3-2
	Summary of Tazewell Pike & Knoxville Center APR	3-3
	Potential Rutledge Pike at Ault Road Improvements	3-3
	Future Traffic Volumes	3-4
	Projected Capacity and Level of Service	3-4
4	POTENTIAL TAZEWELL PIKE AND WASHINGTON PIKE CONNECTOR	4-1
	Description and Purpose	4-1
	Year 2024 Daily Traffic With and Without Connector	4-1
	Assumes Typical Section and Intersection Geometry	4-2
	Intersection Evaluation and Comparison	4-2
	Summary	4-6
5	RECOMMENDATIONS	5-1
	Advanced Planning Report Recommendations	5-1
	Immediate and Short Term Improvements	5-3
	Long Term Potential Improvements	5-5
	APPENDIX	

## LIST OF FIGURES

<b>Figure</b>	<b>Description</b>	<b>Reference Page</b>
1	Study Vicinity.....	1-2
2	Knoxville/Knox County Major Streets and Road Plan.....	1-4
3-7	Traffic Control and Geometry.....	1-4
8-17	Existing Peak Hour Volumes.....	2-1
18-27	Existing Capacity and LOS.....	2-2
28-37	Baseline Traffic Volumes.....	3-1
38-47	Baseline Capacity and LOS.....	3-2
48-50	Recommended Geometry.....	3-3
51-66	Projected Traffic Volumes.....	3-4
67-82	Projected Capacity and LOS.....	3-4
83	Projected Average Daily Trips with Anderson Road Connector...	4-1
84	Proposed Geometry with Anderson Road Connector.....	4-2
85	Projected AM Traffic Volumes with Anderson Road Connector...	4-2
86	Projected PM Traffic Volumes with Anderson Road Connector...	4-3
87-88	Projected Capacity and LOS with Anderson Road Connector.....	4-3
89	Recommended Corridor Improvements.....	5-1
90	Recommended Immediate or Short-term Improvements.....	5-3

## LIST OF TABLES

<b>Table</b>	<b>Description</b>	<b>Page</b>
1	Level of Service Description for Signalized Intersections.....	2-2
2	Level of Service Description for Two-way Stop Intersections....	2-2
3	Comparison of Intersection Level of Service With and Without Anderson Road Connector.....	4-5
4	Comparison of Total Delay.....	4-5

# Chapter 1

## INTRODUCTION

The Knoxville Center area and environs has experienced significant development in the last several years, which has outpaced roadway and transportation improvements. The result is increased traffic congestion, abnormal delays, and more accidents. For example, on westbound Tazewell Pike at Jacksboro Pike, motorists often wait up to four minutes to clear the traffic signal. Extremely long delays are also experienced at many other key intersections in the area. Around the Knoxville Center Mall delays are excessive, especially during the afternoon “rush hour” and on Saturdays. Probably the second worst intersection in terms of delays is Millertown Pike at the Knoxville Center/Wal-Mart.

During the public involvement phase of this study, many citizens mentioned problems and potential solutions. Some are confused by the one-way I-640 frontage roads near the mall. Many citizens spoke out against a potential Ault Road extension to the north to intersect Washington Pike, but instead would like minor widening of that road and a traffic signal at Rutledge Pike. Several people mentioned the need to examine the Washington Pike at Valley Road intersection. Most residents of the area want the Tazewell Pike at Jacksboro Pike intersection improved, but few wanted significant widening of Tazewell Pike beyond that intersection.

This traffic study was commissioned by the City of Knoxville and has been developed in cooperation with the Tennessee Department of Transportation (TDOT). There are two companion advance planning reports (APR) which have been developed. The APR’s analyzed existing (1999), projected 2004, and projected 2024 traffic conditions for Tazewell Pike from Broadway to Jacksboro Pike and for Washington and Millertown Pikes, which included the feasibility of extending Murphy Road, from Washington Pike to Millertown Pike north of the Knoxville Center access.

The transportation infrastructure should be further developed to manage the existing traffic conditions and to prepare for future growth anticipated in this area. From the analyses conducted for the existing and projected traffic conditions, improvements are identified for immediate and long-term implementation. Improvements recommended for immediate consideration include intersection turn lanes, installation of new traffic signals, expansion of signal systems, isolated road widening, and updated signal timing.

### **Purpose of Study**

The primary purpose of this study is to evaluate existing and projected traffic conditions for streets not specifically evaluated in the APR's. However, this report does summarize the results of the APR's. The evaluation focused on several key areas. First, it examined the possibility of connecting Tazewell Pike to Washington Pike via a new road near the Farmers Market. Second, it examined signalized intersections on Rutledge Pike between I-40 and Loves Creek Road. Third, it analyzed three corridors – Loves Creek Road, Spring Hill Road, and Ault Road – which extend south from Rutledge Pike. Fourth, it explored briefly the feasibility of modifying South Mall Road, providing for greater access to Knoxville Center. Fifth, it looked at optimizing the existing traffic signal system around the Knoxville Center mall and at the intersection of Tazewell Pike and Jacksboro Pike. Finally, short-term spot improvements were recommended like adding turn lanes, traffic signals, and minor segment widening.

### **Study Location**

The study examined the northeast Knoxville area. Broadway and Ault Road bound the area to the west, Loves Creek Road to the east, Tazewell Pike to the north and Rutledge Pike to the south. The study vicinity is illustrated in Figure 1 along with the 50 study area intersections.

### **Local and Regional Access**

The study area generates much traffic, both retail and residential, yet many of the streets are two-lane facilities. Broadway is a major arterial that leads to the Knoxville

Central Business District. Its congestion results in more traffic on lower classified roads in the study area like Jacksboro Pike, Murphy Road, and Beverly Road.

Tazewell Pike, which is a state secondary route, extends northeast from Broadway. Its functional classification is an urban minor arterial street with an average daily traffic (ADT) volume of 15,031 vehicles per day (vpd). One traffic signal exists at the intersection of Jacksboro Pike. Two deficient vertical curves were noted near the intersections of Shannon Run Drive and Shannondale Road.

Millertown Pike, which is classified as an urban minor arterial street, extends northeast from Washington Pike through and beyond the study area and has an average daily traffic volume of 15,666-vpd north and 4,397-vpd south of the I-640 interchange. Millertown Pike, northeast of the interchange, is multi-lane through the Knoxville Center access before it transitions back to a two-lane facility and crosses the Southern Pacific Railroad. Traffic signals exist at the intersections of Loves Creek Road, Knoxville Center, and the I-640 ramps.

Another urban two-lane minor arterial is Washington Pike, which extends northeast and southwest with an ADT of 13,608-vpd north and 7,072-vpd south of the I-640 interchange. This facility is a multi-lane section through the I-640 interchange, across the Southern Pacific Railroad and to Greenway Drive where it turns to the right and continues as a two-lane facility with an ADT of 7,624-vpd. Traffic signals exist at the intersections of Greenway Drive and the interchange ramps. Washington Pike intersects Millertown Pike and continues to the southwest, where it intersects Broadway (US 441, SR 33).

Loves Creek Road is a two-lane collector street with an approximate ADT of 5770-vpd. This road extends north and south between Rutledge and Millertown Pikes. Ault Road is another north/south two-lane road extending east of the I-40 interchange between Buffat Mill Road and Rutledge Pike. Buffat Mill Road is an east/west collector facility connecting Loves Creek Road on the east to Whittle Springs Road on the west. Buffat

Mill Road parallels Washington and Millertown Pikes. Access to Washington Pike is provided from Whittle Springs Road.

Broadway (U.S. Route 441) is a regional facility accessing Tazewell Pike to the southwest. It provides one of the few connections between the Knoxville CBD and Halls. Broadway intersects Washington Pike further south, between I-640 and Magnolia Avenue (U.S. 11 & 70). Rutledge Pike has an ADT of 19,065-vpd. An interchange with I-40 exists north of Magnolia Avenue for greater regional access. East of the interchange is the intersection with Loves Creek Road which provides local access to the study area.

Figure 2 illustrates the Knoxville/Knox County Major Street and Road Plan, as well as current daily traffic volumes. Figures 3-7 illustrate the principal intersections, identifying the traffic control and the geometry.

## Chapter 2

### EXISTING TRAFFIC CONDITIONS

In order to assess future conditions, it is first necessary to quantify existing traffic conditions. The following sections discuss 1999 traffic volumes, a definition of levels of service, and existing intersection operation.

#### Existing Traffic Volumes

Traffic counts were conducted for an eight-hour period during 1999 and from these counts peak-hour traffic volumes were developed, which are illustrated in Figures 8-17.

#### Existing Capacity and Level of Service

In order to evaluate the current operations of the traffic control devices, capacity and level of service were calculated using the 1994 **Highway Capacity Manual, Special Report 209** published by the Transportation Research Board. Signalized and unsignalized intersections are evaluated based on estimated intersection stop delays, which may be related to level of service (LOS). Level of service and capacity are the measurements of an intersection's ability to accommodate traffic volumes. Levels of service for intersections range from A to F. A LOS of A is the best, and LOS F is failing.

For signalized intersections, a LOS A has an average estimated intersection stop delay of 5 seconds or less, and LOS F has an estimated stop delay of greater than 60 seconds. A LOS of C and D are typical design values. Within urban areas, the Institute of Transportation Engineers (ITE) consider a LOS D, which is a stop delay between 25 and 40 seconds, acceptable for signalized intersections.

Unsignalized intersection levels of service have lower thresholds of delay. A LOS of F exceeds estimated delays of 45 seconds. For urban arterials, minor approaches may frequently experience levels of service E. A full level of service description for signalized and unsignalized intersections is presented in Tables 1 and 2, respectively.

**Table 1  
LEVEL OF SERVICE (LOS) DESCRIPTION  
FOR SIGNALIZED INTERSECTIONS**

<b>LOS</b>	<b>AVERAGE STOP DELAY PER VEHICLE (SEC)</b>	<b>DESCRIPTION</b>
A	≤ 5.0	Very low delay with extremely favorable progression. Most vehicles don't stop.
B	>5.0 and ≤15.0	Generally good progression. Increase number of stops from that described for LOS "A" resulting in higher delays
C	>15.0 and ≤25.0	Fair progression with increased delay. Number of stopping vehicles become significant; however, many still pass through the intersection without stopping. Stable flow.
D	>25.0 and ≤40.0	The influence of congestion becomes more noticeable. Longer delays resulting from unfavorable progression, longer cycles, or high V/C ratios. Approaching unstable flow.
E	> 40.0 and ≤60.0	Limit of acceptable delay. Long delays associated with poor progression, long cycles, or high V/C ratios.
F	>60.0	Unacceptable operation resulting from oversaturation (flow rates exceed capacity). Poor progression, long cycles, and high V/C ratios.

**SOURCE:** Highway Capacity Manual, TRB Special Report 209

**Table 2  
LEVEL OF SERVICE (LOS) DESCRIPTION  
FOR TWO-WAY STOP INTERSECTIONS**

<b>LOS</b>	<b>AVERAGE STOP DELAY PER VEHICLE (SEC)</b>	<b>DESCRIPTION</b>
A	≤ 5.0	No conflicting traffic for the minor movement.
B	>5.0 and ≤10.0	
C	>10.0 and ≤20.0	
D	>20.0 and ≤30.0	
E	>30.0 and ≤45.0	
F	>45.0	

**SOURCE:** Highway Capacity Manual, TRB Special Report 209

Capacity and level of service analyses were conducted for the principal intersections and the results for the AM and PM peak hours are illustrated in Figures 18-27. The following intersections currently have movements operating at LOS E or F (unsignalized locations) or have an overall operation of LOS E or F (signalized intersections).

- ◆ Broadway and Greenway Road
- ◆ Broadway and Sanders Drive
- ◆ Tazewell Pike and Collier Road
- ◆ Tazewell Pike and Jacksboro Pike
- ◆ Briercliff Road and Tazewell Pike
- ◆ Beverly Road and Tazewell Pike
- ◆ South Mall Road and west crossover
- ◆ Ault Road and Rutledge Pike

In most cases, the unacceptable LOS's at these intersections suggest that some improvements are warranted.

Although it is not completely apparent from the LOS analysis, the intersection of Tazewell Pike at Jacksboro Pike creates the most delay for motorists. Delays often exceed 4 minutes at this intersection. Again, not completely reflected in the LOS analysis is the delay at the intersection of Millertown Pike and the Knoxville Center Mall Road/Wal-Mart access. Delays at this intersection typically occur on weekends and on other days when retail space experiences peak activity.

Tazewell Pike, from the Broadway bridge to Jacksboro Pike (at Pratt's Market), experiences substantial congestion, especially during the PM peak hour. A large part of the congestion is not attributed to the Tazewell Pike at Jacksboro intersection, but instead is due to a lack of through lanes. Congestion is exasperated by frequent left and right turning traffic and a lack of turn lanes.

There are several intersections along Tazewell Pike that create excessive delay in peak periods. Consequently some mitigation might be necessary. Traffic signals with turn lanes should be considered, but the disadvantage is that uninterrupted flow on Tazewell Pike is sacrificed.

Around the Knoxville Center Mall, two intersections with noteworthy delays include Millertown Pike at Loves Creek Road and Washington Pike at Mill Road. A left-turn phase has been added to southbound Millertown Pike at Loves Creek Road, but a southbound left-turn lane would reduce delays even more. Afternoon peak hour queues and delays on northbound Mill Road at Washington Pike indicate that a traffic signal may be warranted.

Many Knoxville Center Mall visitors and customers of the other commercial developments near the South and North Mall Roads complained about the road configuration being confusing. Further analysis should be undertaken to explore options for improvements.

Delays on Ault Road at Rutledge Pike are above average in the afternoon. A traffic signal may be warranted.

## Chapter 3

### PROJECTED TRAFFIC CONDITIONS

The Tennessee Department of Transportation requires that APR's contain baseline traffic five years beyond the existing traffic counts. As such, this overall transportation study will include existing conditions, Year 2004 baseline conditions, and Year 2024 conditions.

#### **Traffic Growth Rate**

Traffic projections were determined using historical traffic counts for the past ten years that identified an annual growth rate of 7.0 percent for the Washington and Millertown Pikes study area. This growth rate not only represents the historical growth in the study area, but also the trend from residential characteristics to greater commercialization. The study area is expected to continue in commercial growth or even more intense land uses for many more years. For Tazewell Pike, the historical traffic counts for the past ten years identified an annual growth rate of 3.0 percent. In the Beverly Road and Greenway Road area, a 3.0 percent annual growth rate was used as well. A 0.5 percent annual growth rate was used in the Rutledge Pike area.

#### **Baseline Traffic Volumes**

Baseline traffic for 2004 used a growth factor of 35.0 percent around the Knoxville Center Mall. Therefore, the five-year baseline traffic for the Millertown/Washington Pike APR and mall roads north and south was calculated by factoring the 1999 design hour volumes (DHV) by 1.35. Intersections along Tazewell Pike were assigned 2004 DHV's by multiplying the 1999 DHV's by a factor of 1.15. Likewise, the 1999 traffic volumes in the Beverly Road area were increased by 15 percent to estimate year 2004 conditions. In the Rutledge Pike area, the total growth assumed in developing year 2004 traffic volumes was 2.5 percent. Figures 28-37 illustrates the resulting 2004 baseline traffic for AM and PM peak hours.

#### **Baseline Capacity and Level of Service**

Capacity and level of service analyses were conducted to determine the baseline conditions of the study intersections. Figures 38-47 illustrate the resulting capacity and levels of service.

By 2004, the following intersections will have movements operating at LOS E or F (unsignalized locations) or have an overall operation of LOS E or F (signalized intersections).

- ◆ Broadway and Greenway Road
- ◆ Broadway and Sanders Drive
- ◆ Tazewell Pike and Collier Road
- ◆ Tazewell Pike and Jacksboro Pike
- ◆ Luttrell Road and Tazewell Pike
- ◆ Kesterwood Drive and Tazewell Pike
- ◆ Oakland Road and Tazewell Pike
- ◆ Beverly Place and Tazewell Pike
- ◆ Briercliff Road and Tazewell Pike
- ◆ Beverly Road and Tazewell Pike
- ◆ Villa Road and Tazewell Pike
- ◆ Shannondale Road and Tazewell Pike
- ◆ Murphy Road and Tazewell Pike
- ◆ Murphy Road and Washington Pike
- ◆ McCampbell Road and Washington Pike
- ◆ Edmonson Lane and Washington Pike
- ◆ Babelay Road and Washington Pike
- ◆ Mill Road and Washington Pike
- ◆ Greenway Road and Washington Pike
- ◆ Valley View Road and Washington Pike
- ◆ Centerline Drive and Washington Pike
- ◆ Washington Pike and Millertown Pike
- ◆ Springhill Road and Millertown Pike

- ◆ South Mall Road and Millertown Pike
- ◆ South Mall Road and west crossover
- ◆ North Mall Road and Millertown Pike
- ◆ North Mall Road and west crossover
- ◆ North Mall Road and east crossover
- ◆ Mall/Wal-mart Entrance and Millertown Pike
- ◆ Loves Creek Road and Millertown Pike
- ◆ Mill Road and Millertown Pike
- ◆ I-40 EB Ramp and Rutledge Pike
- ◆ Springhill Road and Rutledge Pike

### **Summary of Tazewell Pike and Knoxville Center APR's**

The Tazewell Pike APR calls for widening Tazewell Pike to five lanes from Broadway to Jacksboro Pike and improving the intersections of Tazewell Pike at Jacksboro Pike. In the long-term future, improvements to Tazewell Pike from Jacksboro Pike eastwards may be necessary. Figure 48 depicts improvements recommended in the APR plus possible long-term future improvements along Tazewell Pike.

Figures 49 and 50 illustrate proposed street improvements contained in the Knoxville Center APR. The most significant recommendations include widening the 2-lane portions of Washington and Millertown Pikes to multi-lane (either 5-lane or 4-lane divided), widening Millertown Pike near the Mall/Wal-mart entrance, and extending Murphy Road southwards to Loves Creek Road.

### **Potential Rutledge Pike at Ault Road Improvements**

Motorists often experience long delays at the intersection of Rutledge Pike and Ault Road. A traffic signal warrant analysis suggests that a traffic signal may be warranted at this location. As such, Figure 50 depicts geometric conditions with a traffic signal at this location and a new southbound left-turn lane on Ault Road's approach to Rutledge Pike.

## **Future Traffic Volumes**

Using the calculated growth rates and the baseline 2004 traffic, the projected 2024 ADT on Tazewell Pike is 23,370-vpd. The extended Murphy Road ADT is projected to be 15,000-vpd to 22,000-vpd by Year 2024. The 2024 ADT for the north segment of Washington Pike above the I-640 interchange is projected to be 34,660-vpd, and the south segment is projected to have 27,370-vpd. On Millertown Pike, the projected 2024 ADT is 50,720-vpd north and 15,090-vpd south of I-640.

This report has projected ADT's and DHV's for the roads and intersections within the study area. Peak hour DHV's for 2024 with and without the Murphy Road extension can be found in Figures 51-66.

The Murphy Road extension should have a significant effect on the existing travel patterns. This new road should divert approximately 20 percent of the traffic from Tazewell Pike and 10 percent from Washington Pike.

## **Projected Capacity and Level of Service**

The calculated capacity and LOS for the study intersections with and without Murphy Road extended are illustrated in Figures 67-82. The capacity and LOS were calculated assuming the proposed signals and left-turn lanes were installed. Even with the proposed improvements several intersections may experience unacceptable levels of service. Mitigation of these failing or poorly operating intersections will require consideration of additional improvements as operations deteriorate over the next 20 years.

By 2024, the following intersections will have movements operating at LOS E or F (unsignalized locations) or have an overall operation of LOS E or F (signalized intersections) without Murphy Road being extended southward to Millertown Pike.

- ◆ Broadway and Greenway Road
- ◆ Broadway and Sanders Drive

- ◆ Tazewell Pike and Collier Road
- ◆ Tazewell Pike and Jacksboro Pike
- ◆ Luttrell Road and Tazewell Pike
- ◆ Kesterwood Drive and Tazewell Pike
- ◆ Oakland Road and Tazewell Pike
- ◆ Beverly Place and Tazewell Pike
- ◆ Briercliff Road and Tazewell Pike
- ◆ Beverly Road and Tazewell Pike
- ◆ Villa Road and Tazewell Pike
- ◆ Anderson Road and Tazewell Pike
- ◆ Fountain Gate Road and Tazewell Pike
- ◆ Clearbrook Drive and Tazewell Pike
- ◆ Murphy Road and Tazewell Pike
- ◆ Murphy Road and Washington Pike
- ◆ McCampbell Road and Washington Pike
- ◆ Edmonson Lane and Washington Pike
- ◆ Babelay Road and Washington Pike
- ◆ Mill Road and Washington Pike
- ◆ Greenway Road and Washington Pike
- ◆ I-640 WB Ramp and Washington Pike
- ◆ I-640 EB Ramp and Washington Pike
- ◆ Valley View Road and Washington Pike
- ◆ Centerline Drive and Washington Pike
- ◆ Pinehurst Drive and Washington Pike
- ◆ Washington Pike and Millertown Pike
- ◆ Springhill Road and Millertown Pike
- ◆ South Mall Road and Millertown Pike
- ◆ South Mall Road and west crossover
- ◆ South Mall Road and east crossover
- ◆ North Mall Road and Millertown Pike
- ◆ North Mall Road and west crossover

- ◆ North Mall Road and east crossover
- ◆ Mall/Wal-mart Entrance and Millertown Pike
- ◆ Loves Creek Road and Millertown Pike
- ◆ Mill Road and Millertown Pike
- ◆ Buffat Mill Road and Loves Creek Road
- ◆ Springhill Road and Rutledge Pike

By 2024 with the Murphy Road extension, the following intersections will have movements operating at LOS E or F (unsignalized locations) or have an overall operation of LOS E or F (signalized intersections).

- ◆ Broadway and Greenway Road
- ◆ Broadway and Sanders Drive
- ◆ Tazewell Pike and Collier Road
- ◆ Luttrell Road and Tazewell Pike
- ◆ Kesterwood Drive and Tazewell Pike
- ◆ Oakland Road and Tazewell Pike
- ◆ Beverly Place and Tazewell Pike
- ◆ Briercliff Road and Tazewell Pike
- ◆ Beverly Road and Tazewell Pike
- ◆ Villa Road and Tazewell Pike
- ◆ Anderson Road and Tazewell Pike
- ◆ Fountain Gate Road and Tazewell Pike
- ◆ Clearbrook Drive and Tazewell Pike
- ◆ Murphy Road and Tazewell Pike
- ◆ Murphy Road and Washington Pike
- ◆ McCampbell Road and Washington Pike
- ◆ Edmonson Lane and Washington Pike
- ◆ Greenway Road and Washington Pike
- ◆ Centerline Drive and Washington Pike
- ◆ Pinehurst Drive and Washington Pike

- ◆ Springhill Road and Millertown Pike
- ◆ South Mall Road and Millertown Pike
- ◆ South Mall Road and west crossover
- ◆ South Mall Road and east crossover
- ◆ North Mall Road and Millertown Pike
- ◆ North Mall Road and west crossover
- ◆ North Mall Road and east crossover
- ◆ Mall/Wal-mart Entrance and Millertown Pike
- ◆ Mill Road and Murphy Road
- ◆ Edmonson Road and Murphy Road
- ◆ Mill Road and Millertown Pike
- ◆ Buffat Mill Road and Loves Creek Road
- ◆ Springhill Road and Rutledge Pike

## Chapter 4

### POTENTIAL TAZEWELL PIKE AND WASHINGTON PIKE CONNECTOR

As part of the Advanced Planning Report (APR) for the Tazewell Pike area, it became apparent that an additional connection needed to be given consideration to provide Tazewell Pike with another link to I-640 based on the projected growth. A connector along Anderson Road to the Washington Pike intersection at the Farmers' Market would provide Tazewell Pike direct access to I-640 given consideration to the ridge and railroad line behind the Farmers' Market. Anderson Road is between the current routes used to connect these two areas. An analysis was performed to determine the benefit and cost of a connector roadway.

#### **Description and Purpose**

A connector through the ridge behind the Farmers' Market would provide an access between Tazewell Pike and Washington Pike. Tazewell Pike would then have a direct route to I-640 and the mall business area. The connector would shorten travel times, as current traffic travels Beverly Road, Greenway Road, Washington Pike, and Murphy Road to maneuver around the ridge between Tazewell Pike and I-640. It would also attract trips due to wider lane widths and straighter roadway segments. Traffic would be diverted from Greenway and Beverly Roads and a portion from the intersection of Tazewell Pike and Jacksboro Pike. The topography of this area with the high ridge would assist in constructing a grade separated railroad crossing, thereby reducing the number of vehicles that use the at-grade crossing on Beverly Road. Some diversion of traffic from the intersection of Tazewell Pike and Jacksboro Pike can also be expected, especially for trips destined or originating in the vicinity of the connector road's intersection with Tazewell Pike.

#### **Year 2024 Daily Traffic With and Without Connector**

A comparison between the projected average daily traffic (ADT) with the Anderson Road Connector and without the Anderson Road Connector for 2024 is shown in Figure 83.

**Tazewell Pike** - The connector would reduce the ADT's by 1250 vehicles on the segments between Broadway Street and Beverly Road. Daily traffic on the segments between Beverly and Anderson Roads would increase due to diversion to the connector. Tazewell Pike, north of Anderson Road, would not notice any change in ADT's.

**Beverly Road** - The Anderson Road connector would reduce the Beverly Road ADT's by approximately 7010 vehicles from 9780 to 2770 vehicles per day.

**Anderson Road Connector** - The connector would accommodate a projected 9290-vpd with 1020-vpd already on Anderson Road, 1250-vpd diverting from Tazewell Pike, and 7010-vpd diverting from Beverly Road.

### **Assumes Typical Section and Intersection Geometry**

The proposed geometry is shown in Figure 84. The connector would be a 1.15-mile long 3-lane roadway. The intersection at Tazewell Pike and Anderson Road is proposed to have exclusive left- and right-turn lanes. The intersection at the Farmers' Market would have exclusive left-, through and right-turn lanes on the connector with the proposed APR geometry on Greenway Road and Washington Pike.

### **Intersection Evaluation and Comparison**

**AM Projected Intersection Turning Movement Volumes** - The morning peak hour intersection turning movement volumes are presented in Figure 85. The major movement of traffic travels southward on Tazewell Pike toward Broadway and I-640. The Anderson Road Connector would reduce volumes on the south end of Tazewell Pike below Beverly Road. Some southbound traffic on the segment of Tazewell Pike between Beverly Road and Anderson Road would reverse their direction of travel due to the Anderson Road Connector. This creates a change in critical movements at some intersections with increased left-turn movement volumes. The diverted traffic from the

Tazewell Pike and Jacksboro Pike intersection would become a southbound through movement at the Washington Pike and Farmers' Market intersection.

**PM Projected Intersection Turning Movement Volumes** - The afternoon peak hour intersection turning movement volumes are presented in Figure 86. The major movement of traffic travels northward on Tazewell Pike. The Anderson Road Connector also would reduce volumes on the south end of Tazewell Pike below Beverly Road in the afternoon. Some northbound traffic on the segment between Beverly Road and Anderson Road would reverse their direction of travel due to the Anderson Road Connector.

**AM Projected LOS at Key Intersections** – The projected morning peak hour intersections' level of service (LOS) are illustrated in Figure 87. The signalized intersections at Jacksboro Pike, Briercliff Road, Beverly Road, and Villa Road showed improvements in the LOS and a decrease in the volume to capacity ratio (v/c ratio). The signalized intersection of Shannondale Road showed a worse LOS and an increase in the v/c ratio due to the increase in traffic on these segments. The Anderson Road intersection would be signalized with the proposed improvements and showed an overall LOS F due to the large left turn volumes from Anderson Road onto Tazewell Pike. The Farmers' Market intersection would remain an overall LOS F with an increased v/c ratio to 1.54.

**PM Projected LOS at Key Intersections** – The projected afternoon peak hour intersection levels of service (LOS) are illustrated in Figure 88. With the connector, the signalized intersections at Jacksboro Pike, Briercliff Road, and Beverly Road showed a better LOS and a reduction in the v/c ratio. The signalized intersections of Villa Road and Shannondale Road showed a worse LOS and an increase in the v/c ratio due to the increase in traffic on these segments. The Anderson Road signalized intersection operated at a LOS D. The Farmers' Market intersection would operate at an overall LOS F with a v/c ratio increase to 1.13.

**LOS and Delay Comparison** – The LOS comparison with and without the Anderson Road Connector is shown in Table 3. The LOS and v/c ratio for the individual intersections were compared to determine the benefit of the Anderson Road Connector. Additionally, a total delay time per vehicle was calculated by taking the delay time in seconds per vehicle for the individual intersections and multiplied it by the total volume entering each intersection. This delay comparison for the seven key intersections is shown in Table 4. The delay analysis was performed for AM and PM conditions to determine whether there would be a reduction in total delay time with the Anderson Road Connector. In conclusion, the analysis showed that the Anderson Road Connector improved the operation of the Jacksboro Pike and Beverly Road intersection, but had an adverse impact on the Tazewell Pike intersections located between Villa Road and Anderson Road. Total delay with the Anderson Road Connector was increased by 2 percent and 16 percent during the AM and PM peak hour, respectively.

**Table 3  
COMPARISON OF INTERSECTION LOS AND V/C  
WITH AND WITHOUT ANDERSON ROAD CONNECTOR**

AM Intersection	Description	Without Connector		With Connector		Which is Better?
		LOS	v/c ratio	LOS	v/c ratio	
3	Tazewell Pk / Jacksboro Pk	B	0.62	B	0.57	With
7	Tazewell Pk / Briercliff Rd	F	1.2	E	1.14	With
8	Tazewell Pk / Beverly Rd	D	1.05	D	0.98	With
9	Tazewell Pk / Villa Rd	F	1.14	E	1.13	With
10	Tazewell Pk / Shannondale Rd	B	0.87	E	1.09	Without
11	Tazewell Pk / Anderson Rd	A,F <sub>(1)</sub>	N/A	F	0.79	
27	Washington Pk / Farmers' Market	F	1.08	F	1.54	Without

PM Intersection	Description	Without Connector		With Connector		Which is Better?
		LOS	v/c ratio	LOS	v/c ratio	
3	Tazewell Pk / Jacksboro Pk	B	0.86	B	0.79	With
7	Tazewell Pk / Briercliff Rd	F	1.42	F	1.36	With
8	Tazewell Pk / Beverly Rd	F	1.15	E	1.03	With
9	Tazewell Pk / Villa Rd	B	0.88	C	0.93	Without
10	Tazewell Pk / Shannondale Rd	B	0.81	E	1.05	Without
11	Tazewell Pk / Anderson Rd	B,D <sub>(1)</sub>	N/A	D	1.06	
27	Washington Pk / Farmers' Market	E	0.97	F	1.13	Without

(1) The first letter represents left turns from Tazewell Pike onto Anderson Road whereas the second letter represents left and right turns from Anderson Road onto Tazewell Pike.

**Table 4  
COMPARISON OF TOTAL DELAY**

<b>With Anderson Road Extended</b>	<b>Total Delay (sec)</b>
AM	974,720
PM	868,400
<b>Without Anderson Road Extended</b>	<b>Total Delay (sec)</b>
AM	956,343
PM	747,548
<b>Percent Increase / Reduction With Anderson Road Extended</b>	
AM	2%
PM	16%

## **Summary**

Some intersections along Tazewell Pike will benefit from the Anderson Road Connector and others will not. At the intersection of Washington Pike and Greenway Road at the Farmers' Market, motorists will suffer longer delays if the connector is constructed. Overall intersection delays are expected to be worse in both the AM and PM peak hours. The intersection delay analysis indicates that the connector will not significantly improve travel in the Knoxville Center environs. There is some benefit to a more direct connection between Tazewell and Washington Pikes, more generous lane widths, and a grade separation of the railroad tracks, but the benefit, coupled with more delay at the key intersections, suggest that the Anderson Road Connector not be considered further. Instead, it is probably worthwhile to make improvements to Beverly and Greenway Roads.

## Chapter 5

### RECOMMENDATIONS

The recommendations are divided into three parts including a summary of those related to the Advanced Planning Reports (APR's), short-term relatively low cost improvements, and long-term potential improvements that will require further studies. The recommendations in the APR and long-term potential road improvements are shown in Figure 89.

#### **Advanced Planning Report Recommendations**

**Tazewell Pike-** A significant amount of congestion is experienced on Tazewell Pike from Broadway northwards through its intersection with Jacksboro Pike. This congestion has been exasperated by the opening of I-640's new eastbound off ramp to Old Broadway and Broadway. In fact, this new ramp has resulted in considerable more congestion on Old Broadway up to where it changes to Tazewell Pike.

Some of the congestion is caused by the signalized intersection of Tazewell Pike at Jacksboro Pike. More traffic capacity is needed on all four approaches of this intersection to reduce delays that can exceed four minutes during peak periods. The Tazewell Pike APR recommends widening Tazewell Pike to 5 lanes from the Broadway bridge to Jacksboro Pike. Although not part of this APR, some consideration should be given to improvements to Tazewell Pike and Old Broadway from the Broadway bridge south to the I-640 bridge. The Tazewell Pike APR also recommends significant improvements to the Tazewell Pike and Jacksboro Pike intersection including the following:

- ◆ Northbound - 1 left-turn lane, 2 through lanes, and 1 right-turn lane;
- ◆ Southbound - 1 left-turn lane, 1 through lane, and 1 shared right-turn/through lane;
- ◆ Eastbound - 1 left-turn lane, 1 shared right-turn/through lane; and,
- ◆ Westbound - 2 left-turn lanes and 1 shared right-turn/through lane.

The westbound approach widening would extend from Jacksboro Pike to just beyond Fowler Lane.

**Washington/Millertown Pikes** - Improvements contained in the Knoxville Center APR include widening both Millertown and Washington Pikes, and provision of additional auxiliary lanes to better manage the intersection turning movements. Millertown Pike would transition from the existing two lanes to a five-lane undivided section with a continuous left-turn lane south of the I-640 interchange and to a six-lane divided facility north of the interchange to Loves Creek Road where the section transitions to a four-lane divided roadway. The typical section of the five-lane facility is an 84-foot minimum R.O.W. with five 12-foot travel lanes, two 30-inch curb and gutter on each side, and two 7-foot sidewalks. The four-lane divided section would have a minimum R.O.W. of 94 feet. The four-lane section would have a median width of 22 feet with an 18-foot raised median, four 12-foot travel lanes, two 30-inch curb and gutter each side, and two 7-foot sidewalks.

In the APR recommendation, Washington Pike would be upgraded to a five-lane south of Greenway Drive and a four-lane divided roadway northeast of the Greenway Drive intersection. The five-lane undivided and four-lane divided typical sections would be the same as Millertown Pike including two 30-inch curb and gutter on each side, five 12-foot travel lanes, and two 7-foot sidewalks within an 84-foot minimum R.O.W. Between Greenway Drive and Murphy Road, the divided typical section would include a minimum of a 94-foot R.O.W. with an 18-foot raised median. Both directions would be a width of 28 feet between curb faces and two 7-foot sidewalks would be provided. To improve the Washington Pike interchange operation, the relocation of full access at Valley View Drive would be opposite Centerline Drive. The existing intersection of Centerline Drive would be limited to right-turns-only. New traffic signals would be anticipated for the intersections of Washington Pike at Millertown Pike, Centerline Drive, Mill Road, and Babelay Drive and Millertown Pike at Loves Creek Road.

In addition, the APR suggest that Murphy Road should be extended from Washington Pike to Millertown Pike aligning Millertown Pike with the Murphy Road extension, thereby providing a primary movement between Tazewell Pike and the I-640 interchange. Loves Creek Road would intersect Millertown Pike creating a “T” intersection. Millertown Pike north across the railroad would be terminated and vacated. This change in traffic pattern would require the realignment of Loves Creek Road and Mill Road. The Murphy Road extension should be a four-lane divided section having a minimum R.O. W. of 94 feet. The four-lane section would have a median width of 22 feet with an 18-foot raised median, four 12-foot travel lanes, two 30-inch curb and gutter on each side, and two 7-foot sidewalks. For extended Murphy Road, traffic signals would be anticipated at the intersections of Mill Road, Babelay Drive, and Washington Pike.

**Tazewell Pike and Washington Pike Connection** - The analysis undertaken suggests that this connector road should not be pursued. Instead, a more worthwhile project would be to make improvements to Beverly Road and Greenway Road.

### **Immediate and Short Term Improvements**

Based on 1999 traffic conditions, immediate improvements should be considered for new traffic signals, expansion of traffic signal systems, and isolated intersection turn lanes. In addition, improved signal timing can be developed using the traffic data obtained for this traffic study. These improvements are identified in Figure 90.

**Traffic Signals** - New traffic signals are currently warranted and should be considered for the following intersections:

- Tazewell Pike & Murphy Road (Warrant 2, Warrant 3)
- Tazewell Pike & Briercliff Road (Warrant 1, Warrant 2, Warrant 3)
- Tazewell Pike & Beverly Road (Warrant 1, Warrant 2, Warrant 3)
- Washington Pike & Mill Road (Warrant 1, Warrant 2, Warrant 3)
- Washington Pike & Valley View Road (Warrant 1, Warrant 2, Warrant 3)
- Rutledge Pike & Ault Road (Warrant 1, Warrant 2, Warrant 3)

Although each of these intersections meets the volume criteria for a traffic signal, it does not mean that a traffic signal should necessarily be installed at this time. The number of accidents at these intersections preventable by a traffic signal should be weighed against the possibility that a new traffic signal may cause some accidents. Moreover, the characteristics of the area should be considered along with a lack of or presence of other traffic signals. For example, no traffic signals along Tazewell Pike exist today and it would change this facility's character if they were installed. Conversely, a new traffic signal was recently installed at the intersection of Washington Pike at Murphy Road thereby beginning a conversion to a more urban type of roadway.

**Signal Systems** – Wilbur Smith Associates developed updated weekday peak hour timing plans for the Millertown Pike and Washington Pike traffic signal systems east and west of Knoxville Center Mall, respectively. The proposed new splits and offsets are based on 1999 turning movement counts. Ideally the signals in both systems should operate in an actuated/coordinated manner. The Transyt-7F output for these two traffic signal systems is provided in the appendix:

- Millertown Pike signal system re-timing from I-640 interchange to Loves Creek Road.
- Washington Pike signal system re-timing from I-640 interchange to Greenway Road.

**Intersection Improvements** – Four intersections have been identified for turn lanes or realignment. Some of the turn lanes should be constructed in conjunction with the installation of traffic signals. The following improvements are proposed:

- Provide a southbound left-turn lane on Millertown Pike at Loves Creek Road.
- Provide separate left- and right-turn lanes on Ault Road at Rutledge Pike. (If a traffic signal is installed)
- If traffic signals are installed, provide left-turn lanes on Tazewell Pike at Briercliff Road, Beverly Road, and Murphy Road.
- Realign Valley View Road with Center View Road.

**Ault Road** – Many public-meeting participants expressed a concern about Ault Road being too narrow with deep ditches, thereby creating a high probability for accidents. This condition was verified in the field. It is recommended that some isolated widening be completed on this road to improve safety.

### **Long Term Potential Improvements**

As development continues to occur in northeast Knoxville, more road improvements will be needed to assure good access and circulation. Many individuals that participated in the public involvement process expressed a need to provide better access to Knoxville Center from the north (Halls area via Broadway) and south (Rutledge Pike). Broadway is a congested corridor, therefore some motorists use collectors and residential streets to travel between Broadway and the Knoxville Center area.

To the south of Knoxville Center, two roads - Springhill Road and Loves Creek Road – provide the primary access. Loves Creek Road is narrow and contains a very narrow railroad underpass near Rutledge Pike. Widening Loves Creek Road would present some environmental problems because of its proximity to Loves Creek plus would necessitate widening the underpass. Springhill Road extends from Rutledge Pike to Millertown Pike, but it crosses a railroad track, is narrow, has poor vertical and horizontal alignment, and contains primarily residential development. As an alternative to improving Loves Creek Road or Springhill Road, a proposal to extend Ault Road north to intersect Washington Pike was considered.

Despite the cost required to widen the railroad underpass and the environmental concerns, it is recommended that Loves Creek Road be targeted for further planning studies. The two other options for better Knoxville Center access, Ault Road and Springhill Road, are not considered to be viable options. Incidentally, many residents in the Ault Road area were against extending Ault Road to Millertown Pike. Additional studies of Loves Creek Road should consider what impact widening it to four lanes would have on the environment. Moreover, the R.O.W. impact and cost, especially of widening the railroad underpass should be considered.

Potential long-term road improvements in northeast Knoxville would include a circumferential road network consisting of an improved Brown Gap Road, an improved Murphy Road, Murphy Road Extended, an improved Loves Creek Road, and an improved Chilhowee Drive. This circumferential road network would attract trips currently using over-crowded Broadway and collector and neighborhood streets in the Tazewell Pike area.

Proposed improvements to roads around Knoxville Center Mall and the aforementioned circumferential road network will help relieve traffic congestion on Tazewell Pike from Jacksboro Pike to Murphy Road. Nevertheless, some improvements to Tazewell Pike might still be necessary in the long-term. These could be confined to major intersections, or could include a major widening to a consistent typical section.

Although the North and South Mall Roads function at a good level of service for the most part, many citizens that participated in the public involvement process indicated that they are confusing. Some citizens also said that better access to/from I-640 was needed. Additional studies should be conducted to examine access to Knoxville Center Mall and the function of the one-way frontage roads and their connecting bridges.

# **APPENDIX**

*Map Illustrations*

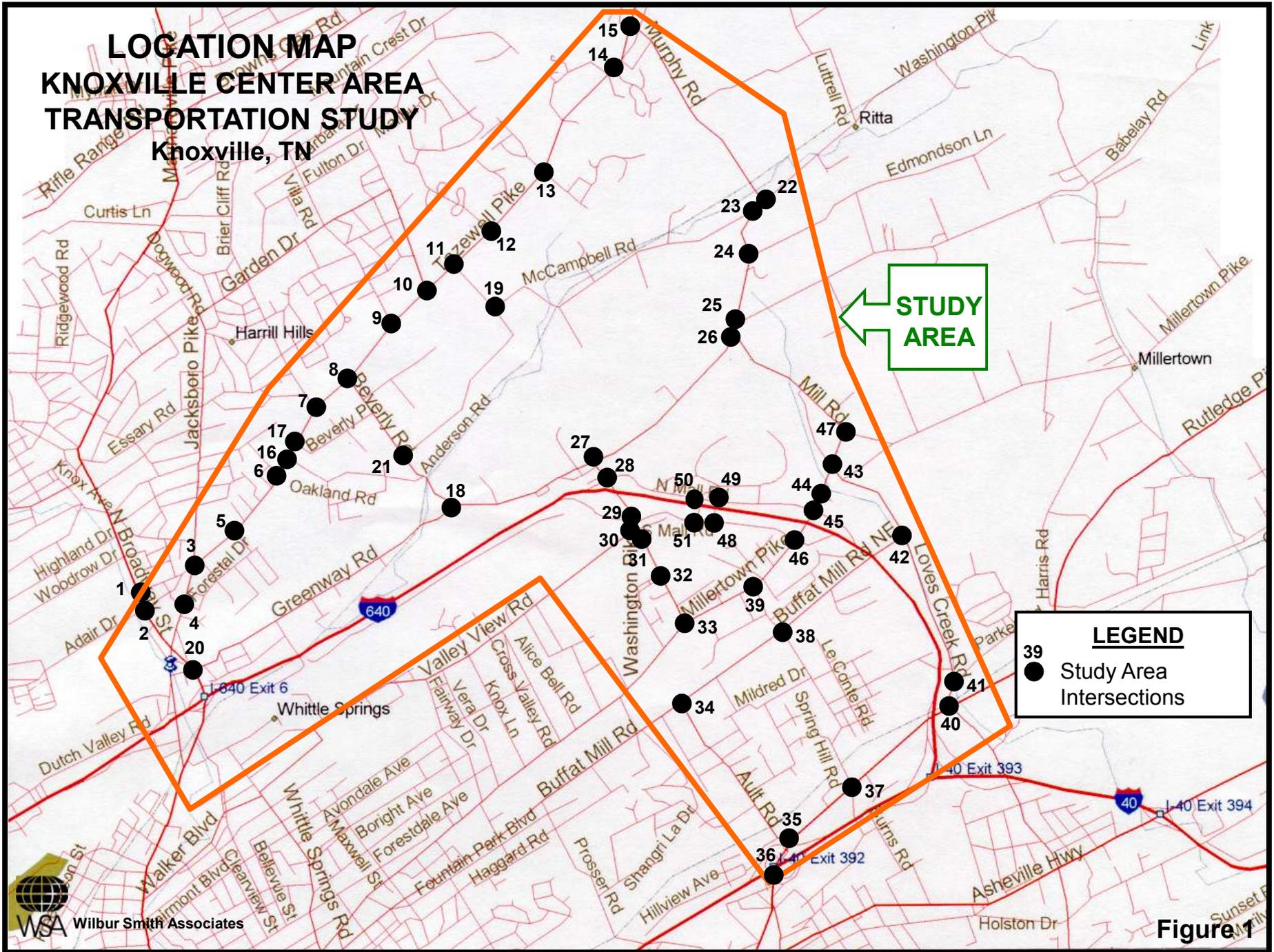
*Geometry, Volume and LOS Figures*

*Turning Movement Counts  
With Signal Warrant Evaluation*

*Daily Traffic Volumes*

*Transyt-7F Runs*

# LOCATION MAP KNOXVILLE CENTER AREA TRANSPORTATION STUDY Knoxville, TN

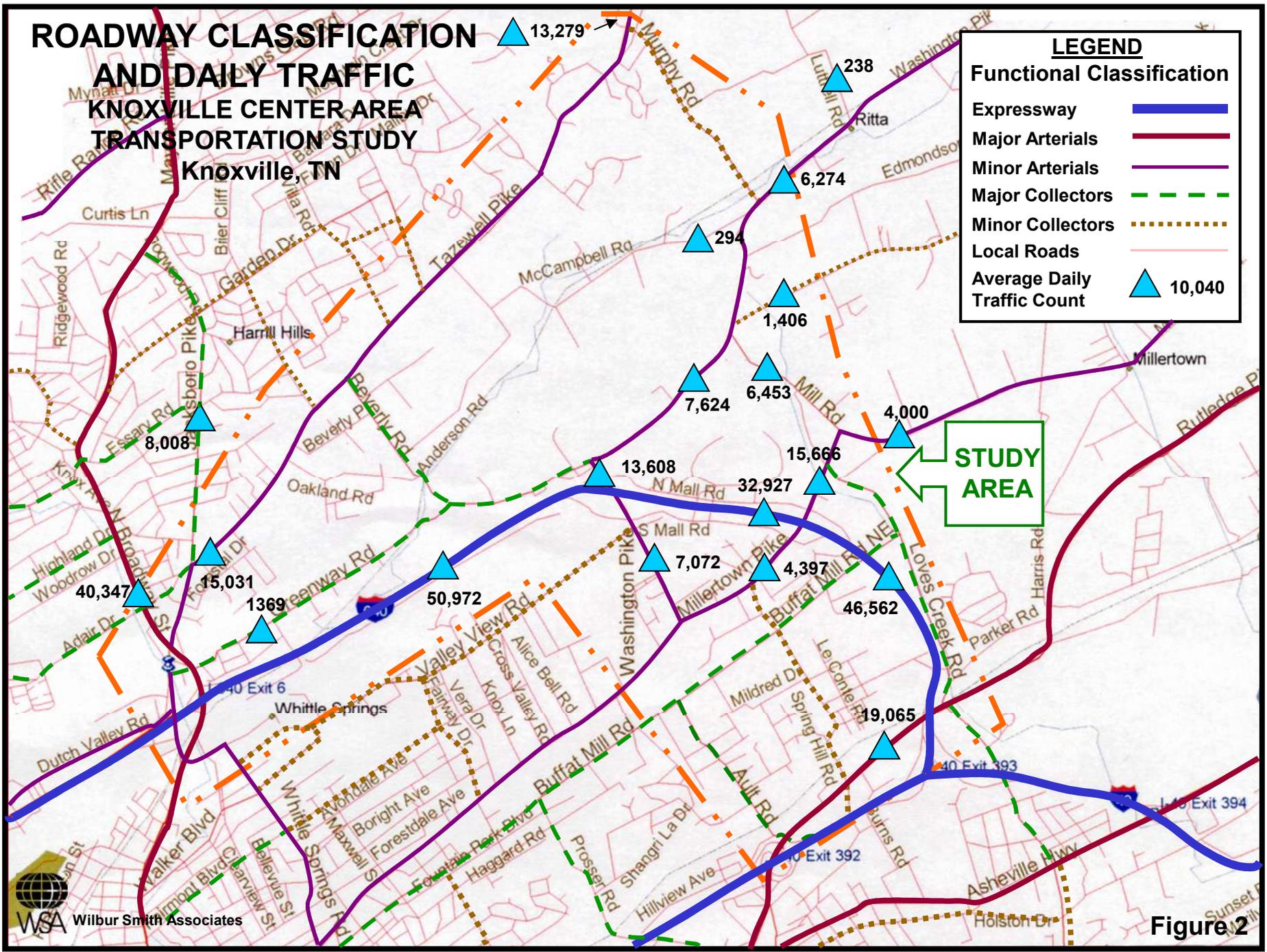


**STUDY AREA**

**LEGEND**  
● Study Area Intersections

# ROADWAY CLASSIFICATION AND DAILY TRAFFIC KNOXVILLE CENTER AREA TRANSPORTATION STUDY Knoxville, TN

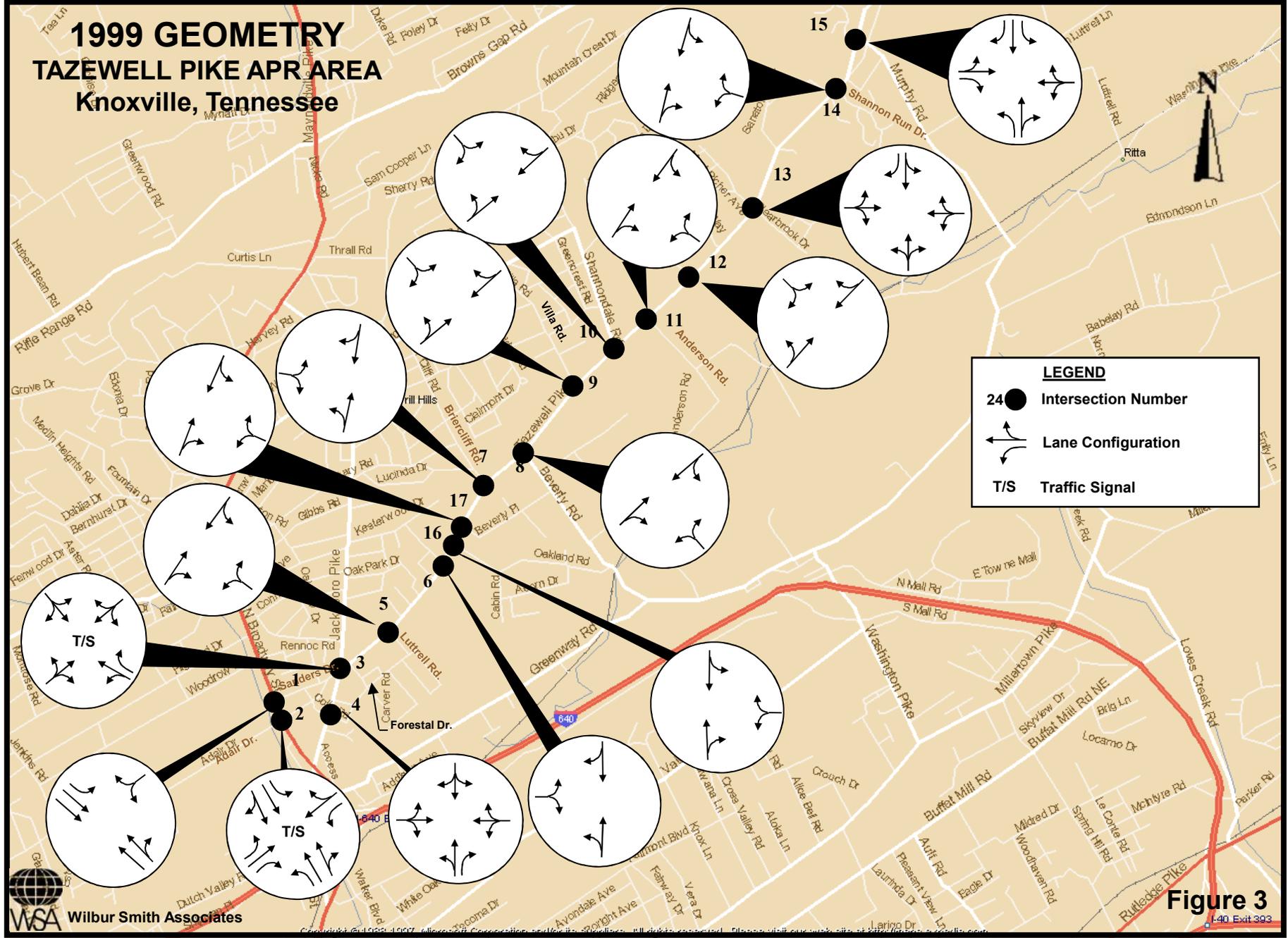
LEGEND	
Functional Classification	
Expressway	
Major Arterials	
Minor Arterials	
Major Collectors	
Minor Collectors	
Local Roads	
Average Daily Traffic Count	10,040



**STUDY AREA**

Figure 2

# 1999 GEOMETRY TAZEWELL PIKE APR AREA Knoxville, Tennessee

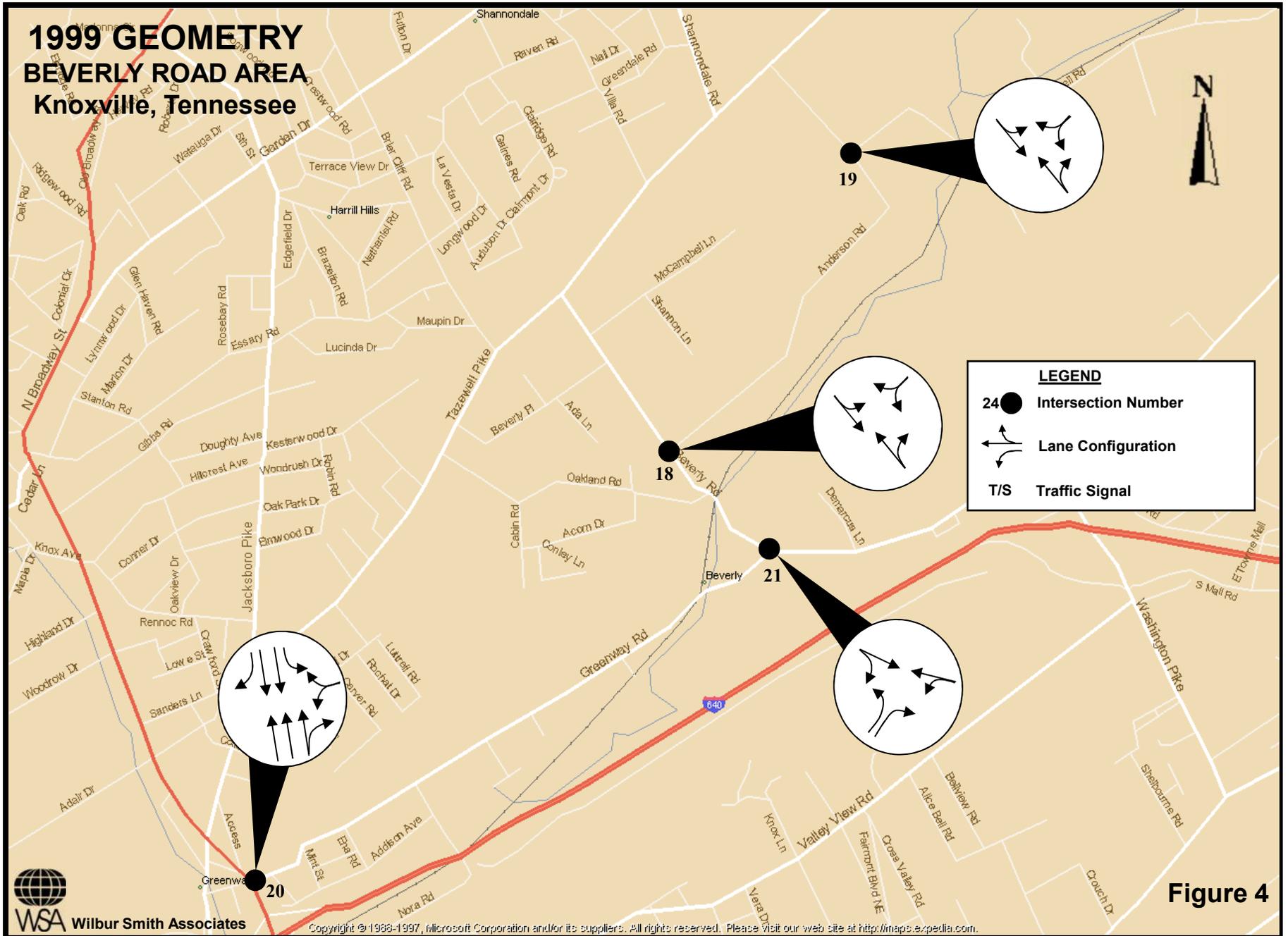


**LEGEND**

- 24 ● Intersection Number
- ↔ Lane Configuration
- T/S Traffic Signal

Figure 3  
I-40 Exit 393

# 1999 GEOMETRY BEVERLY ROAD AREA Knoxville, Tennessee



# 1999 GEOMETRY KNOXVILLE CENTER APR AREA Knoxville, Tennessee

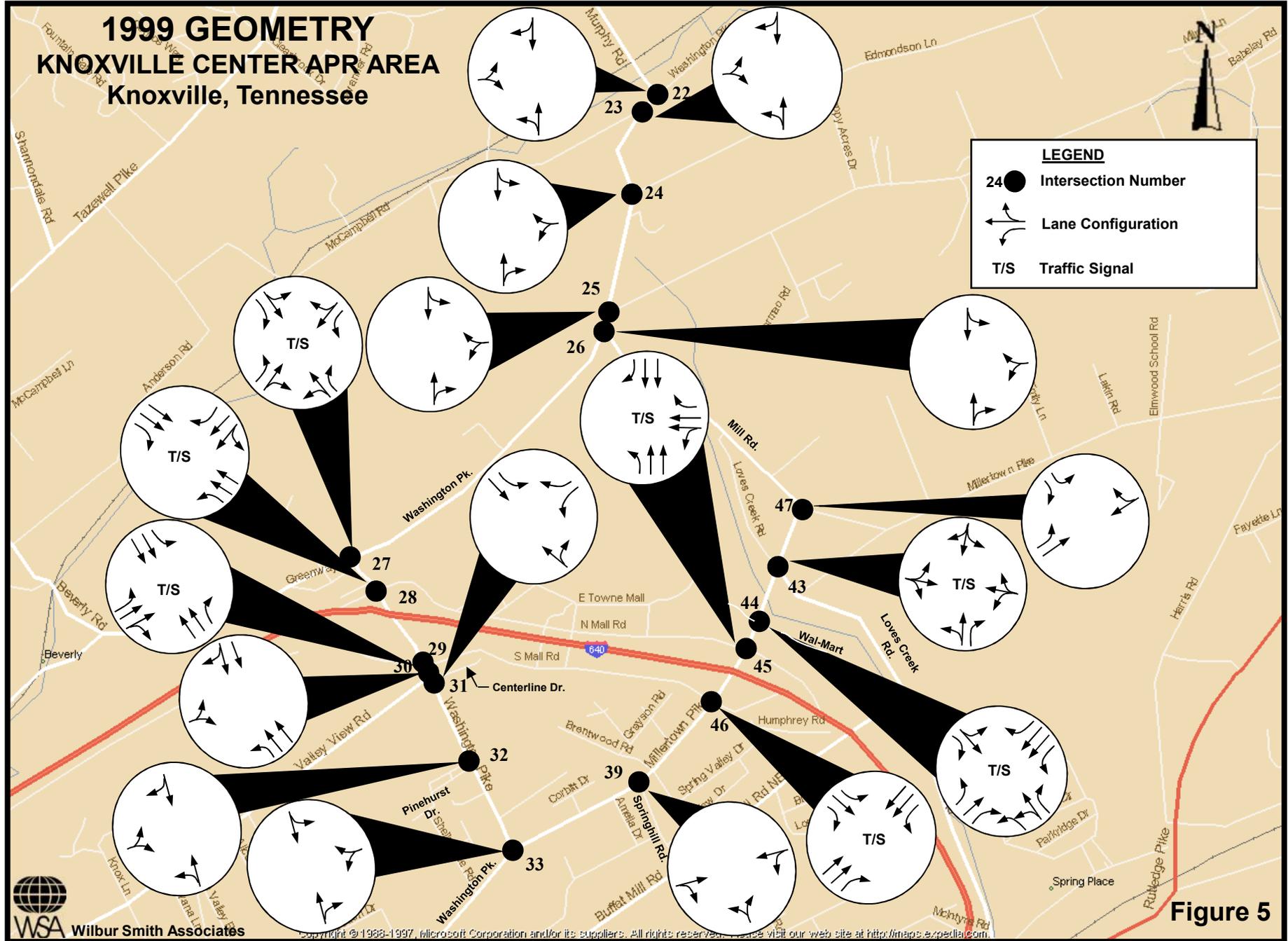
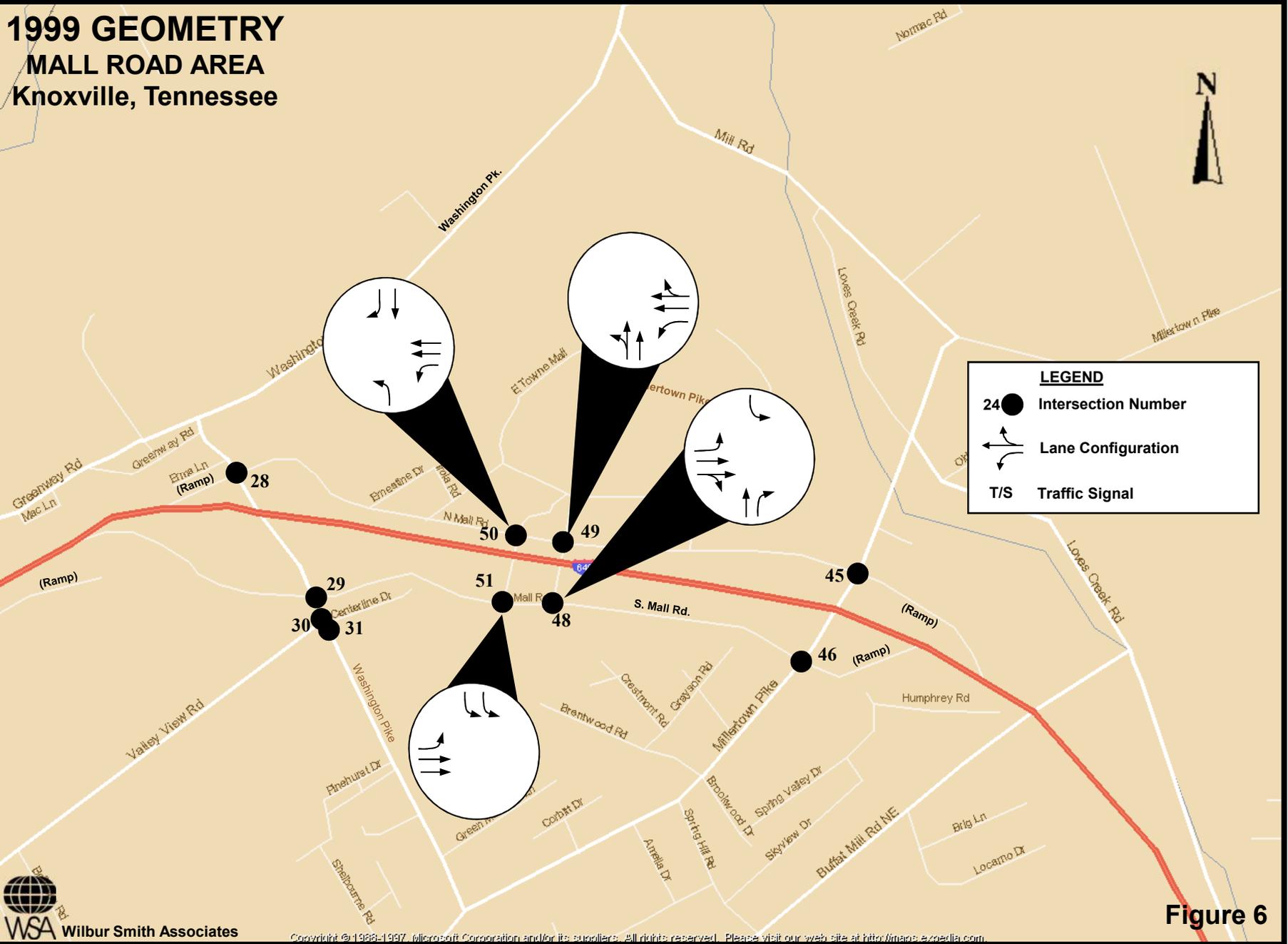


Figure 5

# 1999 GEOMETRY MALL ROAD AREA Knoxville, Tennessee



**Figure 6**

# 1999 GEOMETRY RUTLEDGE PIKE AREA Knoxville, Tennessee

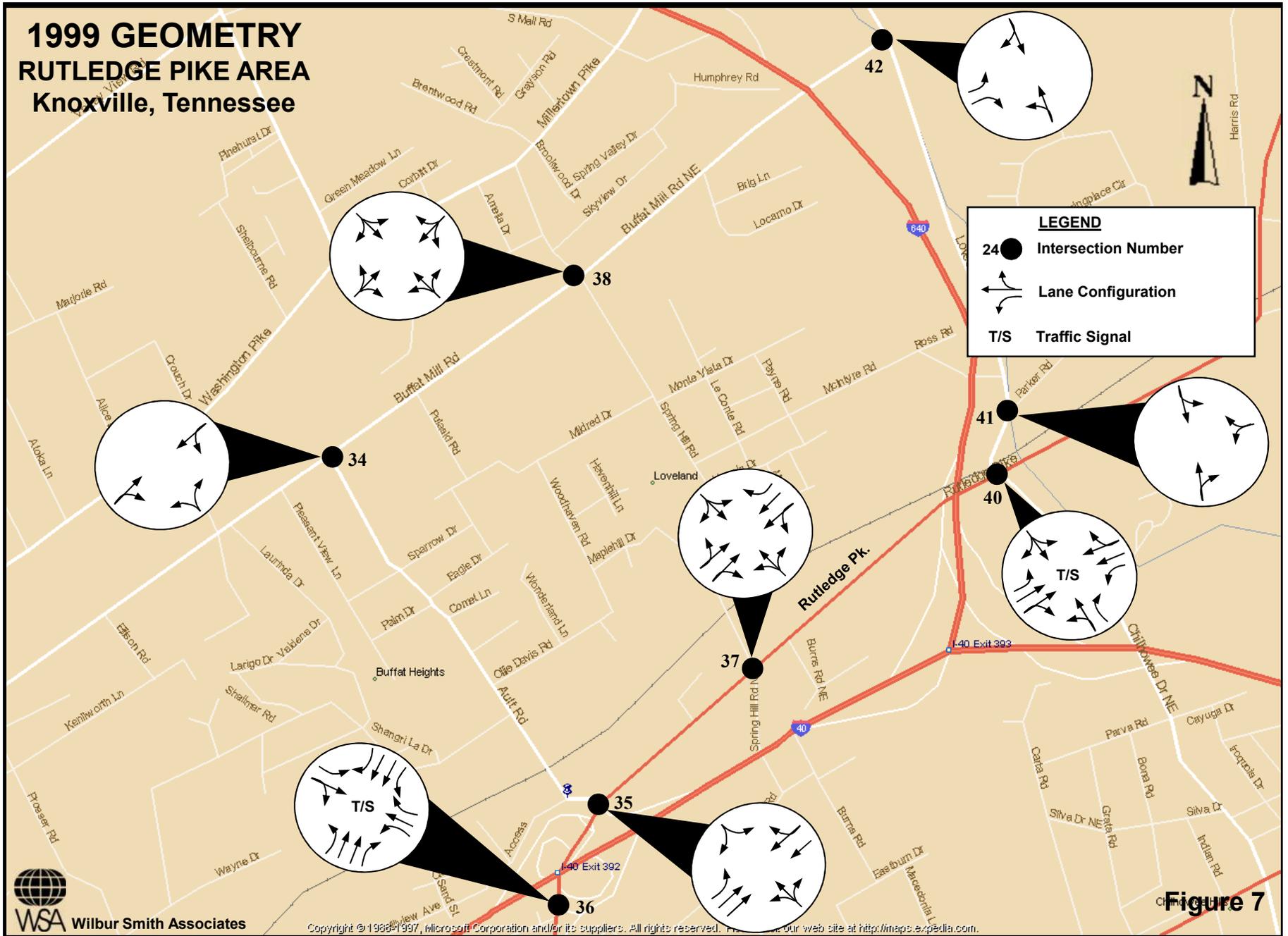
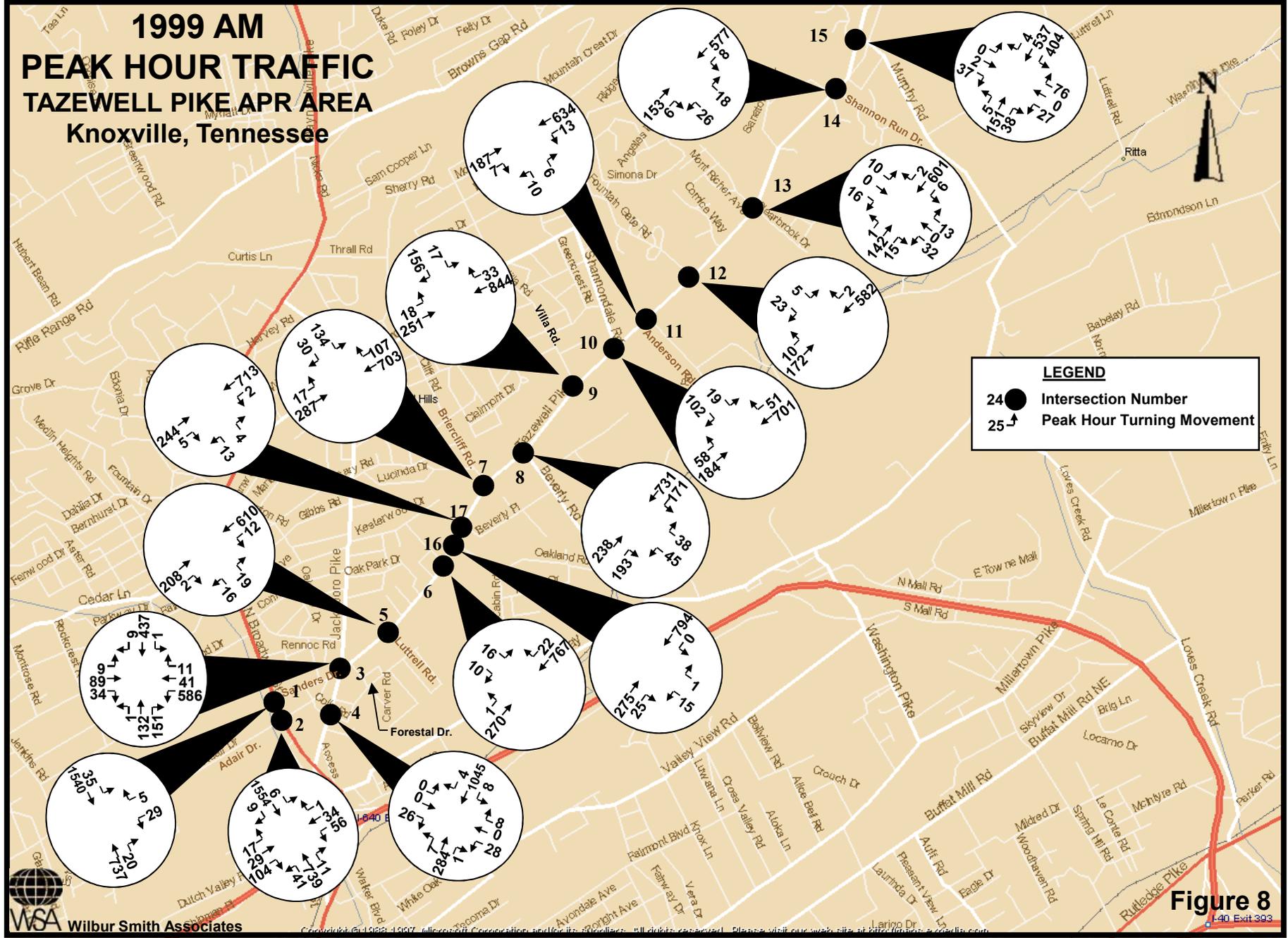


Figure 7

# 1999 AM PEAK HOUR TRAFFIC TAZEWELL PIKE APR AREA Knoxville, Tennessee

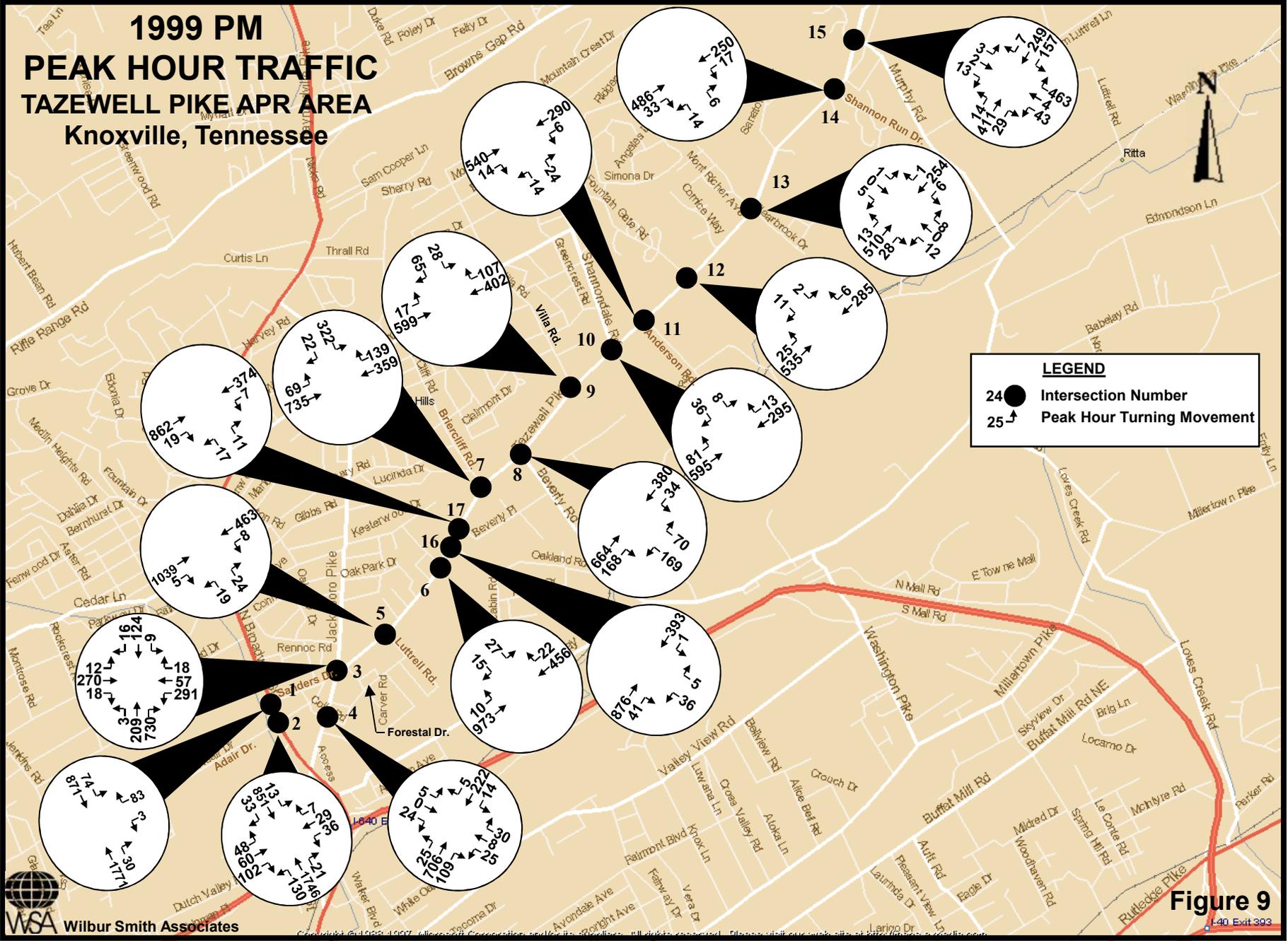


**LEGEND**

- 24 ● Intersection Number
- 25 ↗ Peak Hour Turning Movement

**Figure 8**  
I-40 Exit 393

# 1999 PM PEAK HOUR TRAFFIC TAZEWELL PIKE APR AREA Knoxville, Tennessee



**Figure 9**

# 1999 AM PEAK HOUR TRAFFIC BEVERLY ROAD AREA Knoxville, Tennessee

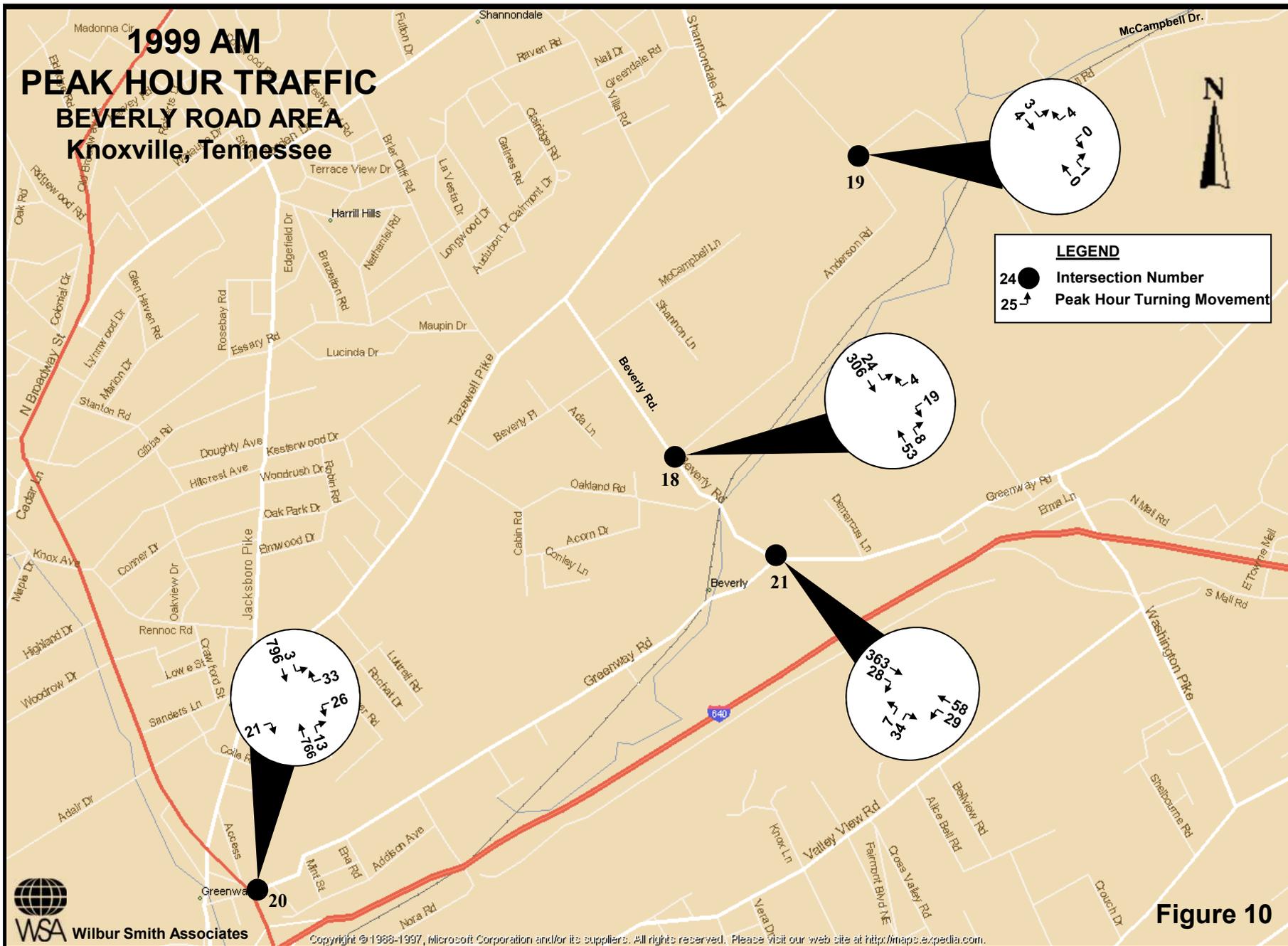
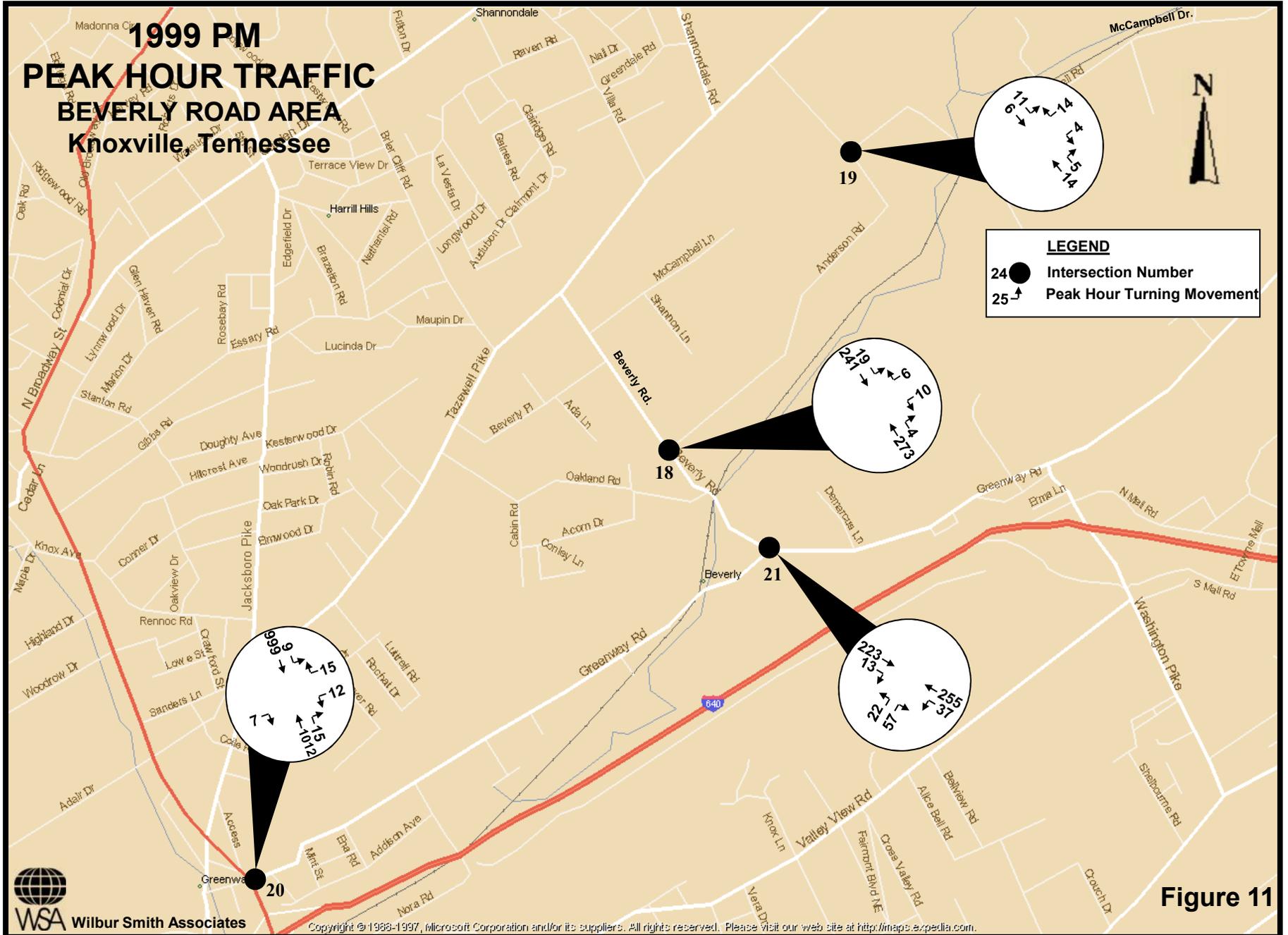


Figure 10

# 1999 PM PEAK HOUR TRAFFIC BEVERLY ROAD AREA Knoxville, Tennessee



**Figure 11**

# 1999 AM PEAK HOUR TRAFFIC KNOXVILLE CENTER APR AREA Knoxville, Tennessee

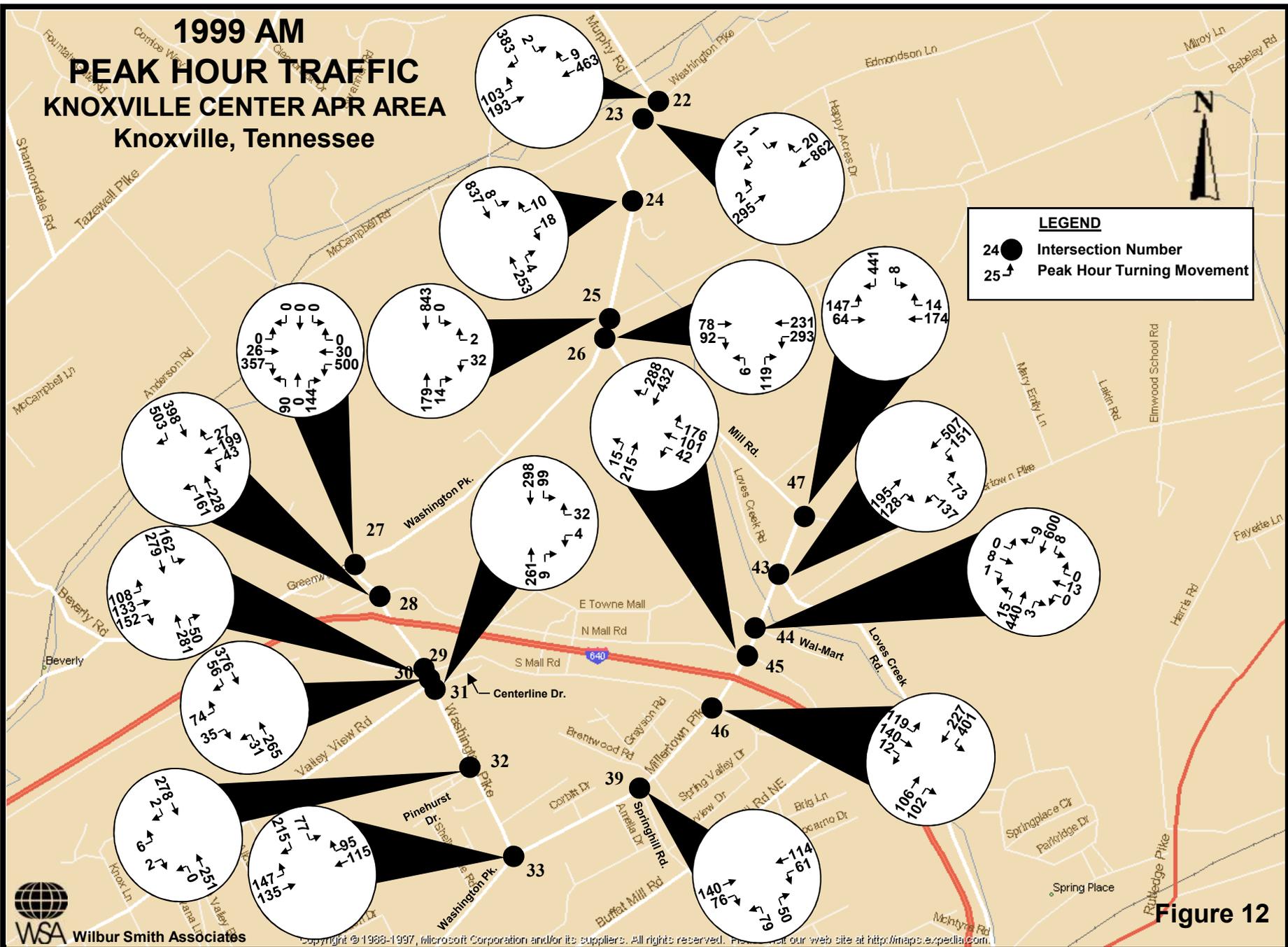


Figure 12

# 1999 PM PEAK HOUR TRAFFIC KNOXVILLE CENTER APR AREA Knoxville, Tennessee

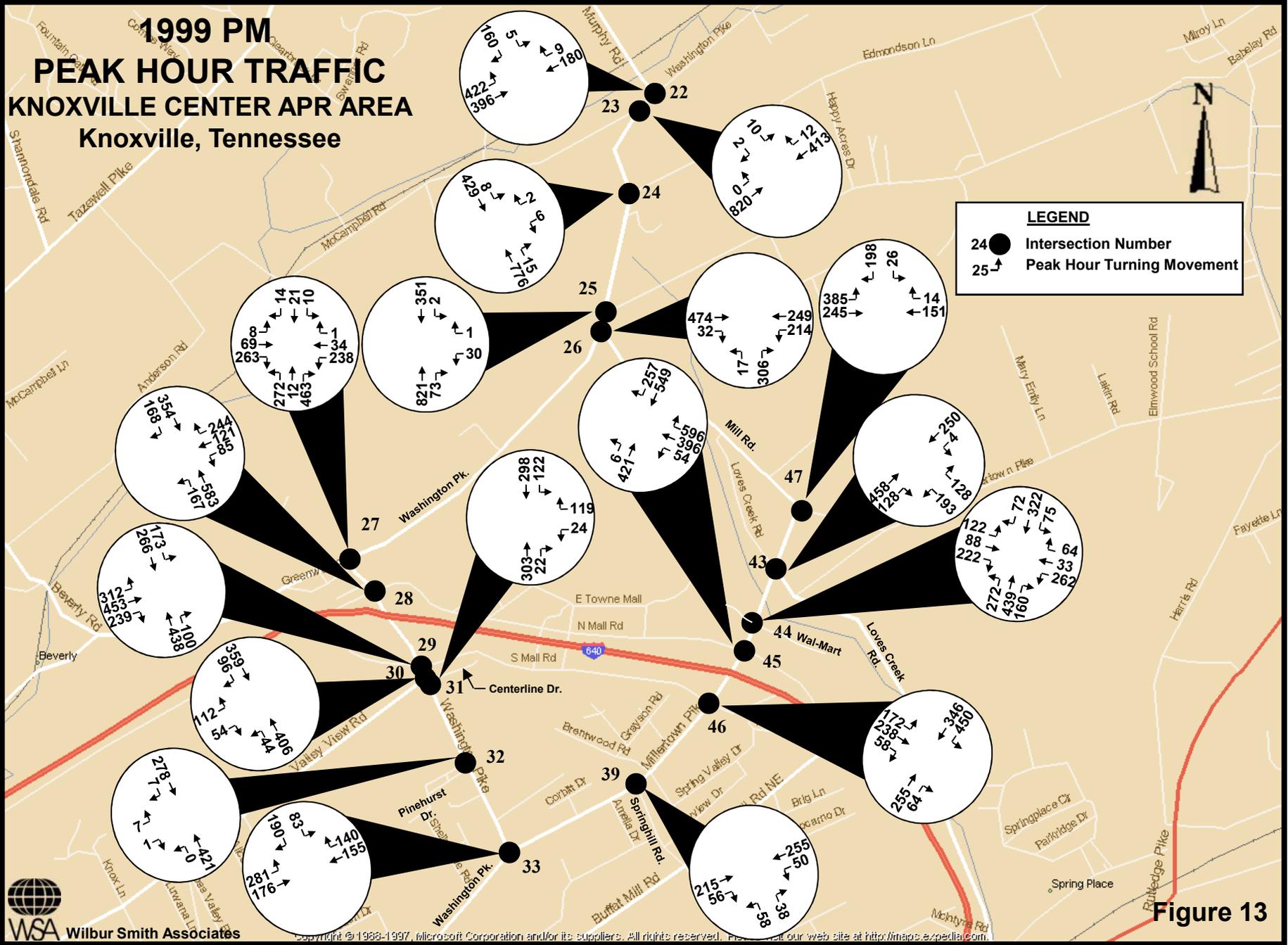


Figure 13

# 1999 AM PEAK HOUR TRAFFIC KNOXVILLE CENTER APR AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- 25 ↗ Peak Hour Turning Movement

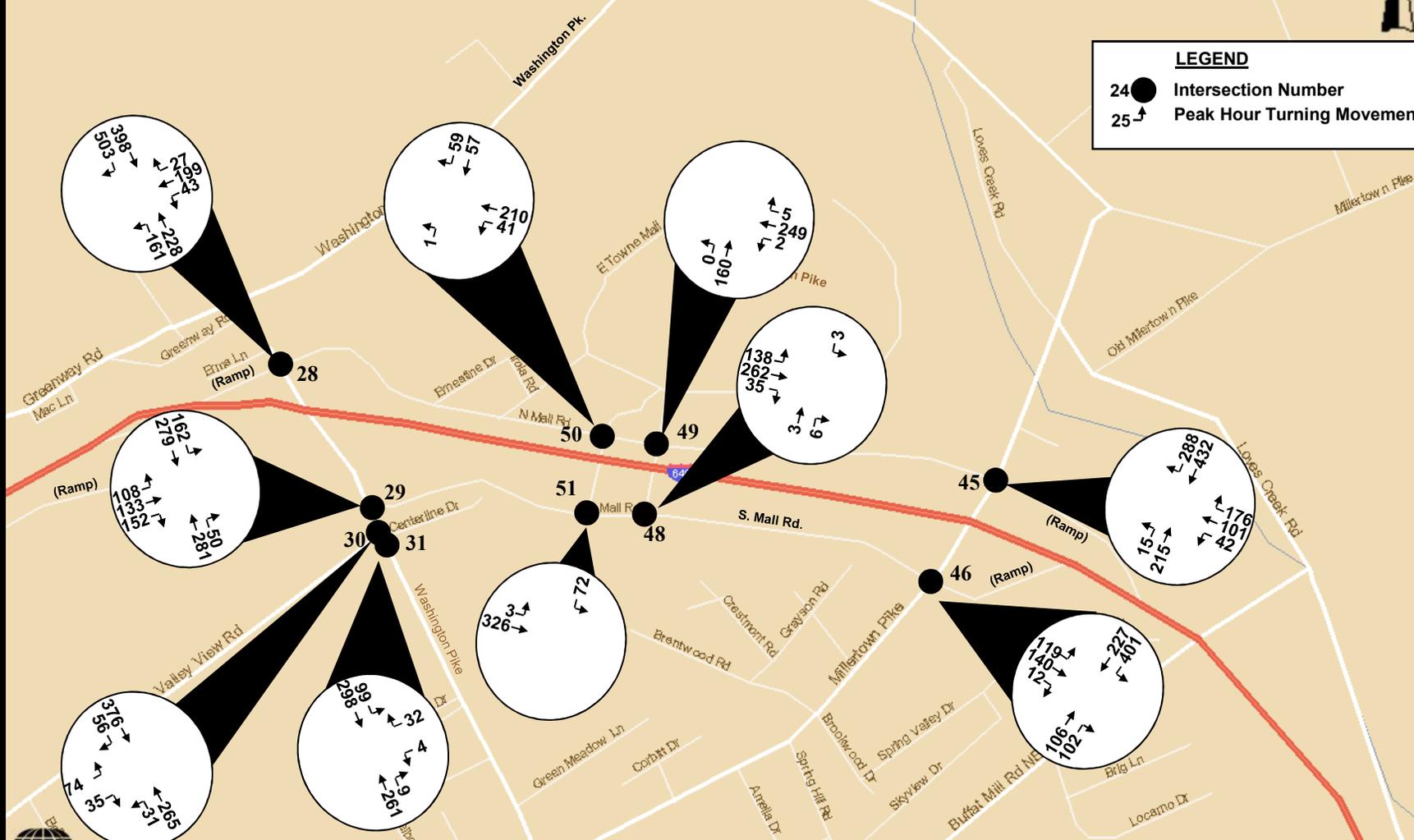


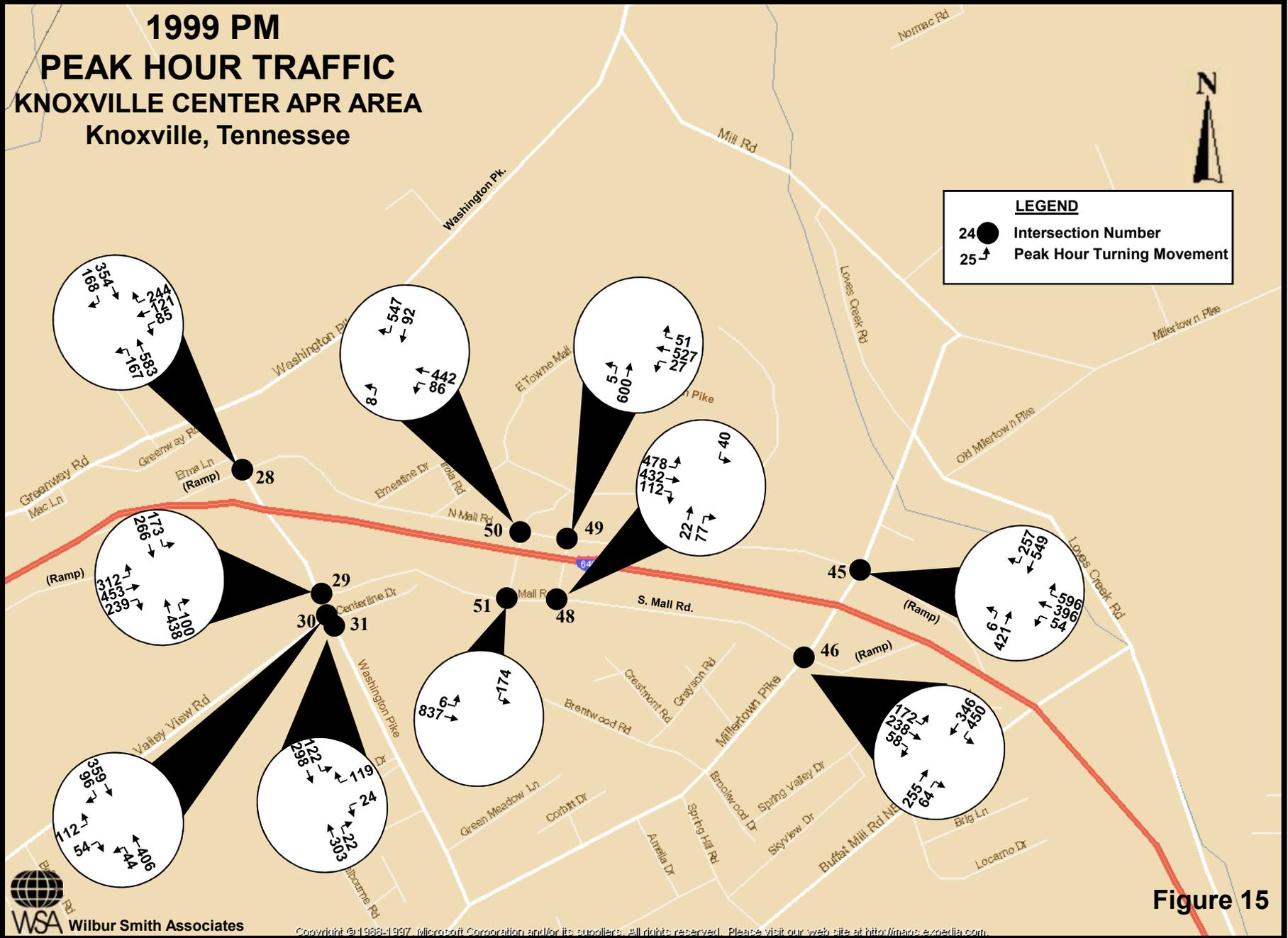
Figure 14

# 1999 PM PEAK HOUR TRAFFIC KNOXVILLE CENTER APR AREA Knoxville, Tennessee



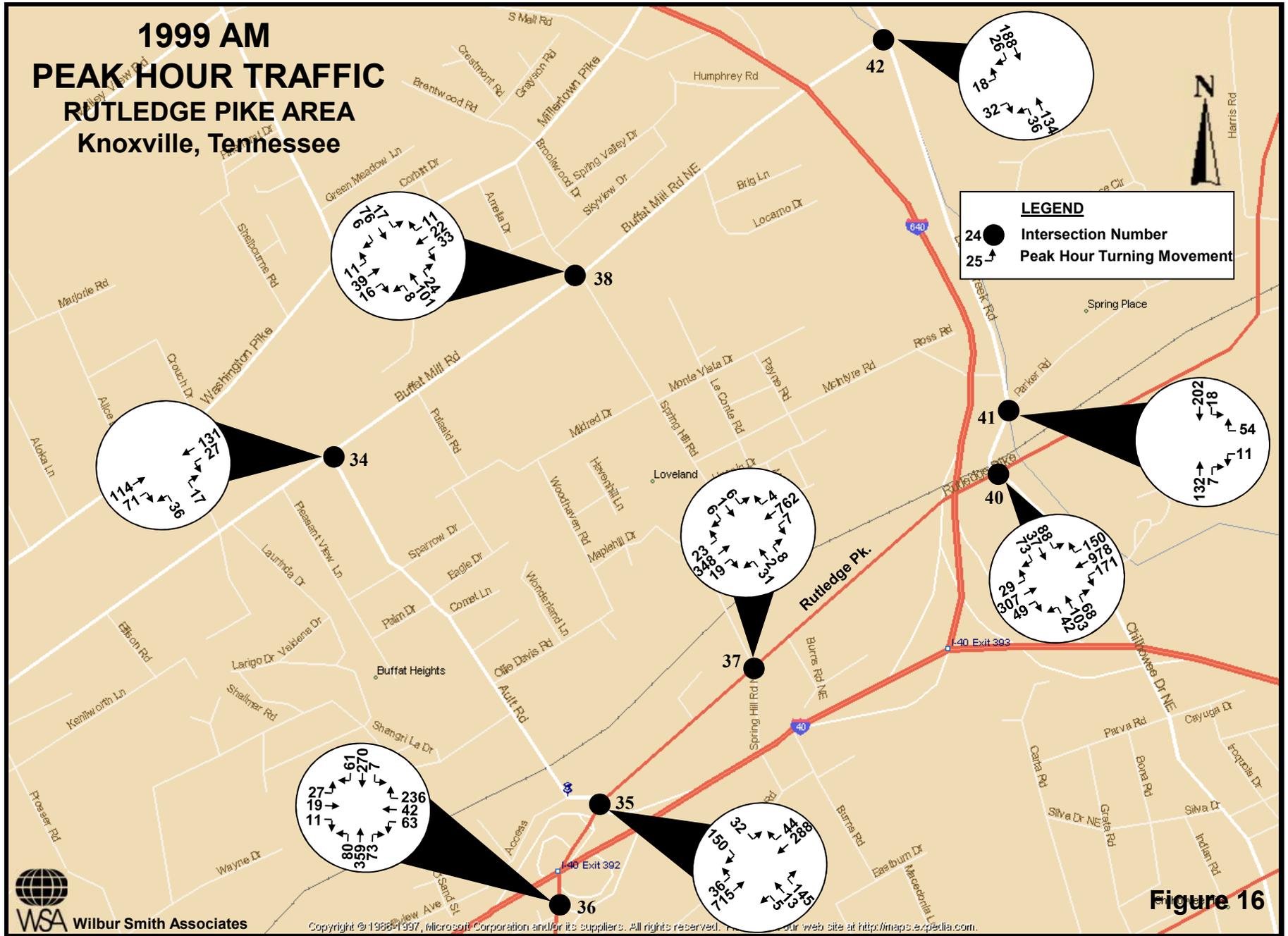
**LEGEND**

- 24 ● Intersection Number
- 25 ↗ Peak Hour Turning Movement



**Figure 15**

# 1999 AM PEAK HOUR TRAFFIC RUTLEDGE PIKE AREA Knoxville, Tennessee



**Figure 16**

# 1999 PM PEAK HOUR TRAFFIC RUTLEDGE PIKE AREA Knoxville, Tennessee

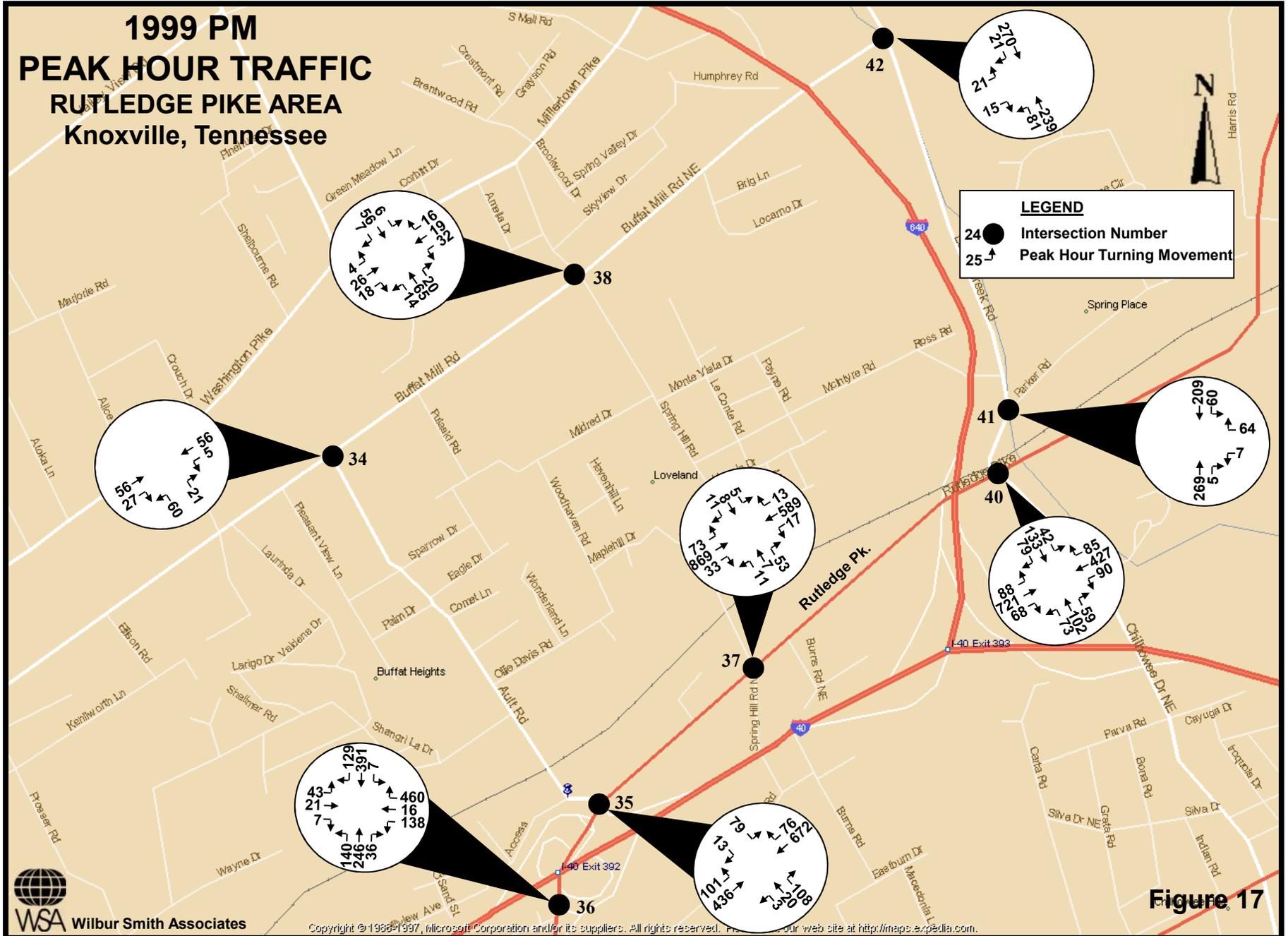


Figure 17

# 1999 AM PEAK HOUR LEVELS OF SERVICE TAZEWELL PIKE APR AREA Knoxville, Tennessee

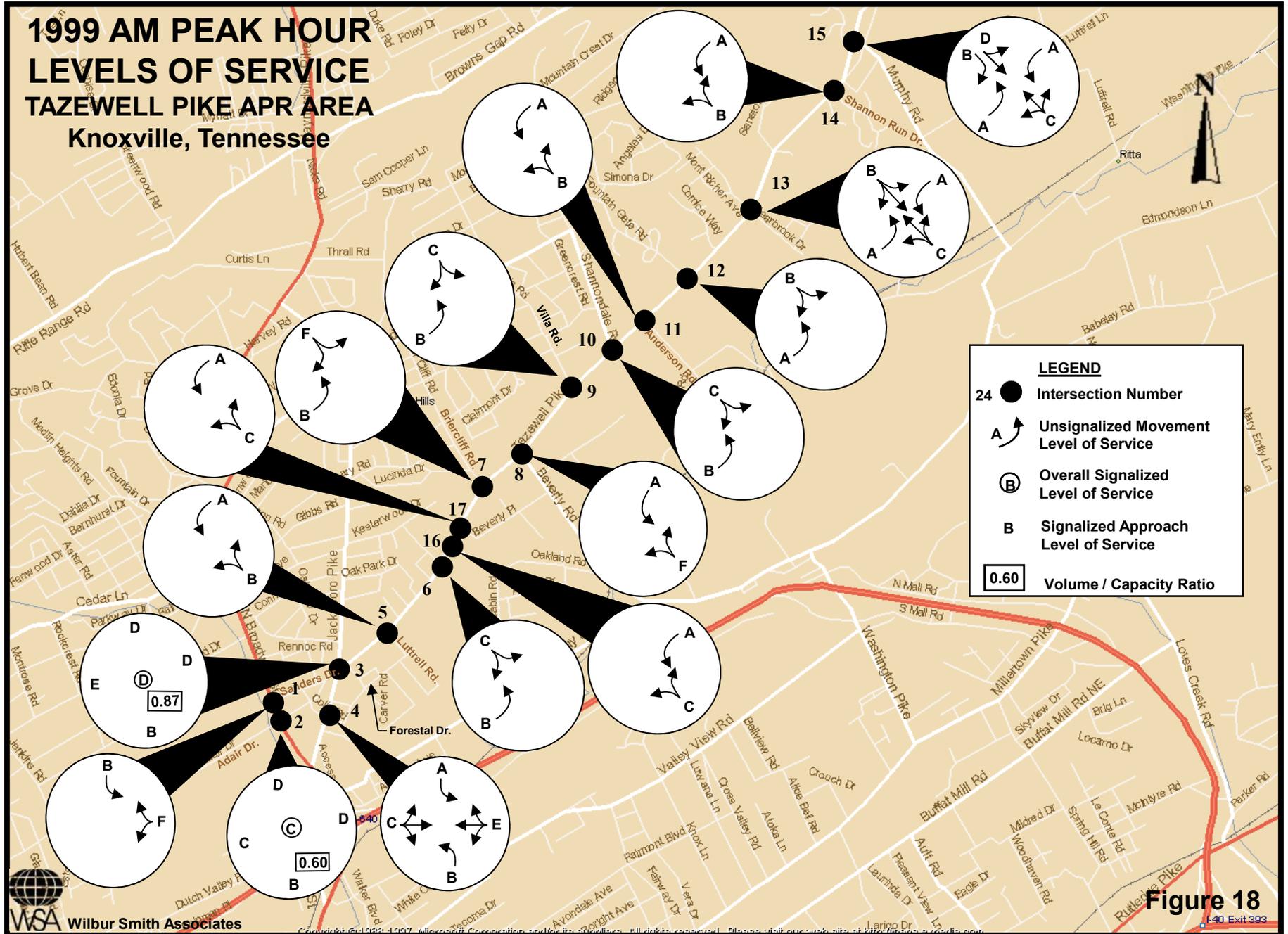


Figure 18

# 1999 PM PEAK HOUR LEVELS OF SERVICE TAZEWELL PIKE APR AREA Knoxville, Tennessee

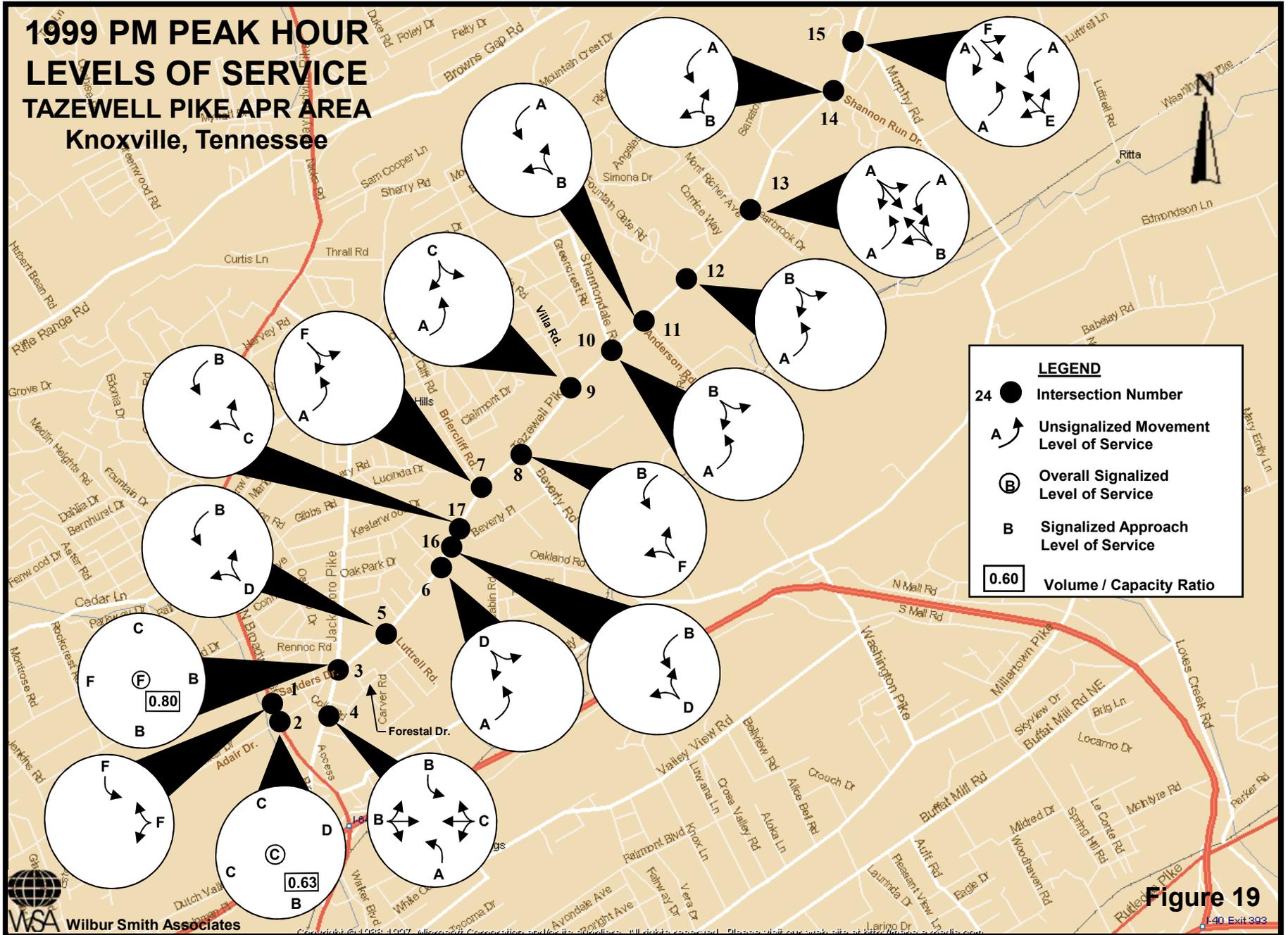


Figure 19

# 1999 AM PEAK HOUR LEVELS OF SERVICE BEVERLY ROAD AREA Knoxville, Tennessee

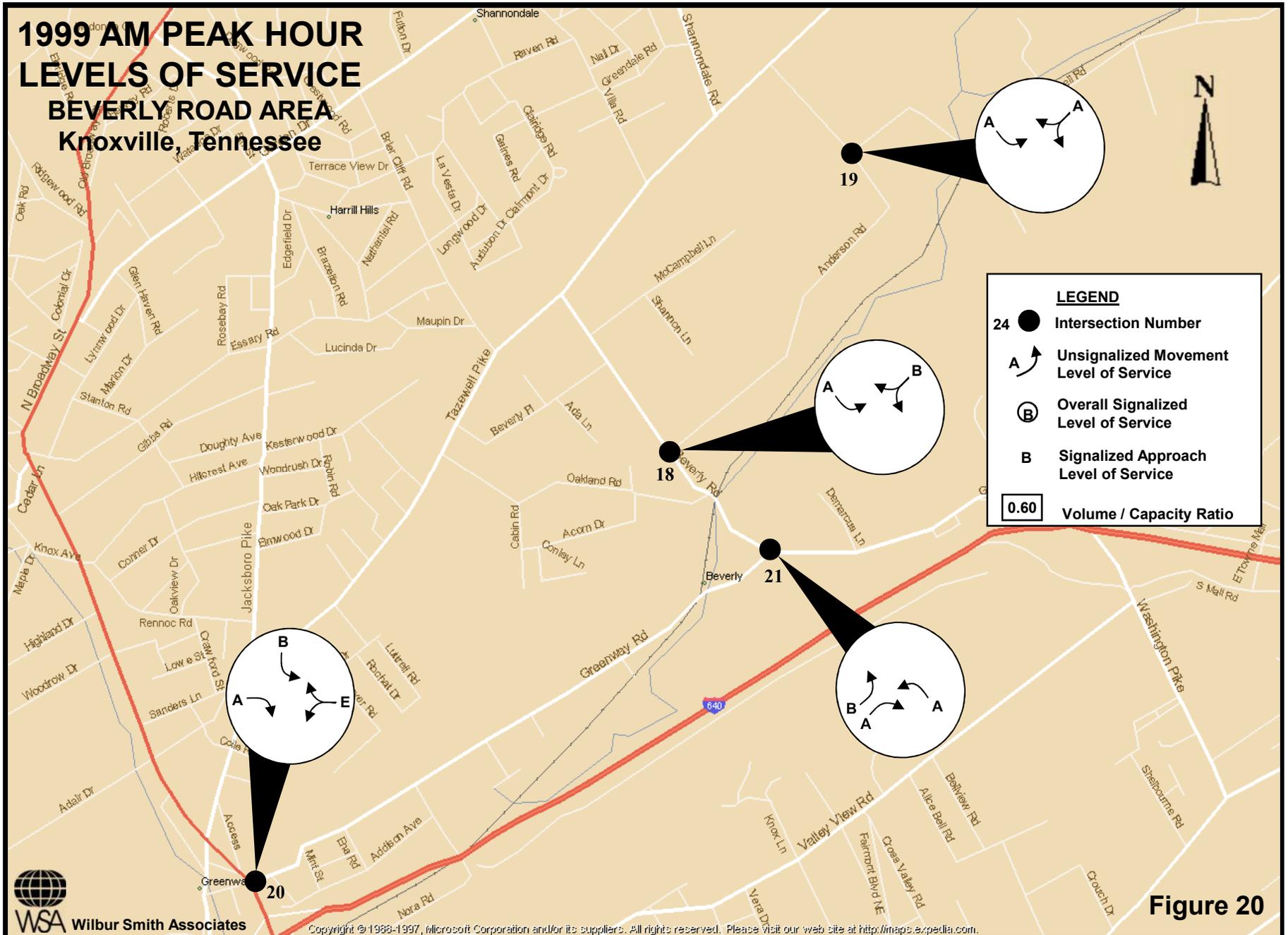


Figure 20

# 1999 PM PEAK HOUR LEVELS OF SERVICE BEVERLY ROAD AREA Knoxville, Tennessee

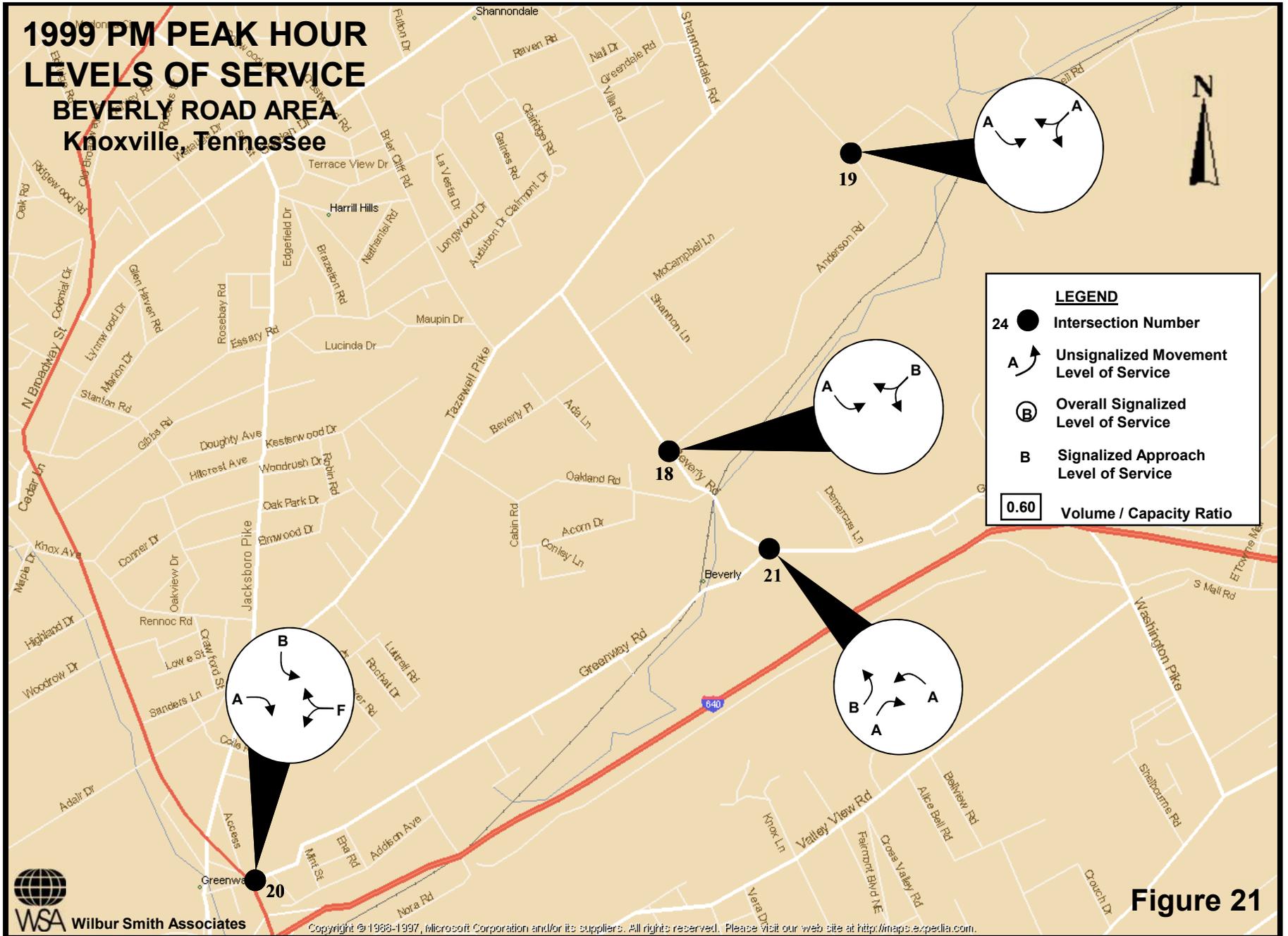


Figure 21

# 1999 AM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER APR AREA Knoxville, Tennessee

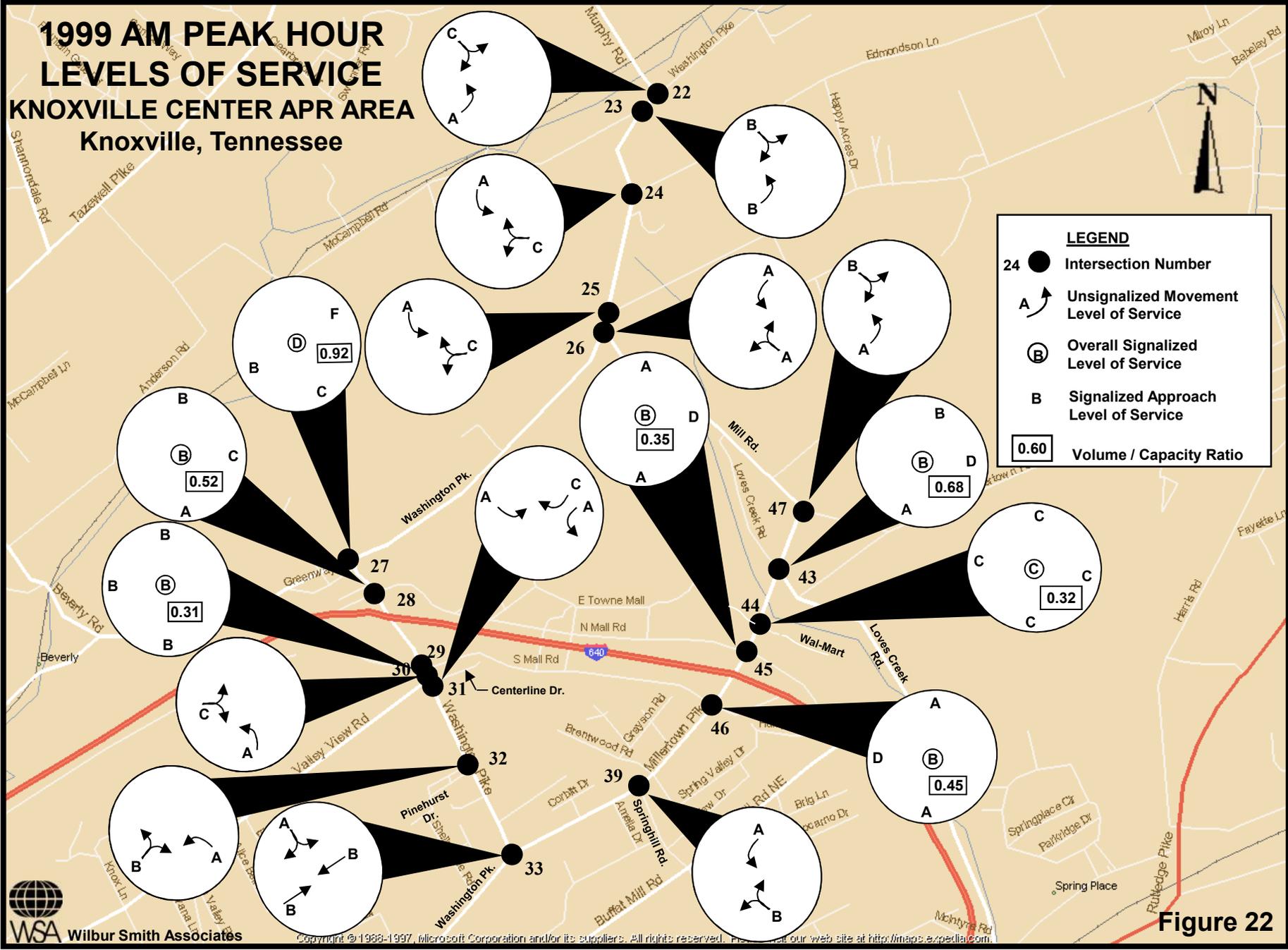


Figure 22

# 1999 PM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER APR AREA Knoxville, Tennessee

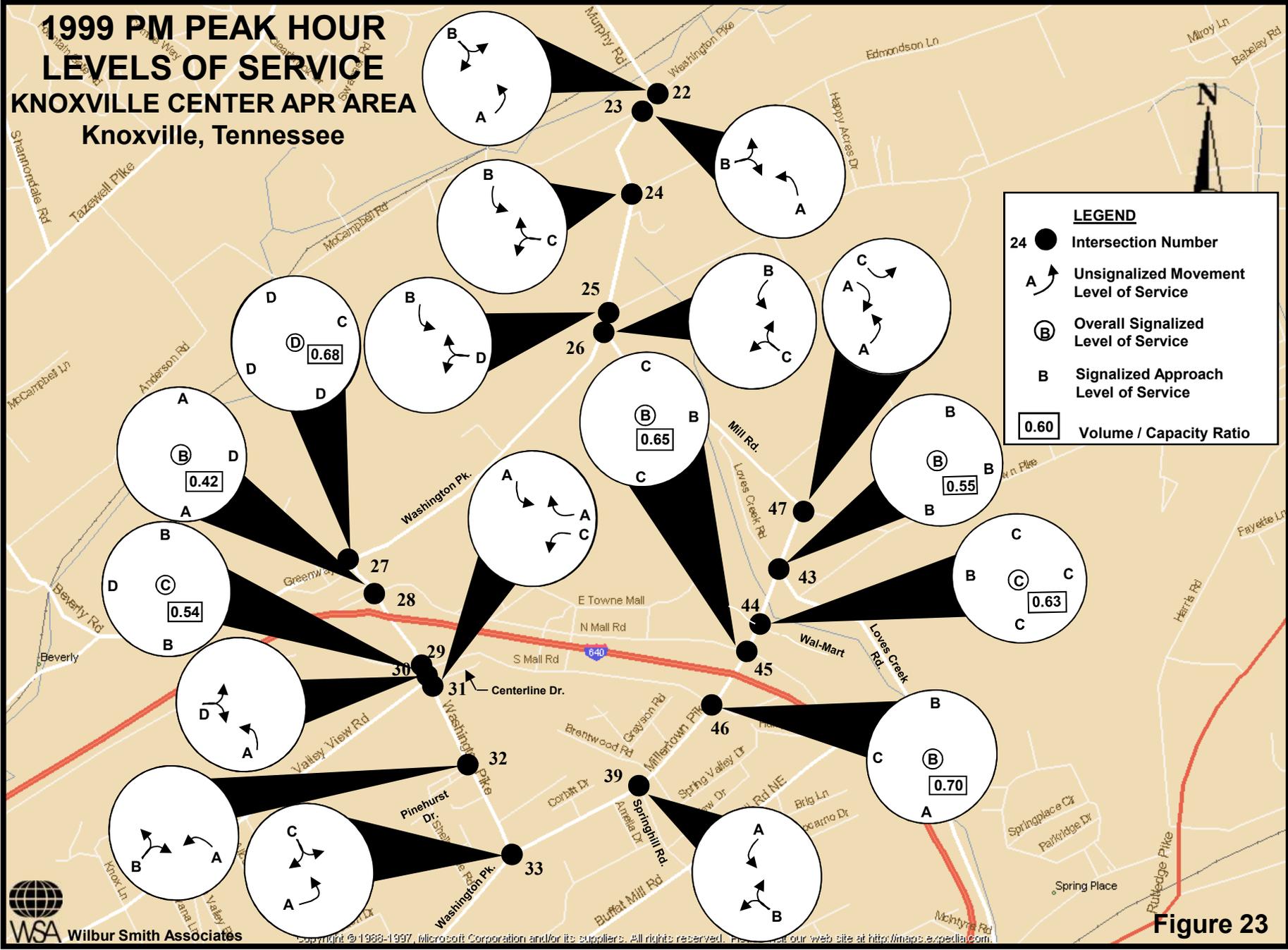


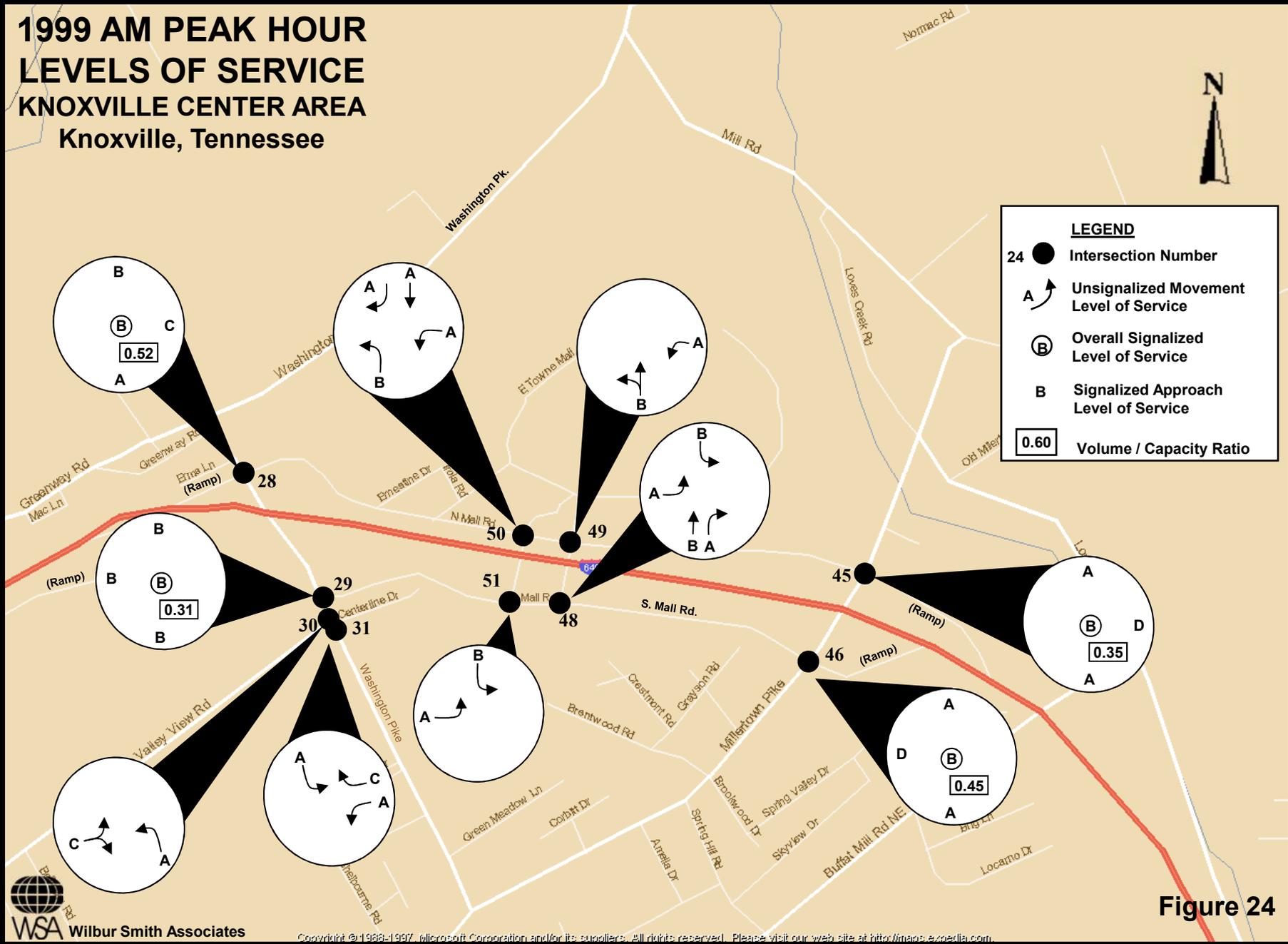
Figure 23

# 1999 AM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- A ↷ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio



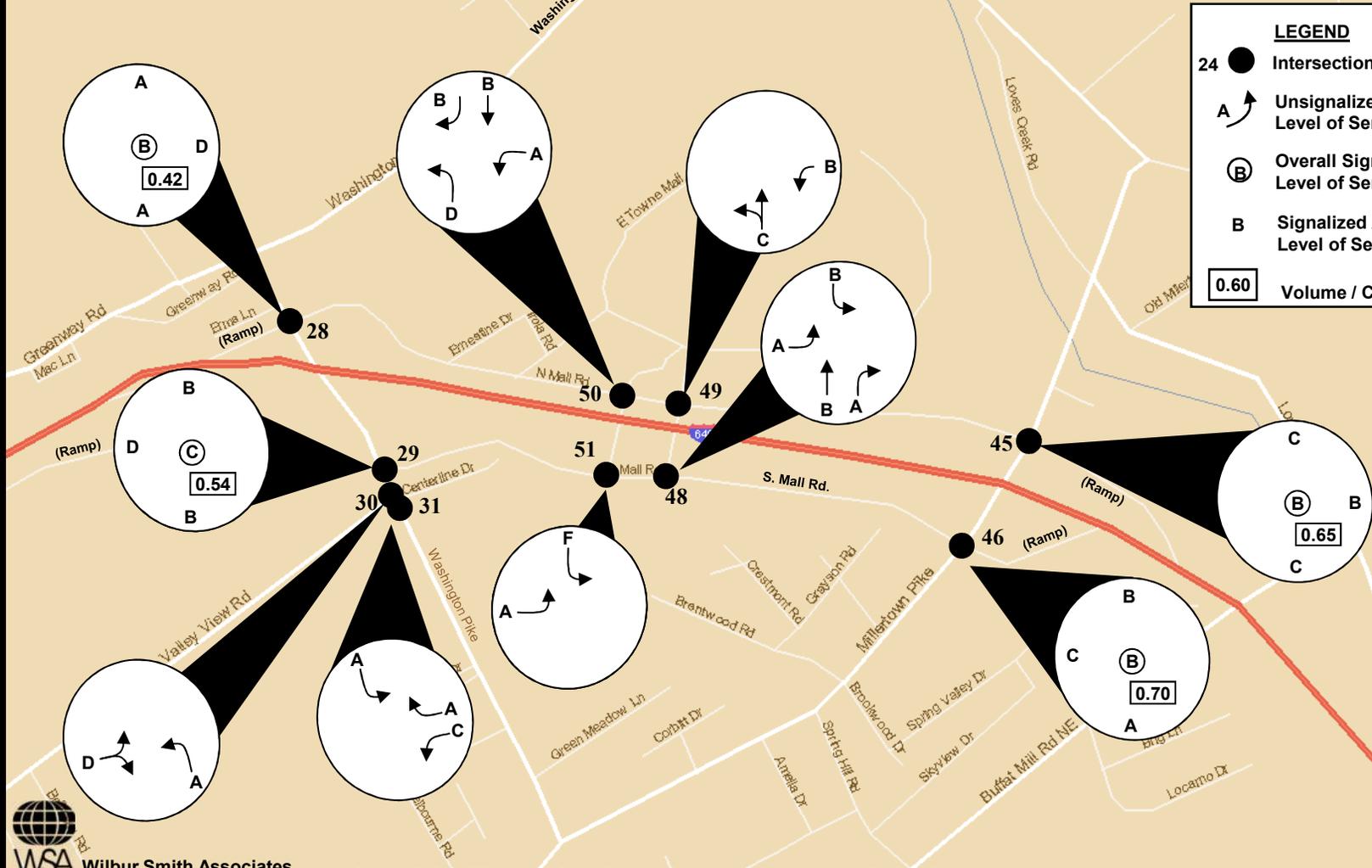
**Figure 24**

# 1999 PM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER AREA Knoxville, Tennessee



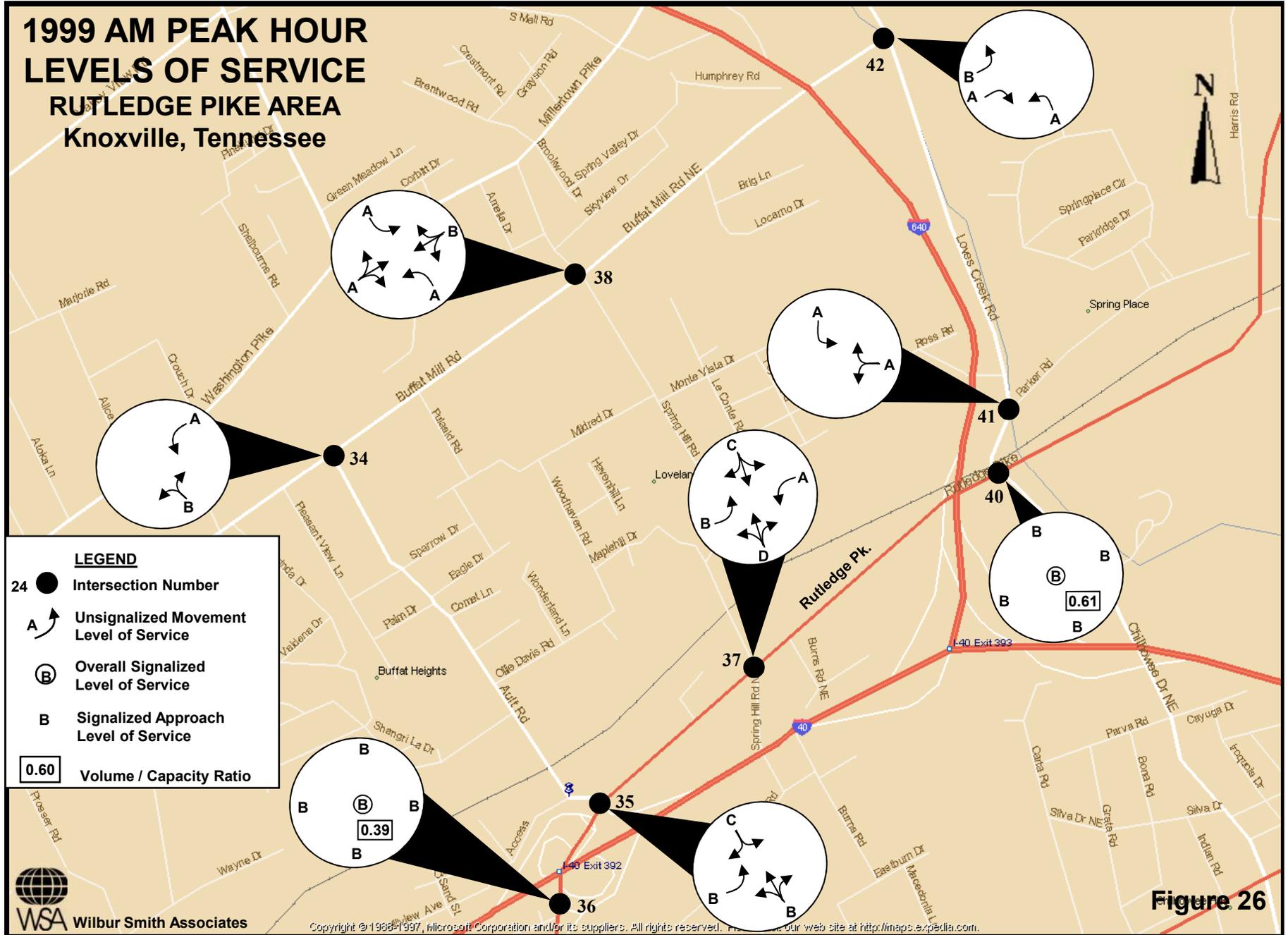
**LEGEND**

- 24 ● Intersection Number
- A ↷ Unsignalized Movement Level of Service
- ⓑ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio



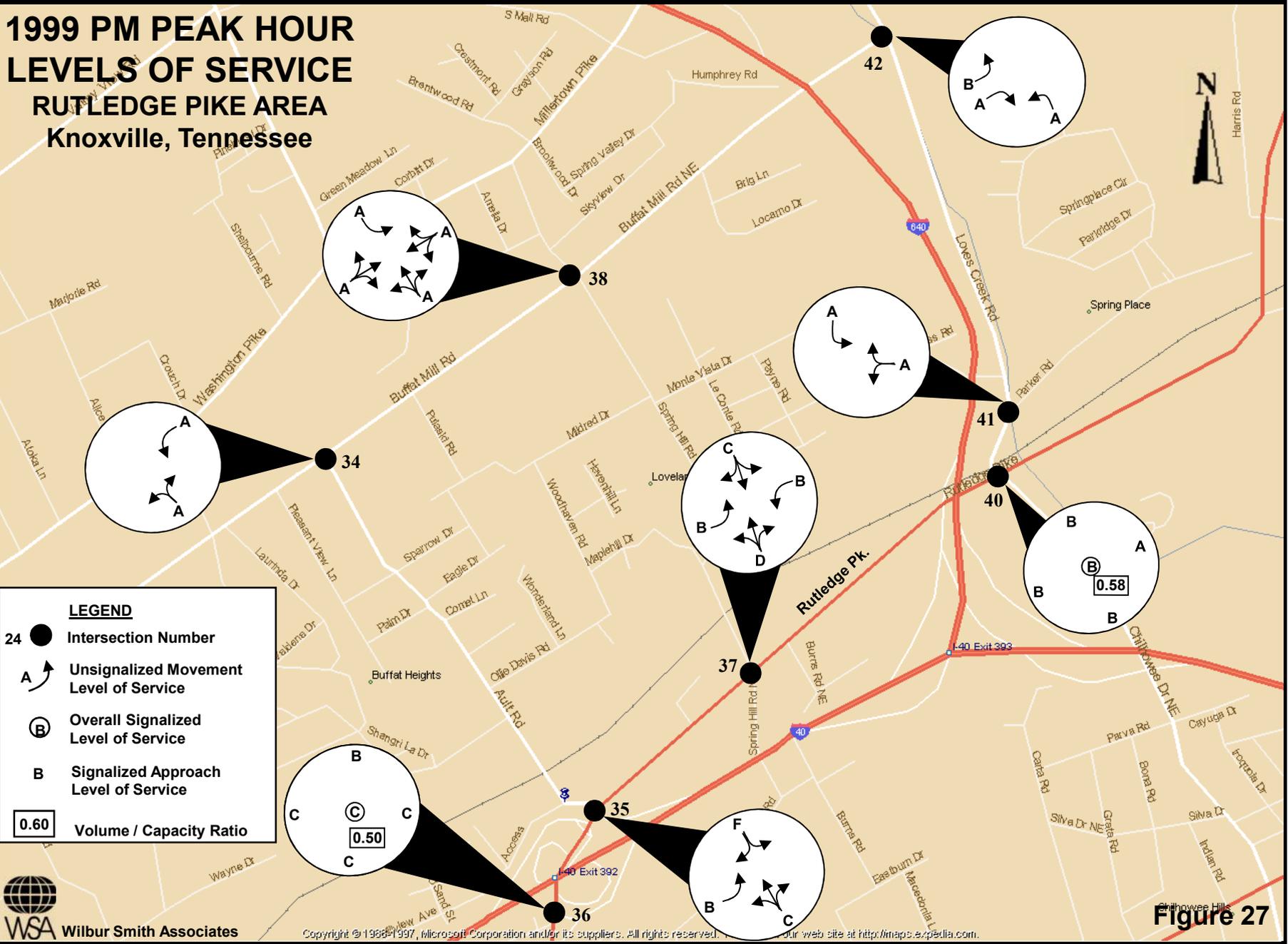
**Figure 25**

# 1999 AM PEAK HOUR LEVELS OF SERVICE RUTLEDGE PIKE AREA Knoxville, Tennessee



**Figure 26**

# 1999 PM PEAK HOUR LEVELS OF SERVICE RUTLEDGE PIKE AREA Knoxville, Tennessee



**LEGEND**

- Intersection Number
- A ↗ Unsignalized Movement Level of Service
- ⓐ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

Figure 27

# 2004 AM PEAK HOUR DHV's TAZEWELL PIKE APR AREA Knoxville, Tennessee

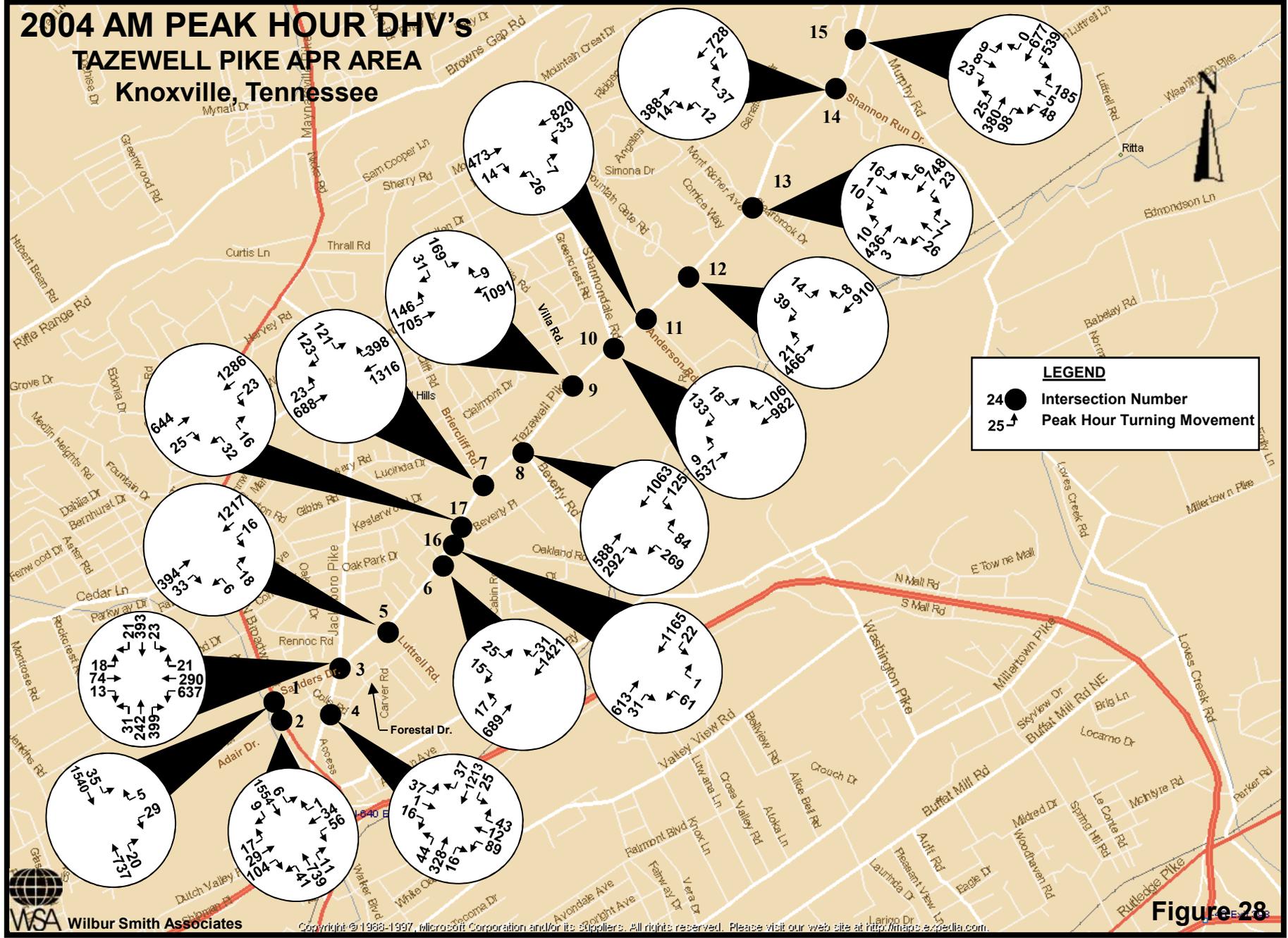


Figure 28

# 2004 PM PEAK HOUR DHV'S TAZEWELL PIKE APR AREA Knoxville, Tennessee

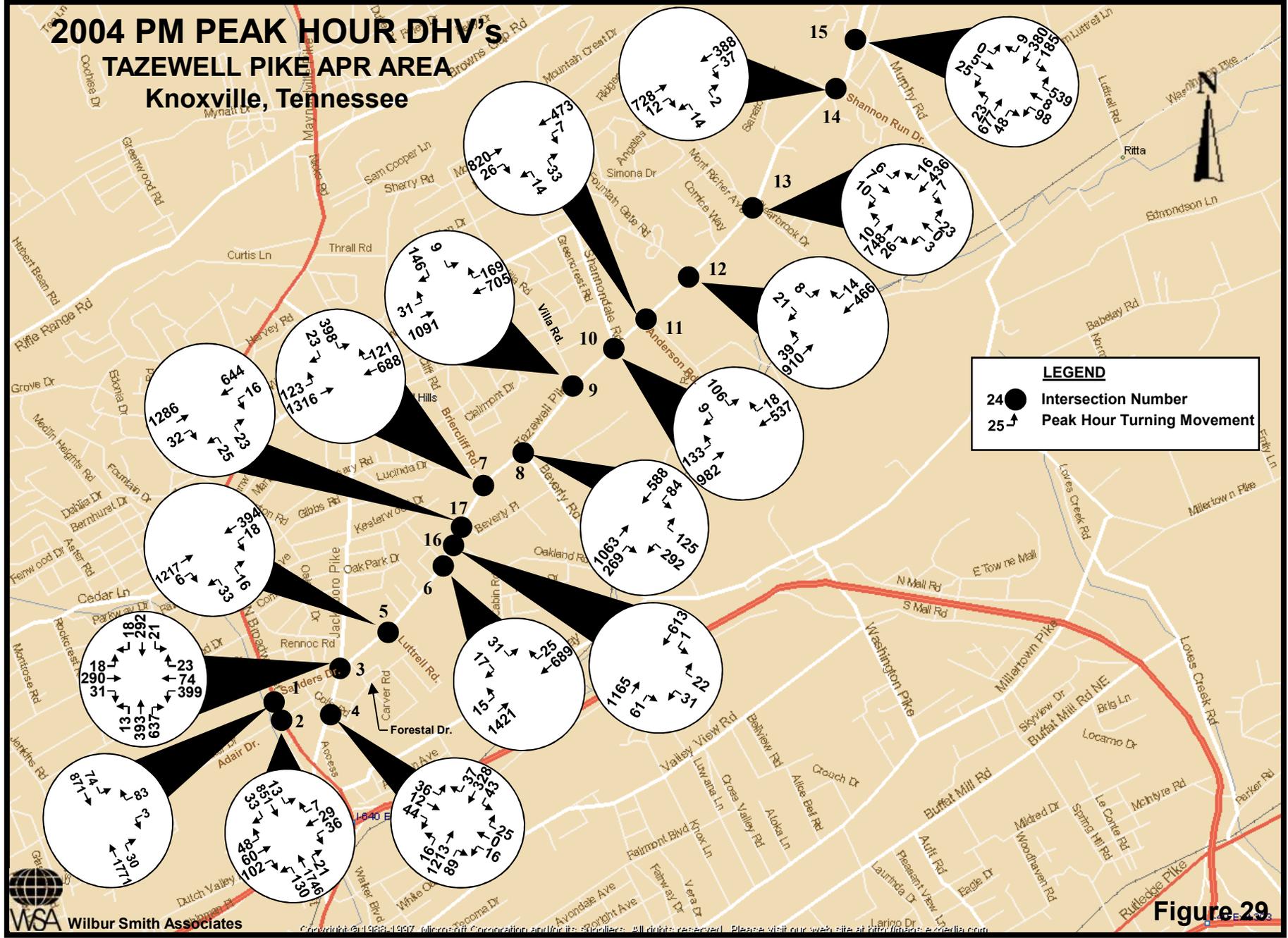


Figure 29

# 2004 AM PEAK HOUR DHV'S BEVERLY ROAD AREA Knoxville, Tennessee

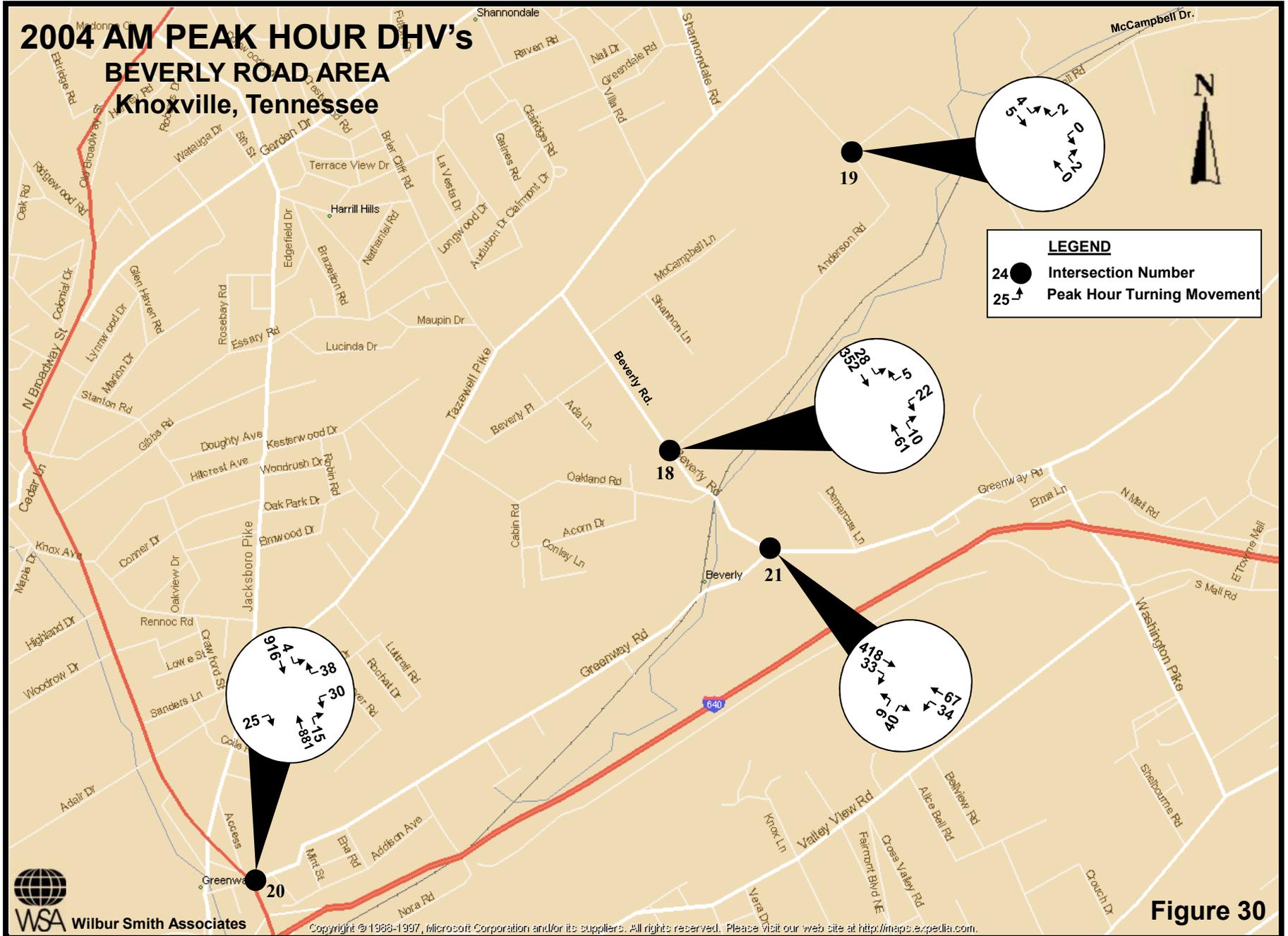


Figure 30

# 2004 PM PEAK HOUR DHV's BEVERLY ROAD AREA Knoxville, Tennessee

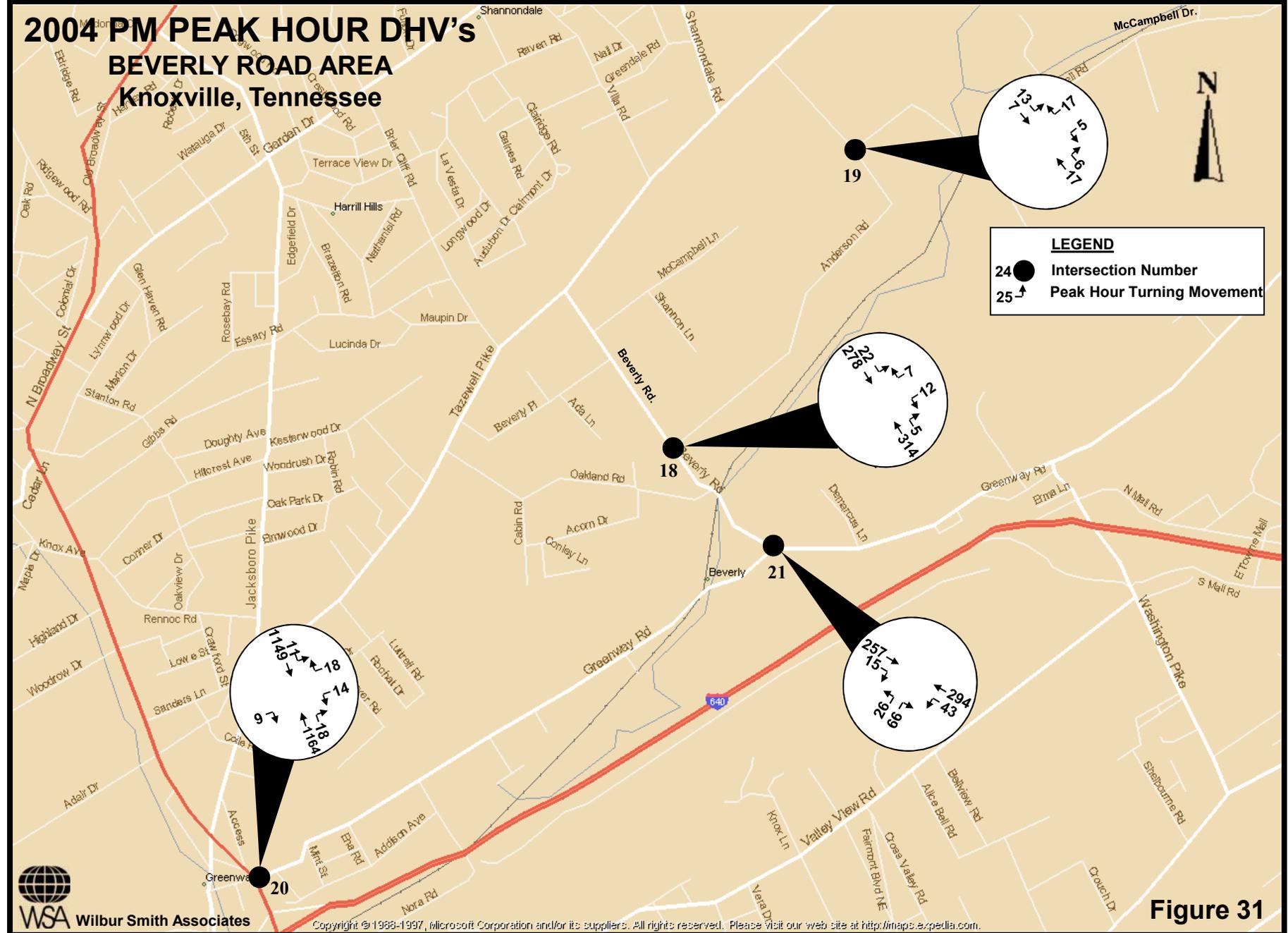


Figure 31

# 2004 AM PEAK HOUR DHV'S KNOXVILLE CENTER APR AREA Knoxville, Tennessee

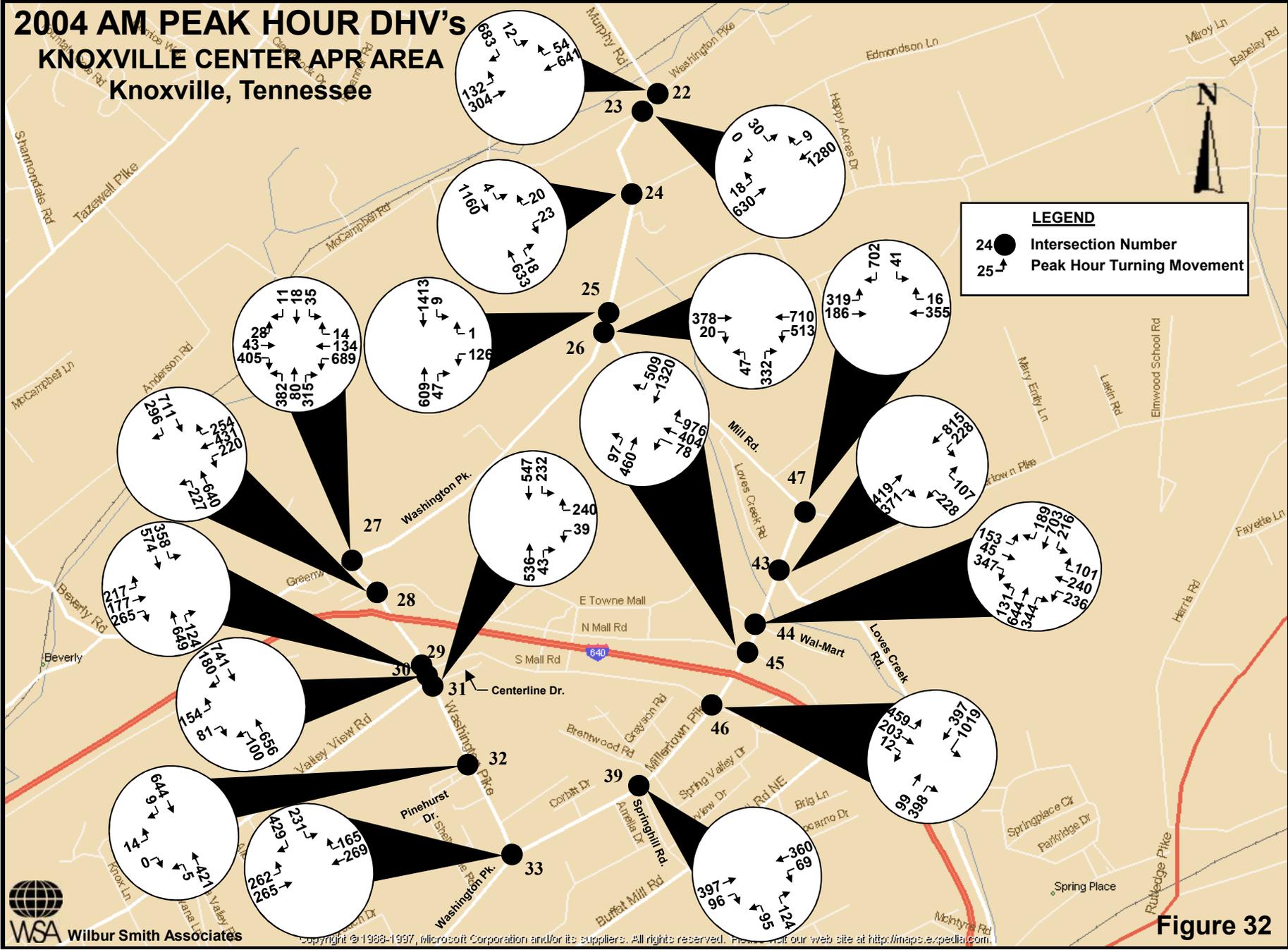


Figure 32

# 2004 PM PEAK HOUR DHV's KNOXVILLE CENTER APR AREA Knoxville, Tennessee

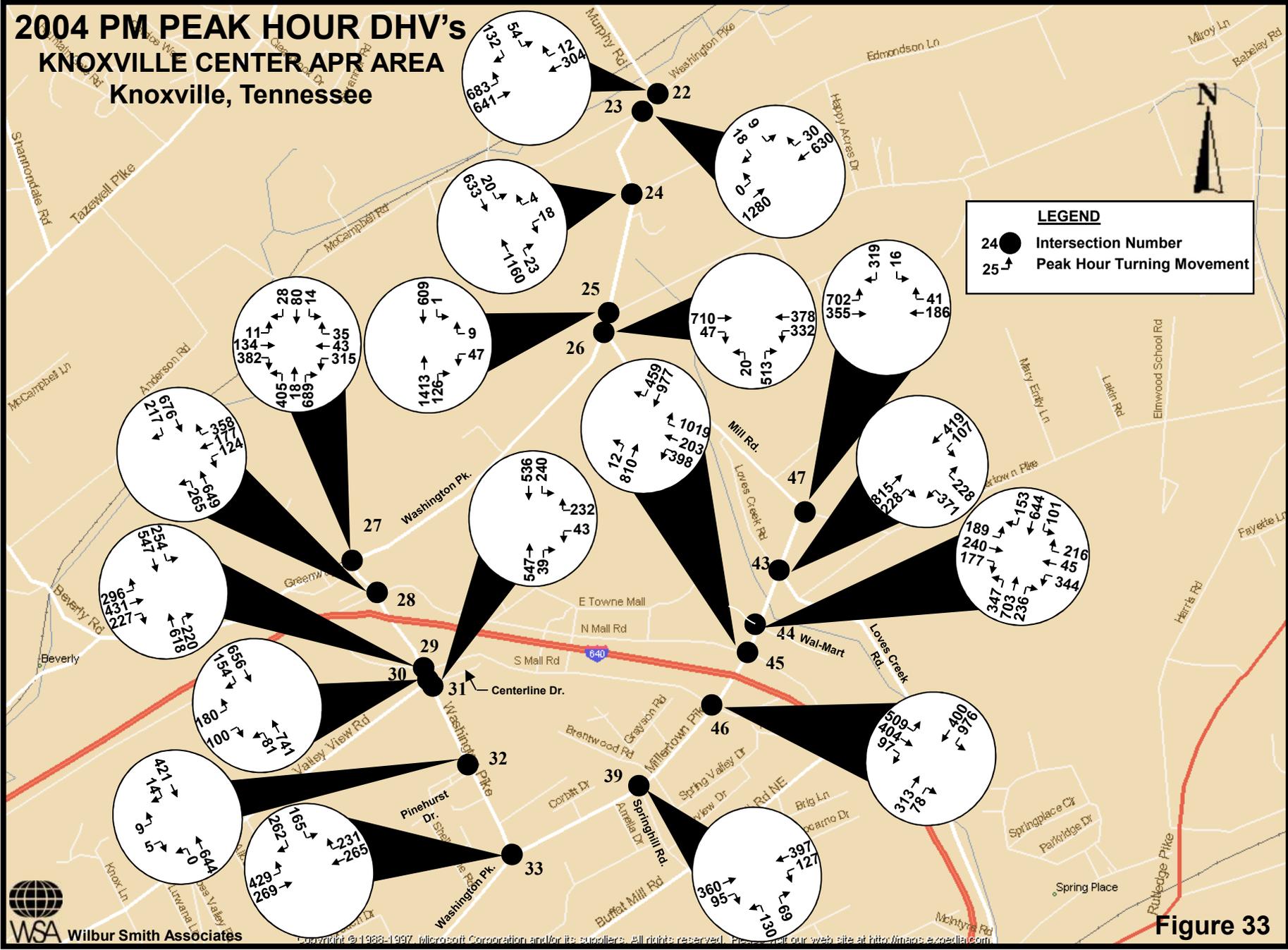


Figure 33

# 2004 AM PEAK HOUR DHV's KNOXVILLE CENTER APR AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- 25 ↗ Peak Hour Turning Movement

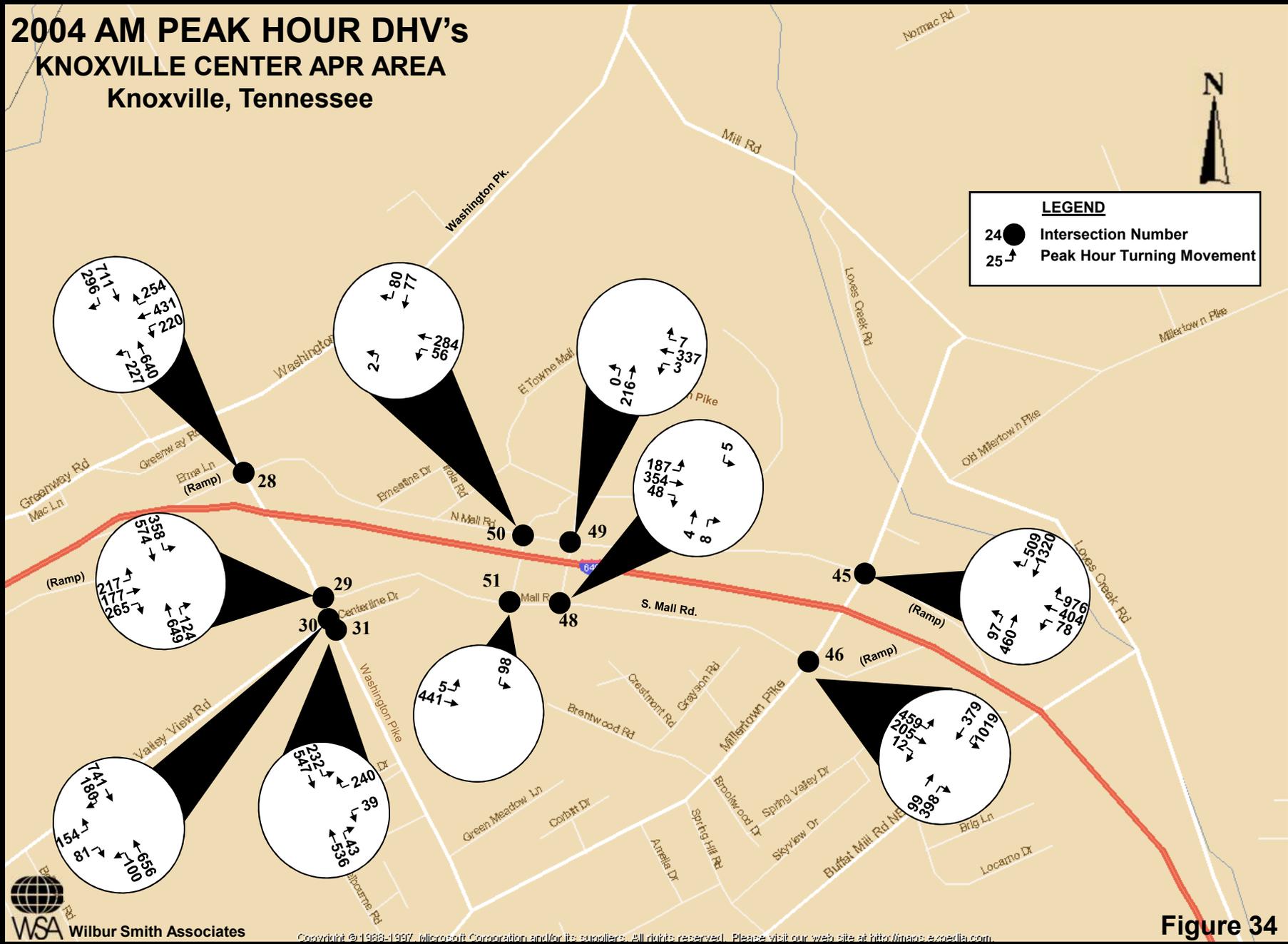


Figure 34

# 2004 PM PEAK HOUR DHV's KNOXVILLE CENTER APR AREA Knoxville, Tennessee

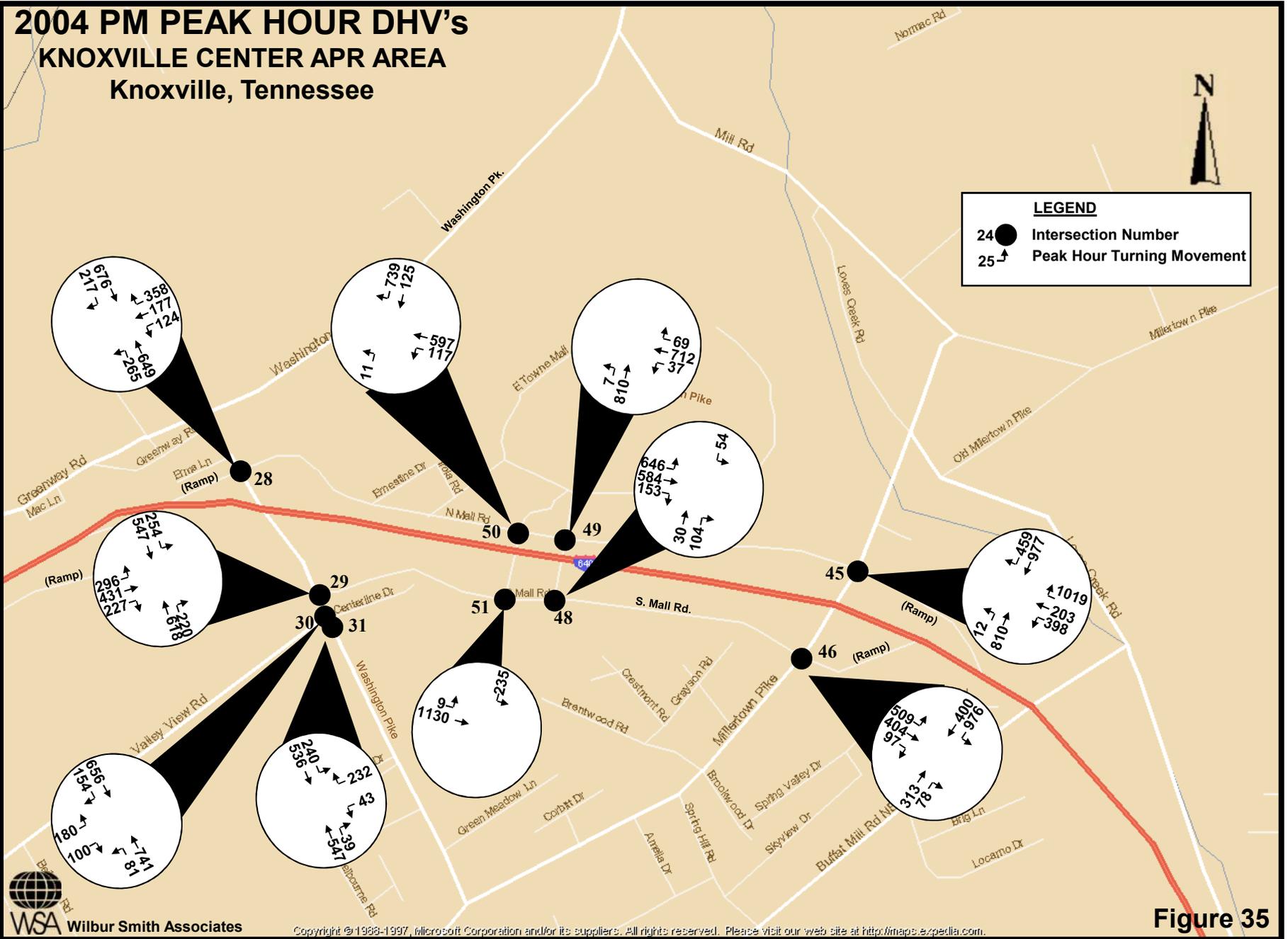
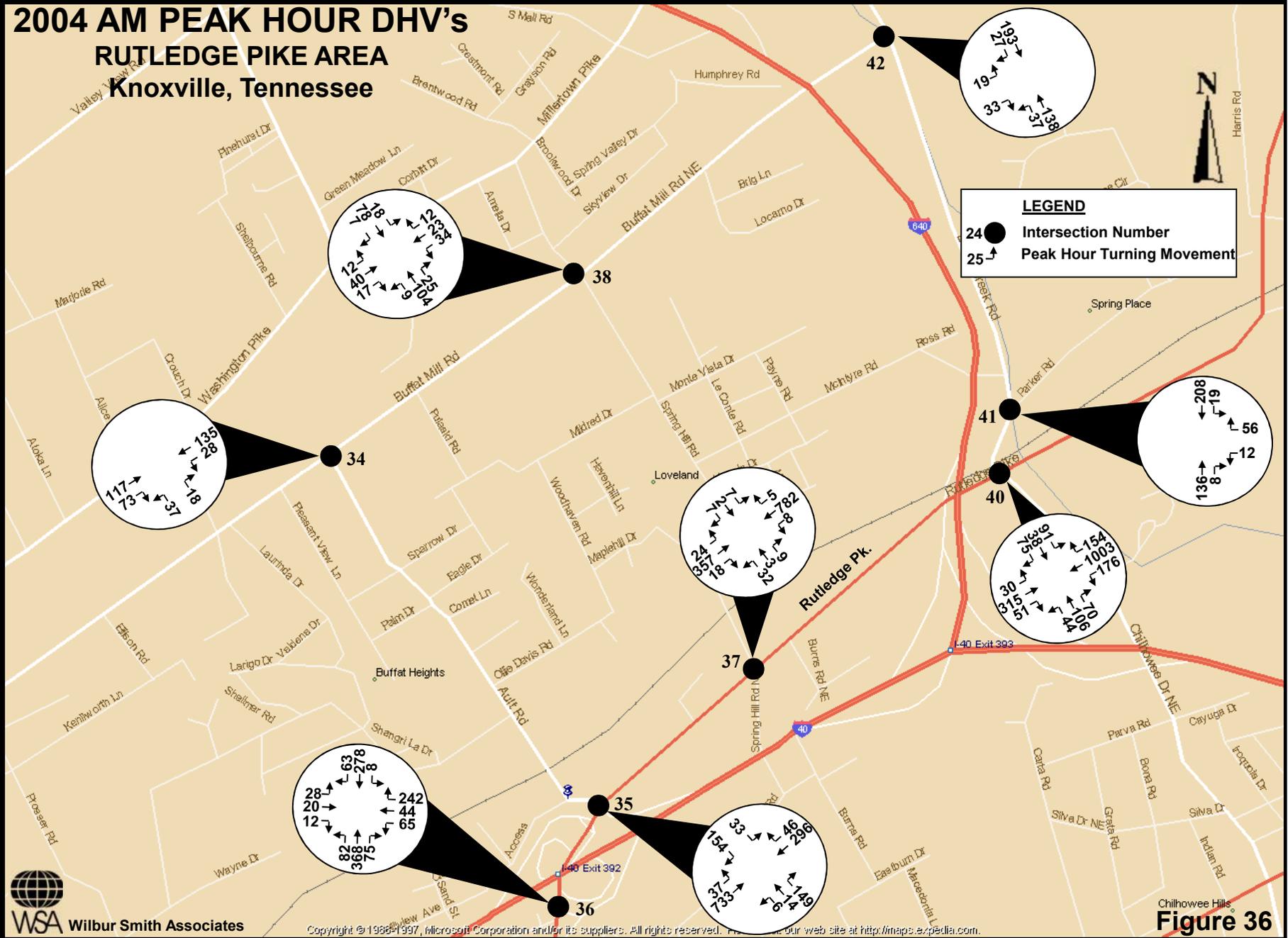


Figure 35

# 2004 AM PEAK HOUR DHV's RUTLEDGE PIKE AREA Knoxville, Tennessee





# 2004 AM PEAK HOUR LEVELS OF SERVICE TAZEWELL PIKE APR AREA Knoxville, Tennessee

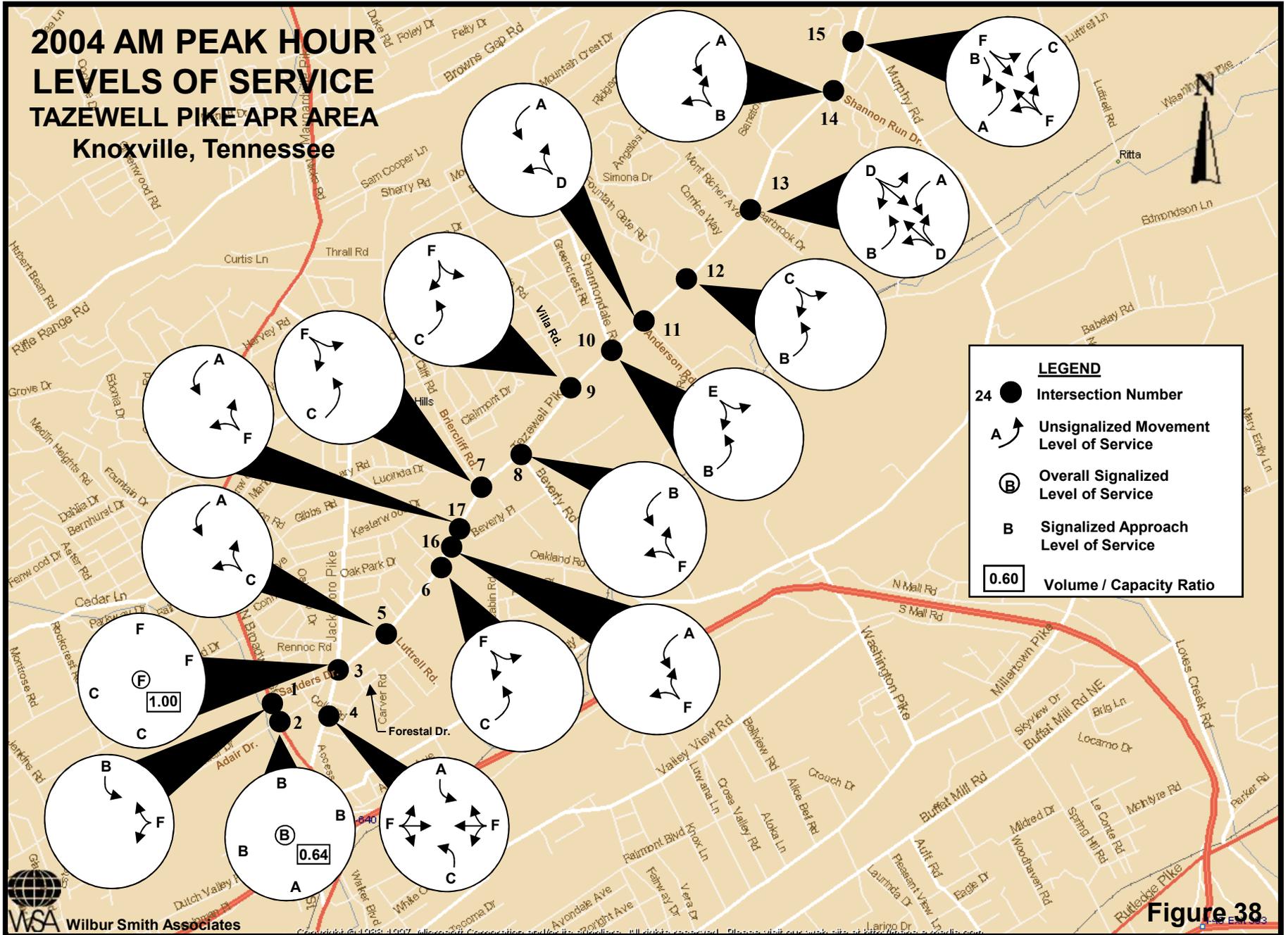


Figure 38

# 2004 PM PEAK HOUR LEVELS OF SERVICE TAZEWELL PIKE APR AREA Knoxville, Tennessee

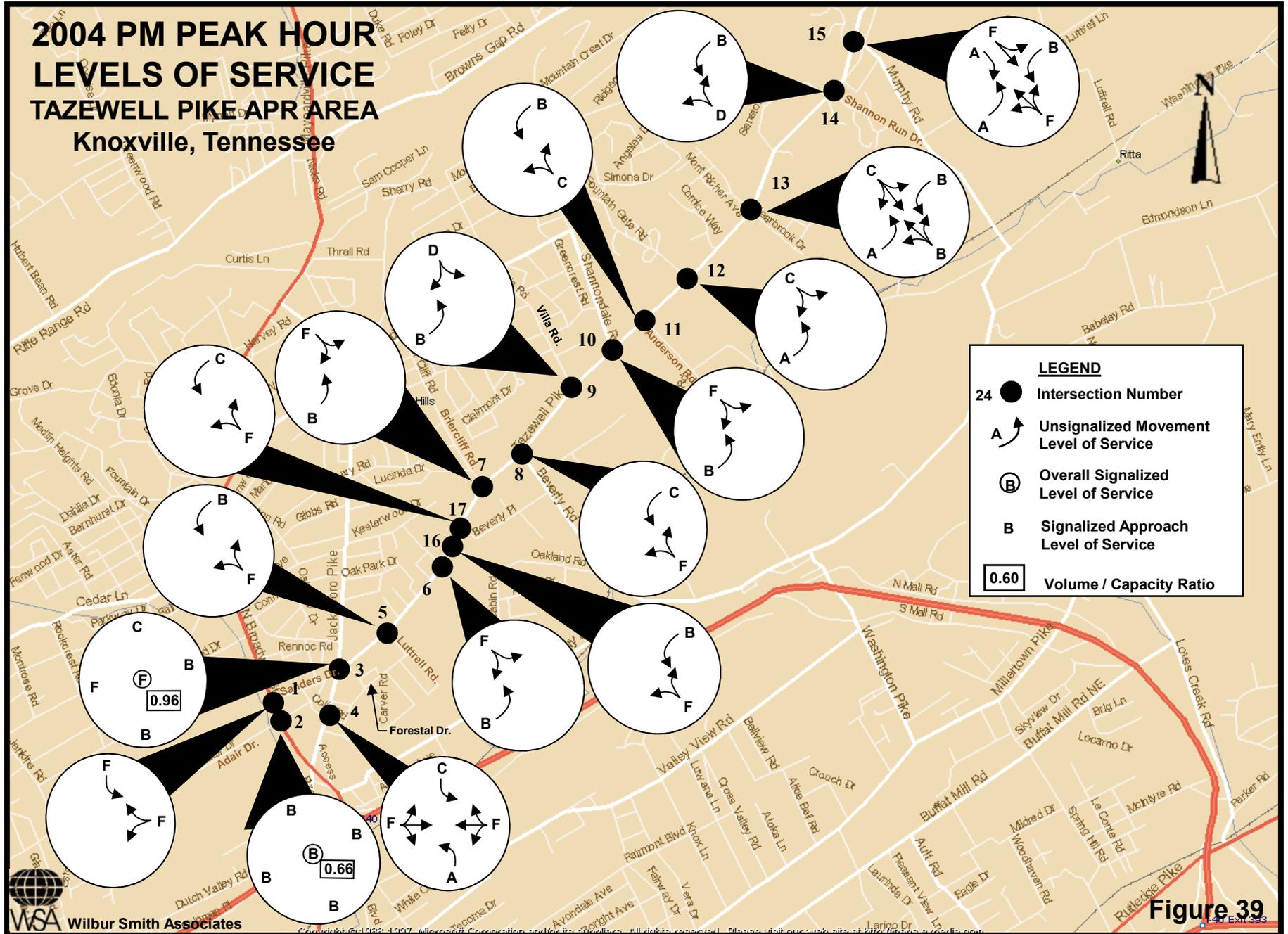


Figure 39

# 2004 AM PEAK HOUR LEVELS OF SERVICE BEVERLY ROAD AREA Knoxville, Tennessee

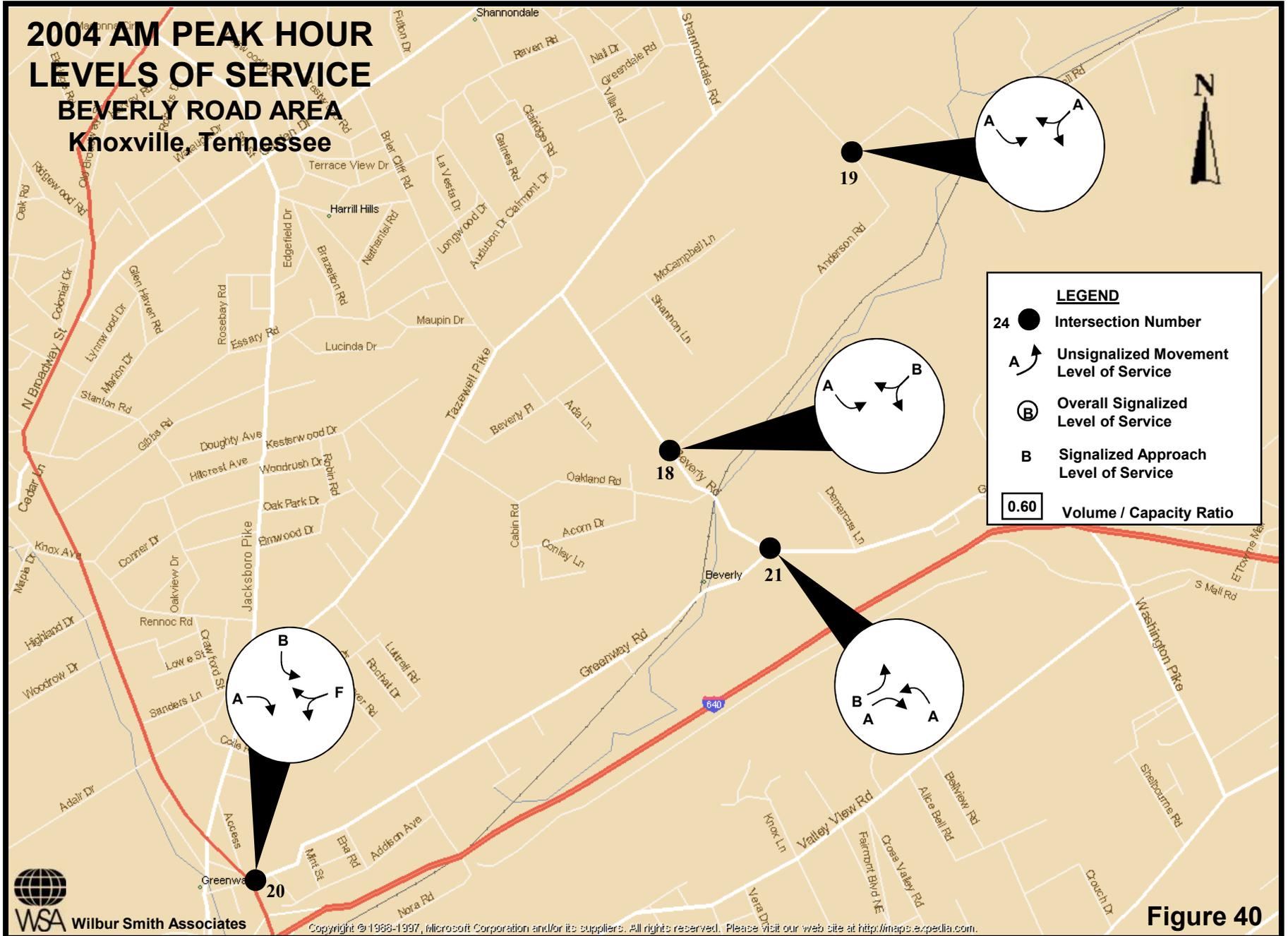
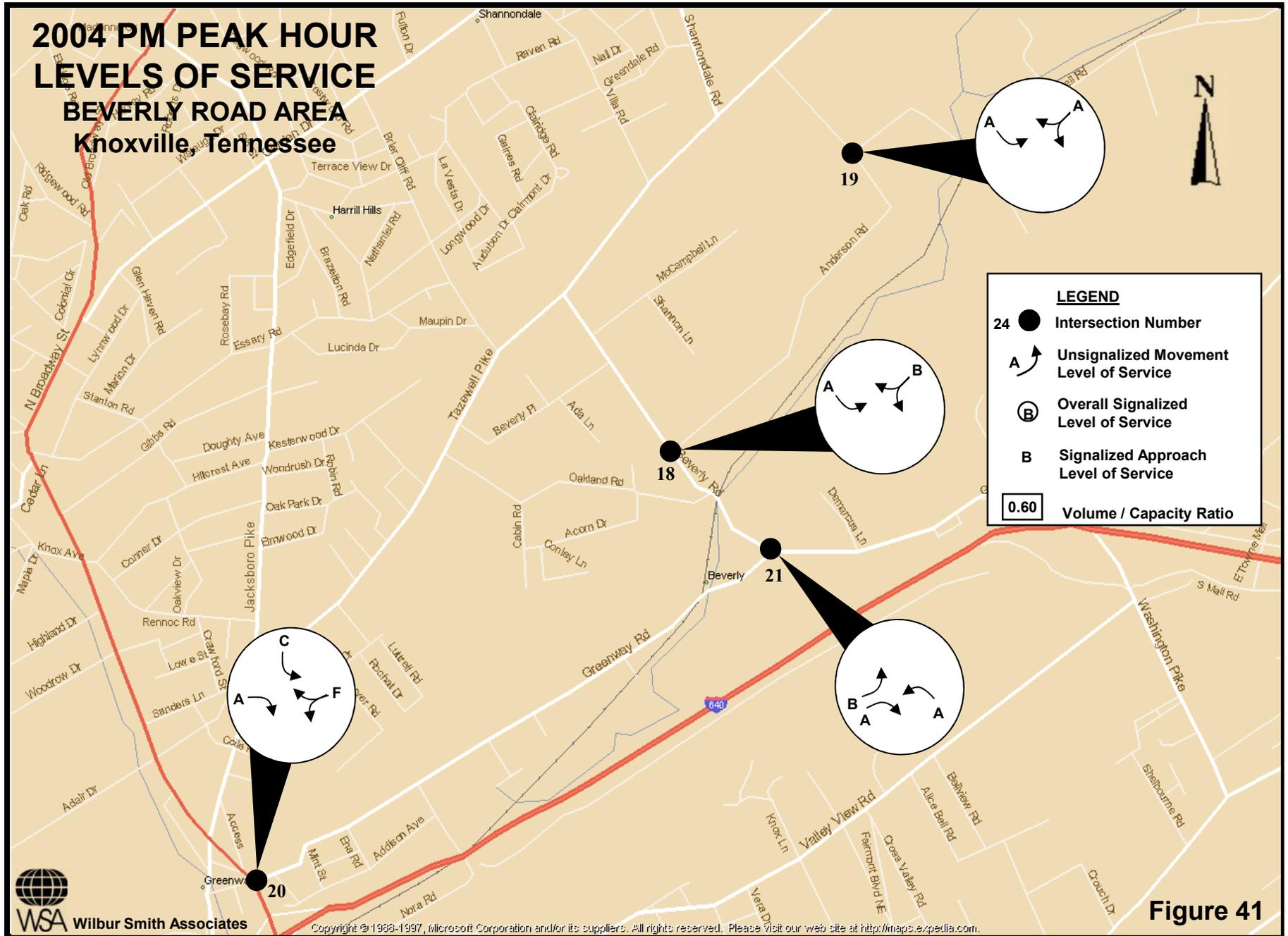


Figure 40

# 2004 PM PEAK HOUR LEVELS OF SERVICE BEVERLY ROAD AREA Knoxville, Tennessee



# 2004 AM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER APR AREA Knoxville, Tennessee

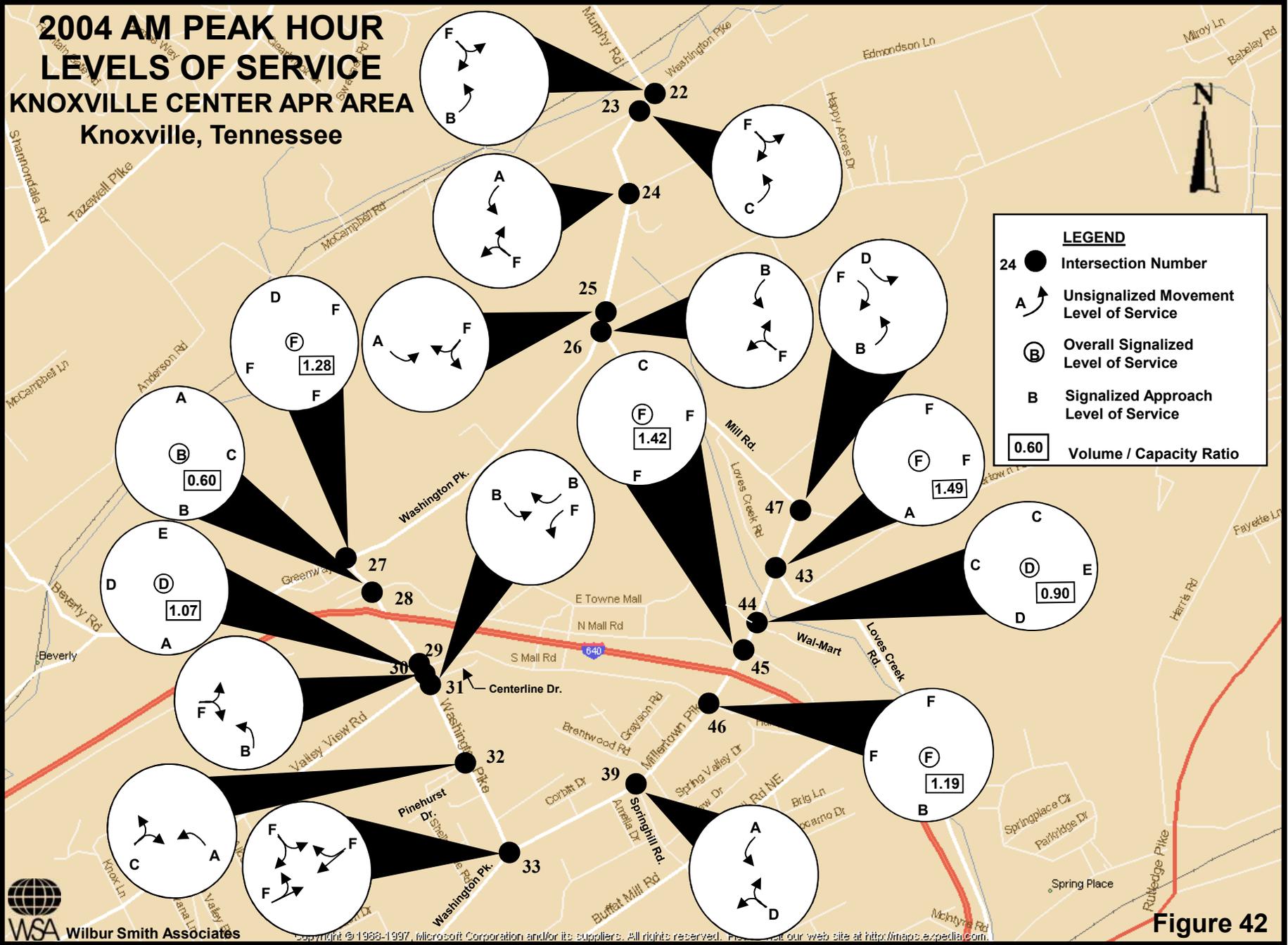
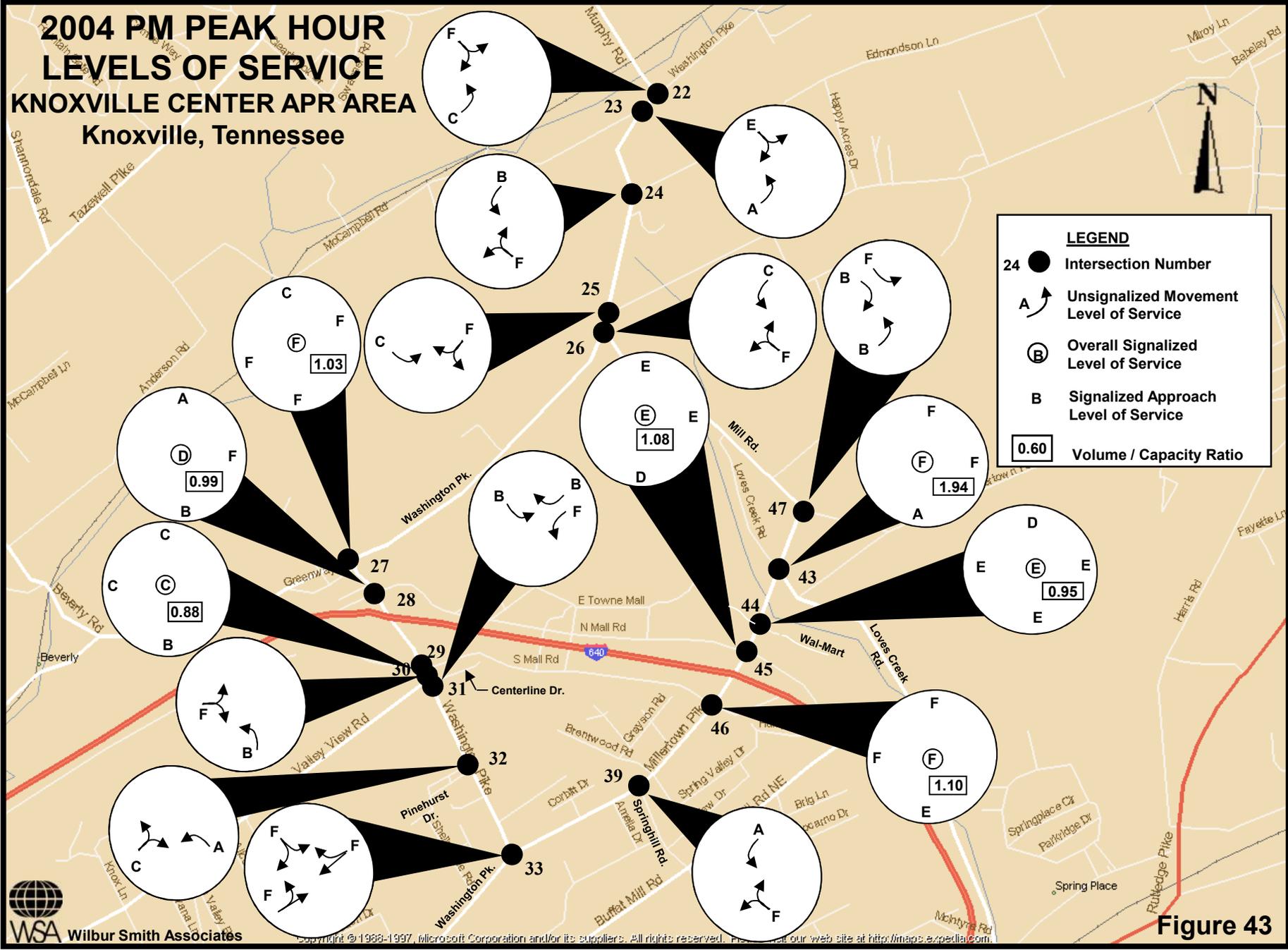


Figure 42

# 2004 PM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER APR AREA Knoxville, Tennessee



**LEGEND**

- Intersection Number
- ↷ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

Figure 43

# 2004 AM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

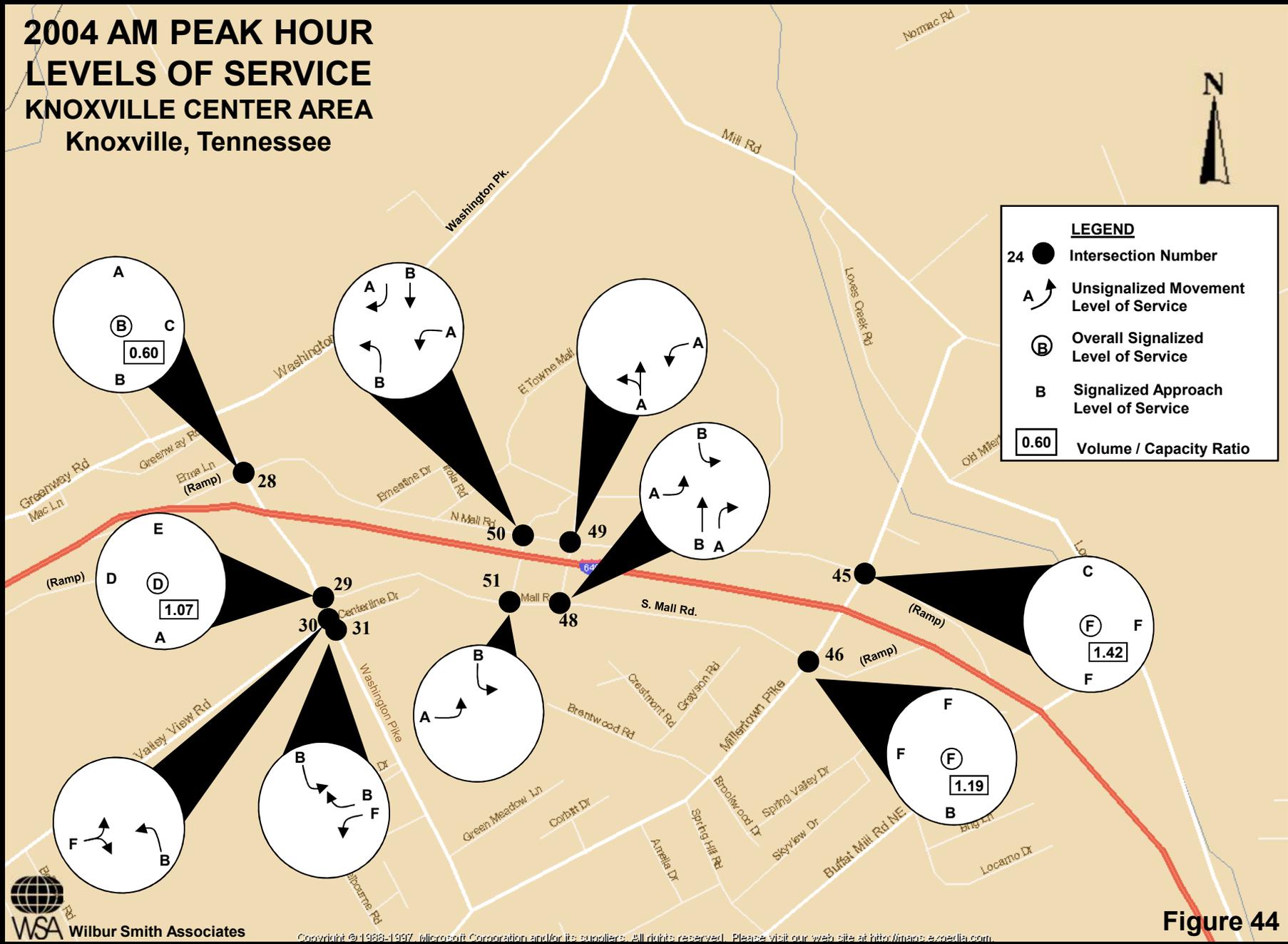


Figure 44

# 2004 PM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

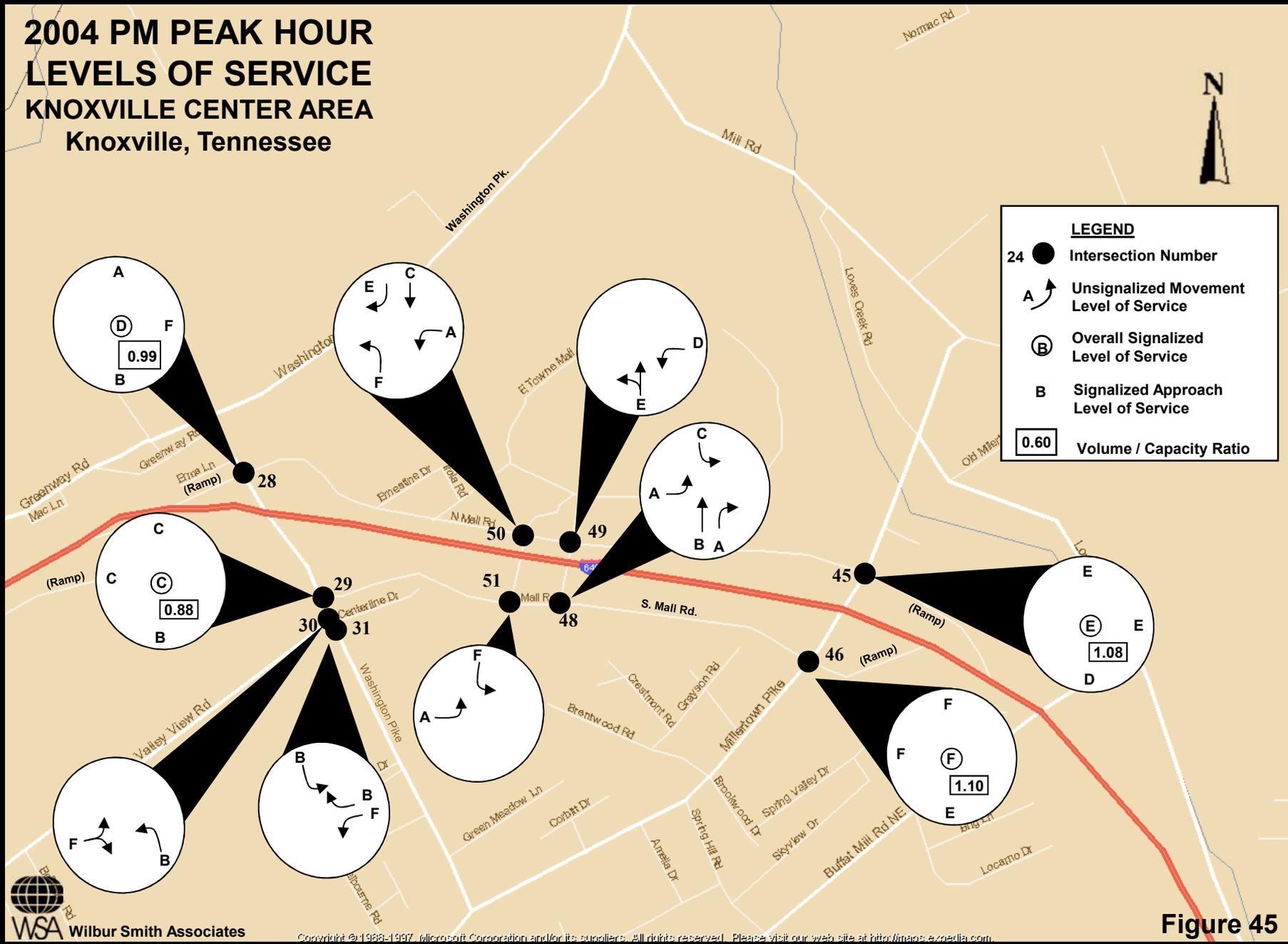
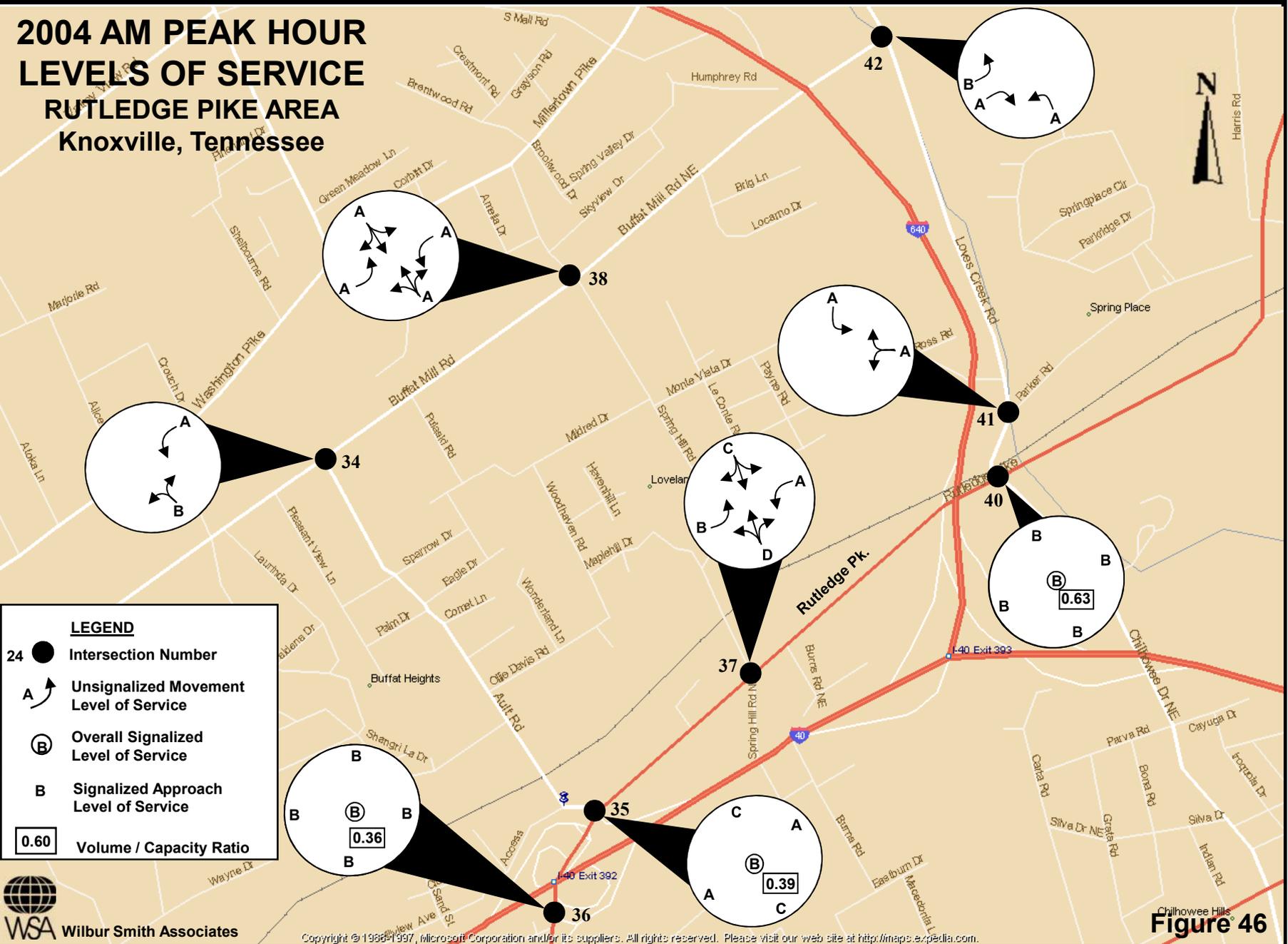
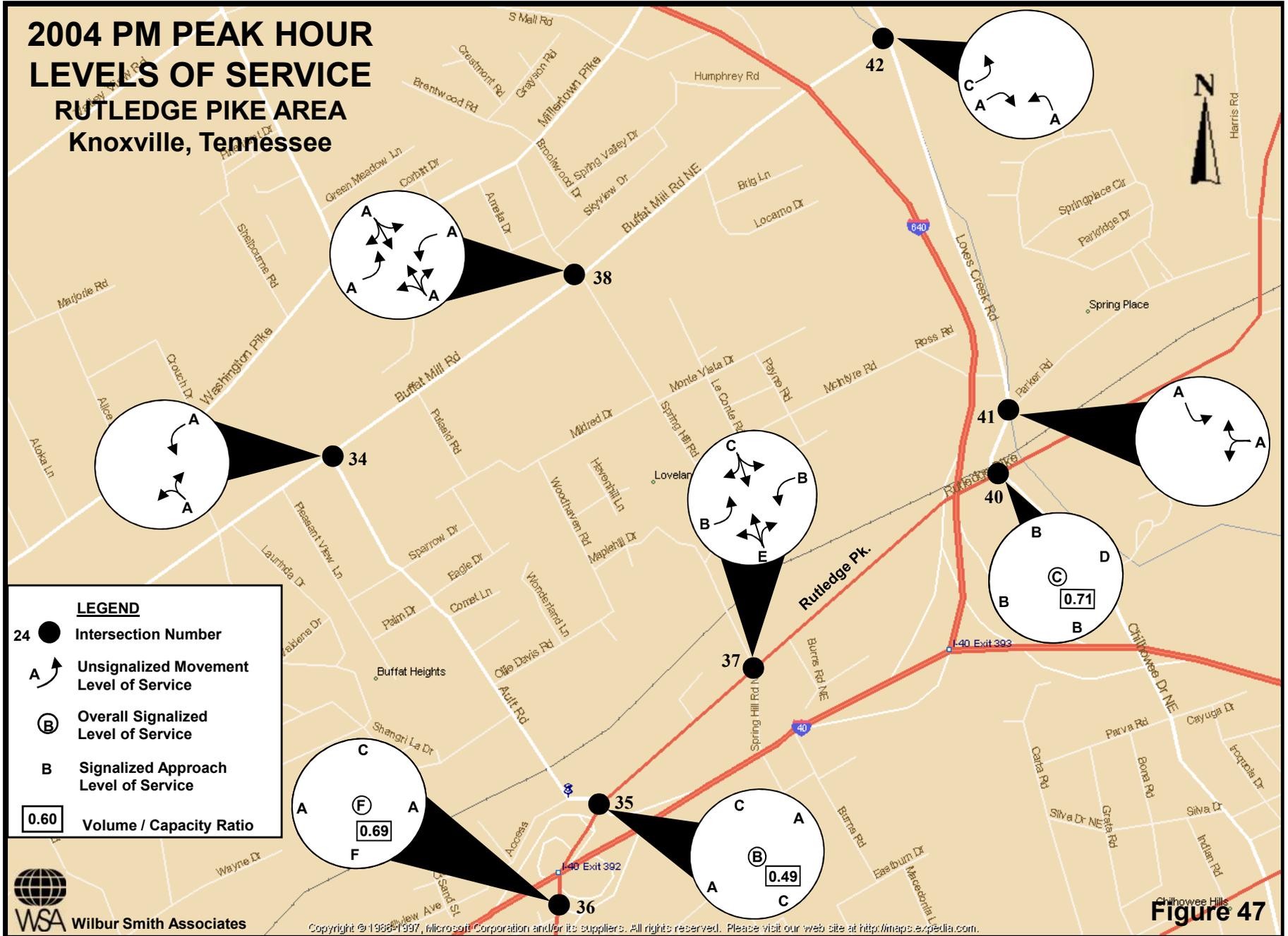


Figure 45

# 2004 AM PEAK HOUR LEVELS OF SERVICE RUTLEDGE PIKE AREA Knoxville, Tennessee



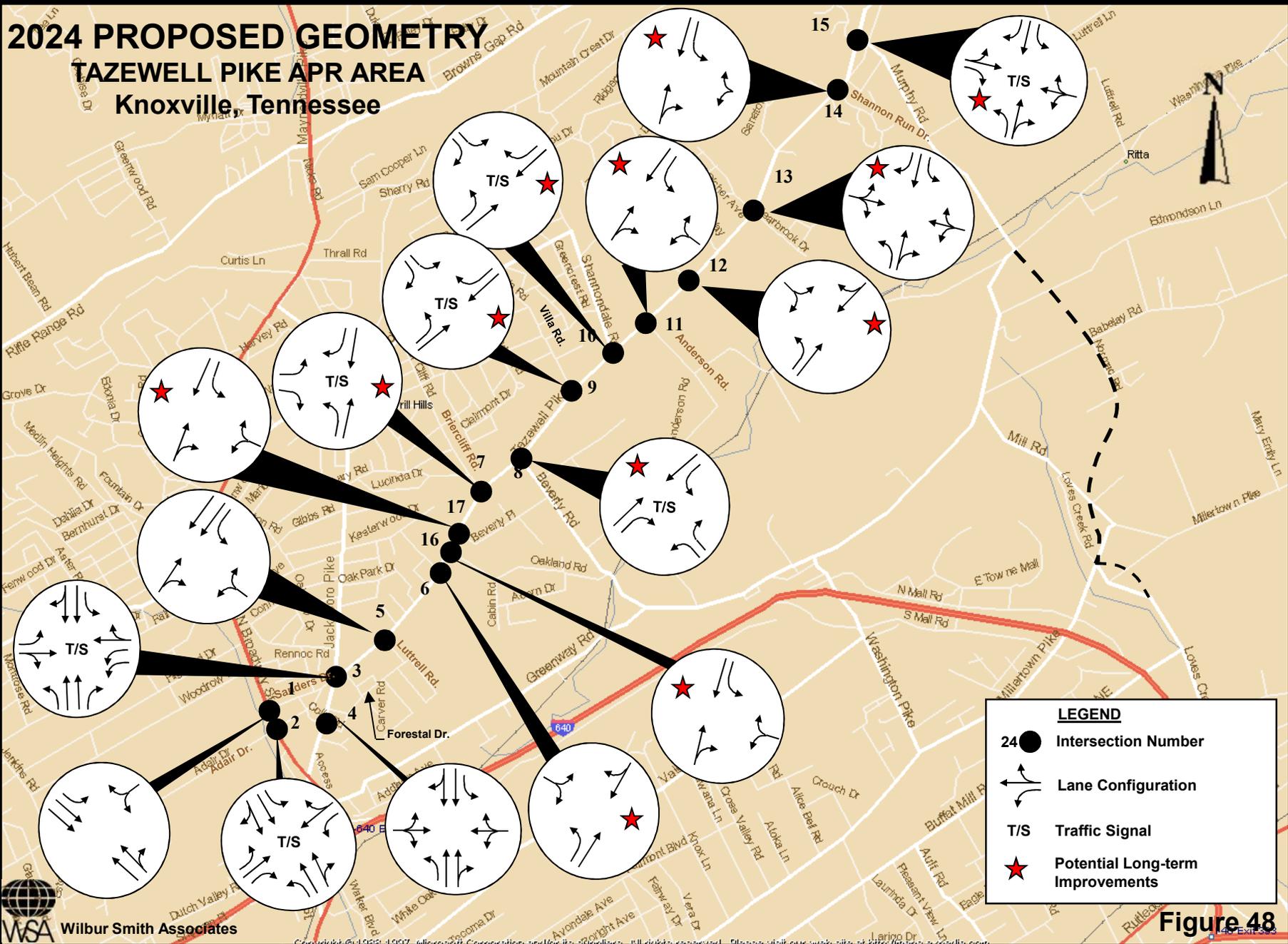
# 2004 PM PEAK HOUR LEVELS OF SERVICE RUTLEDGE PIKE AREA Knoxville, Tennessee



# 2024 PROPOSED GEOMETRY

## TAZEWELL PIKE APR AREA

### Knoxville, Tennessee



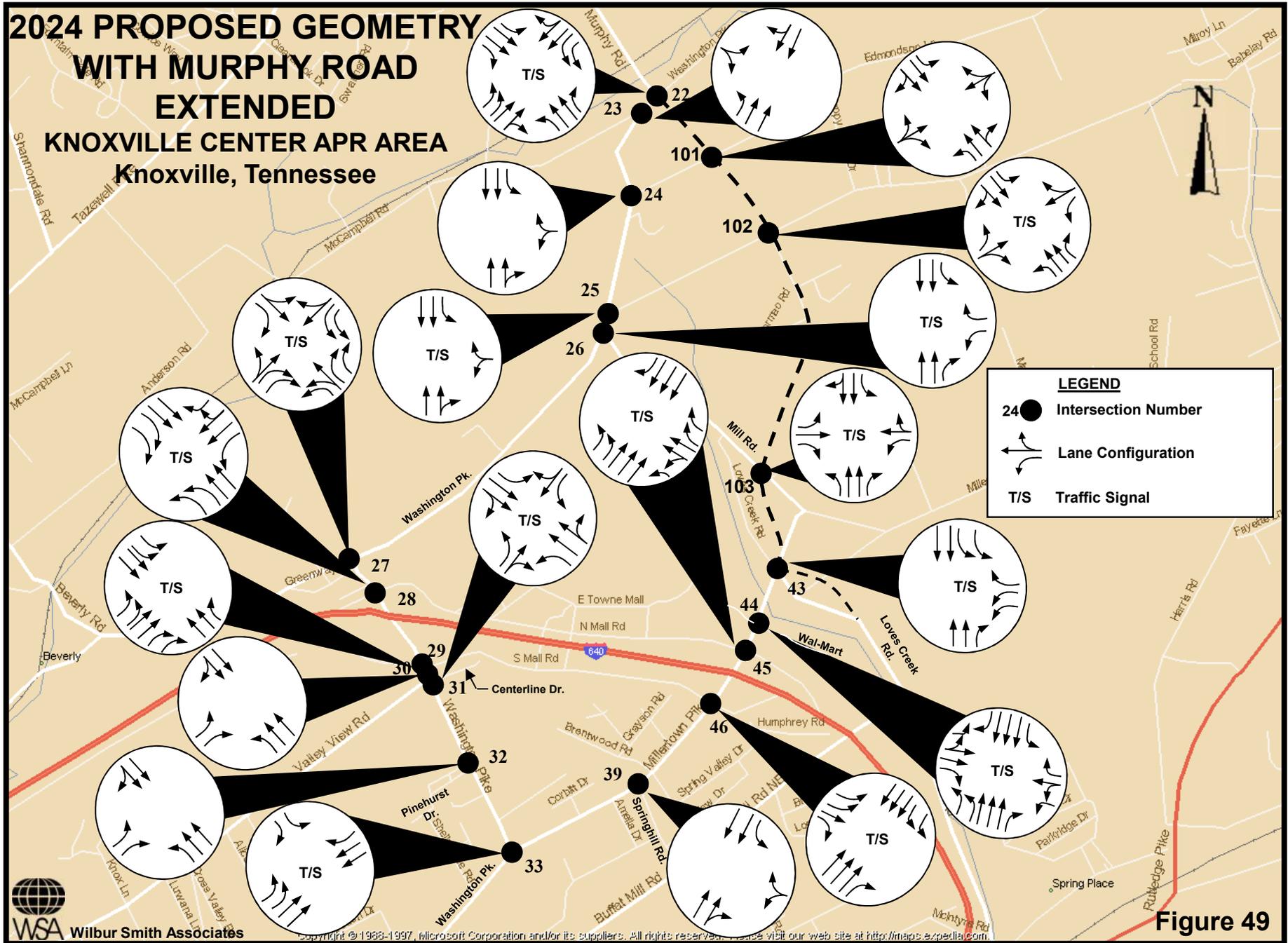
**LEGEND**

- Intersection Number
- ↔ Lane Configuration
- T/S Traffic Signal
- ★ Potential Long-term Improvements

**Figure 48**

# 2024 PROPOSED GEOMETRY WITH MURPHY ROAD EXTENDED

## KNOXVILLE CENTER APR AREA Knoxville, Tennessee

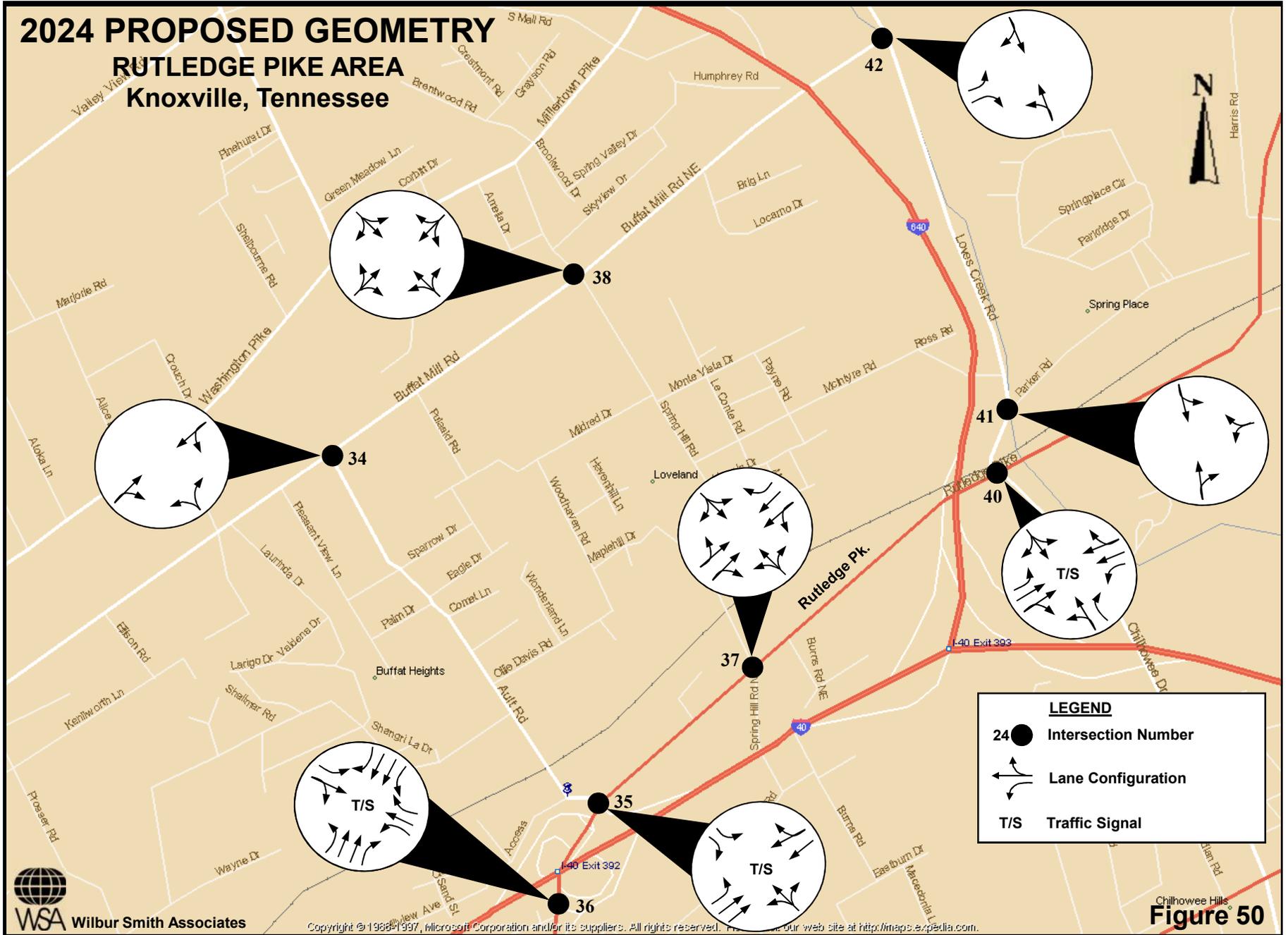


**Figure 49**

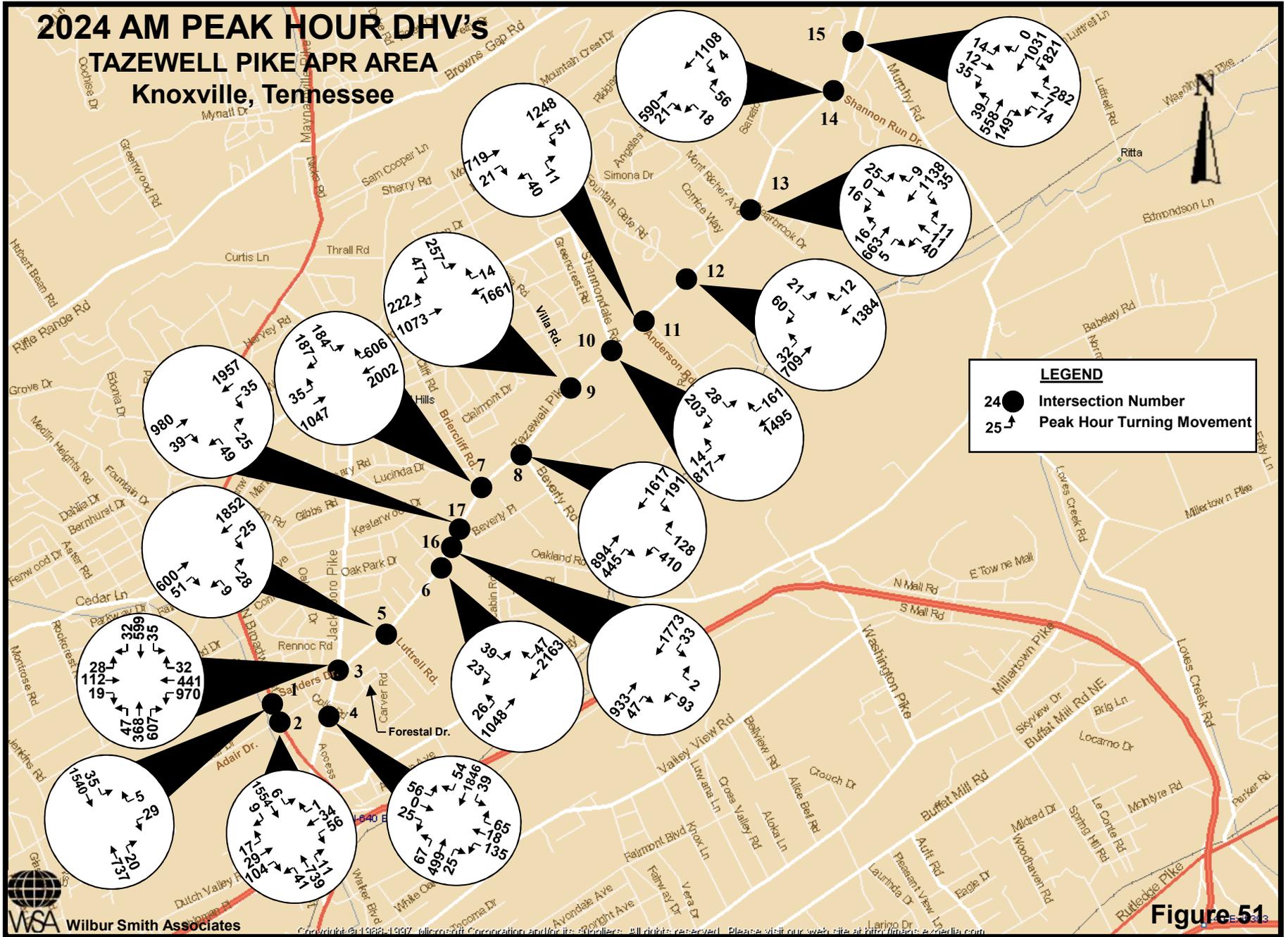
# 2024 PROPOSED GEOMETRY

## RUTLEDGE PIKE AREA

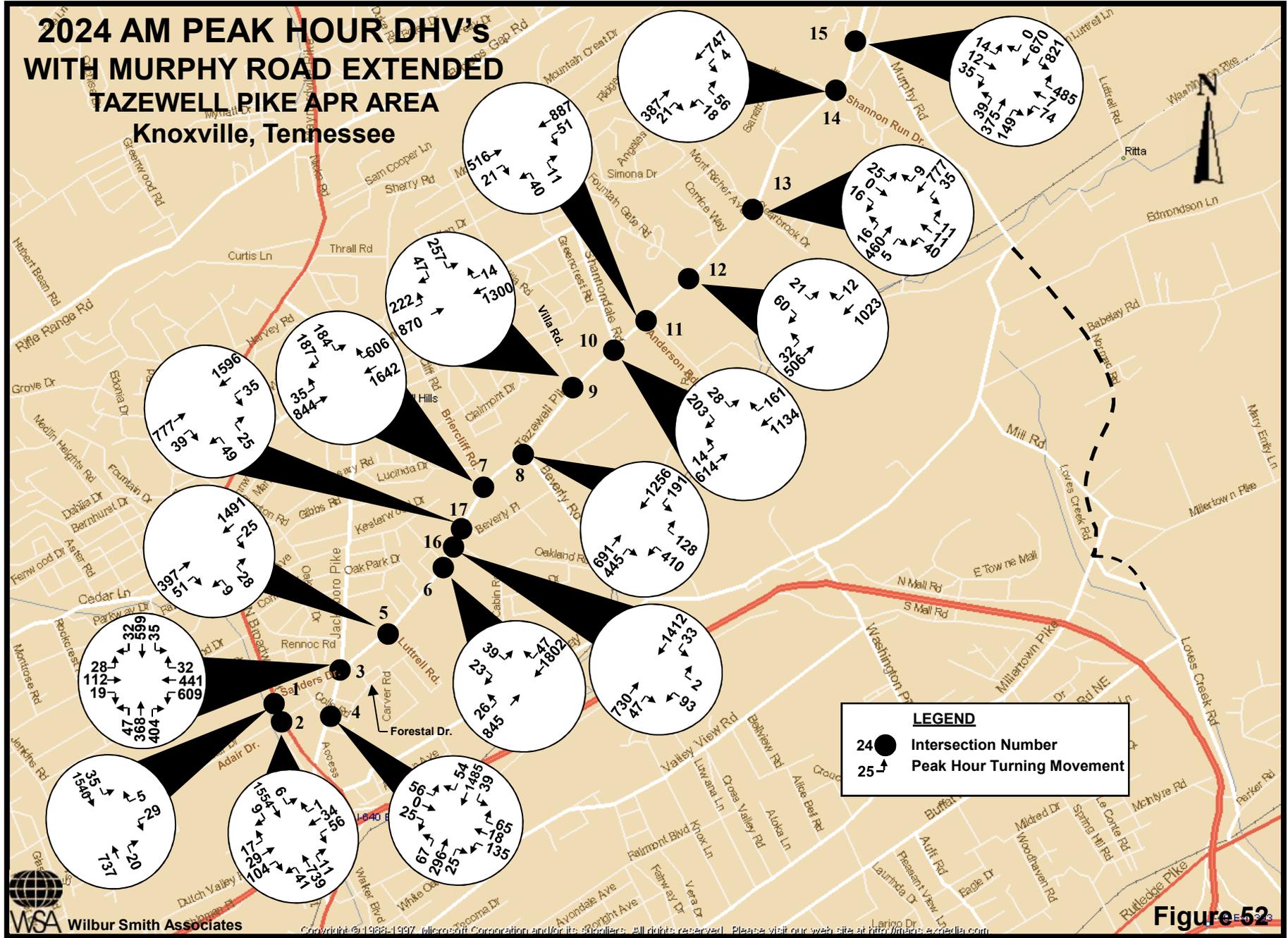
### Knoxville, Tennessee



# 2024 AM PEAK HOUR DHV'S TAZEWELL PIKE APR AREA Knoxville, Tennessee



# 2024 AM PEAK HOUR DHV'S WITH MURPHY ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee





# 2024 PM PEAK HOUR DHV'S WITH MURPHY ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee

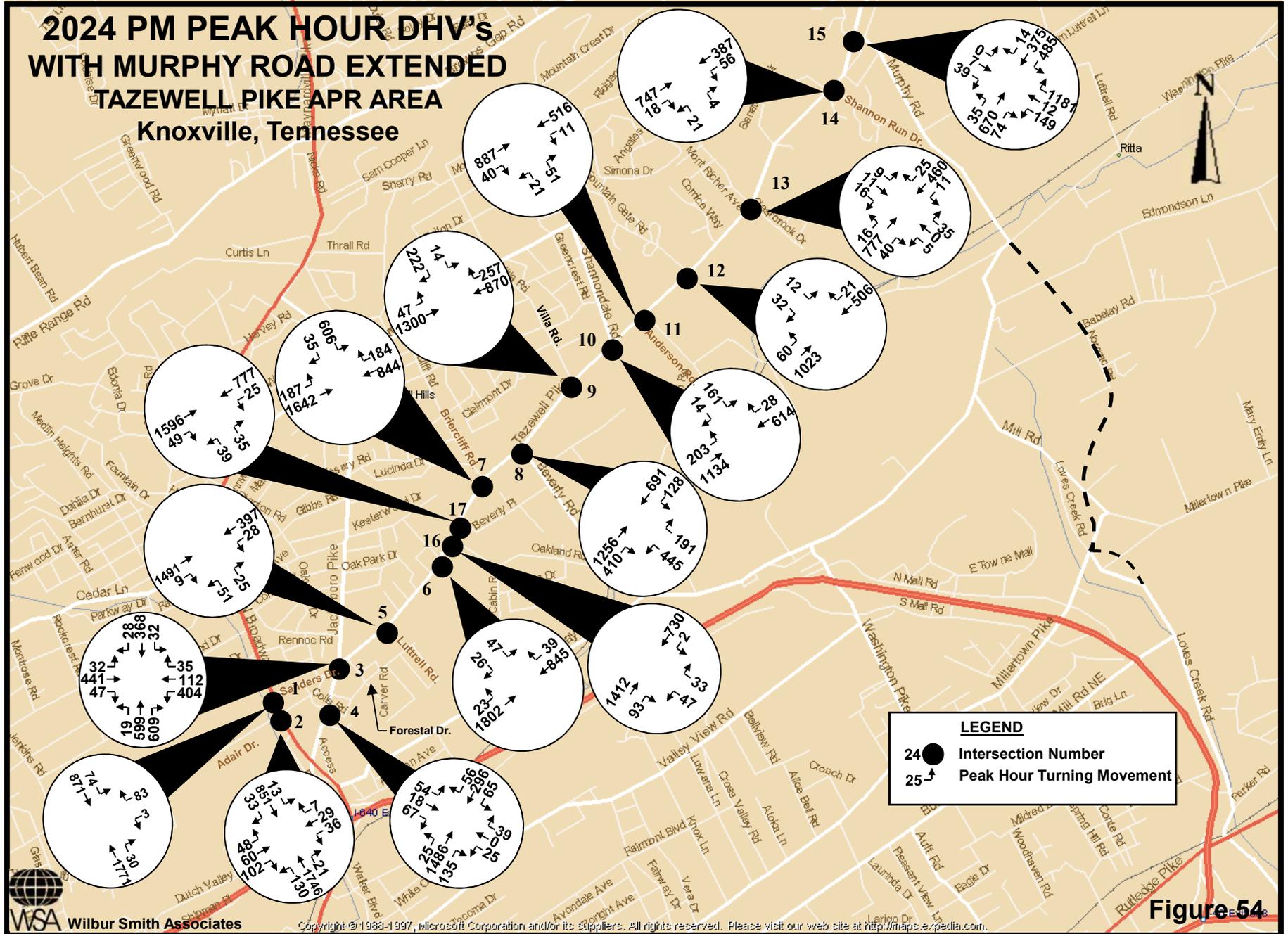
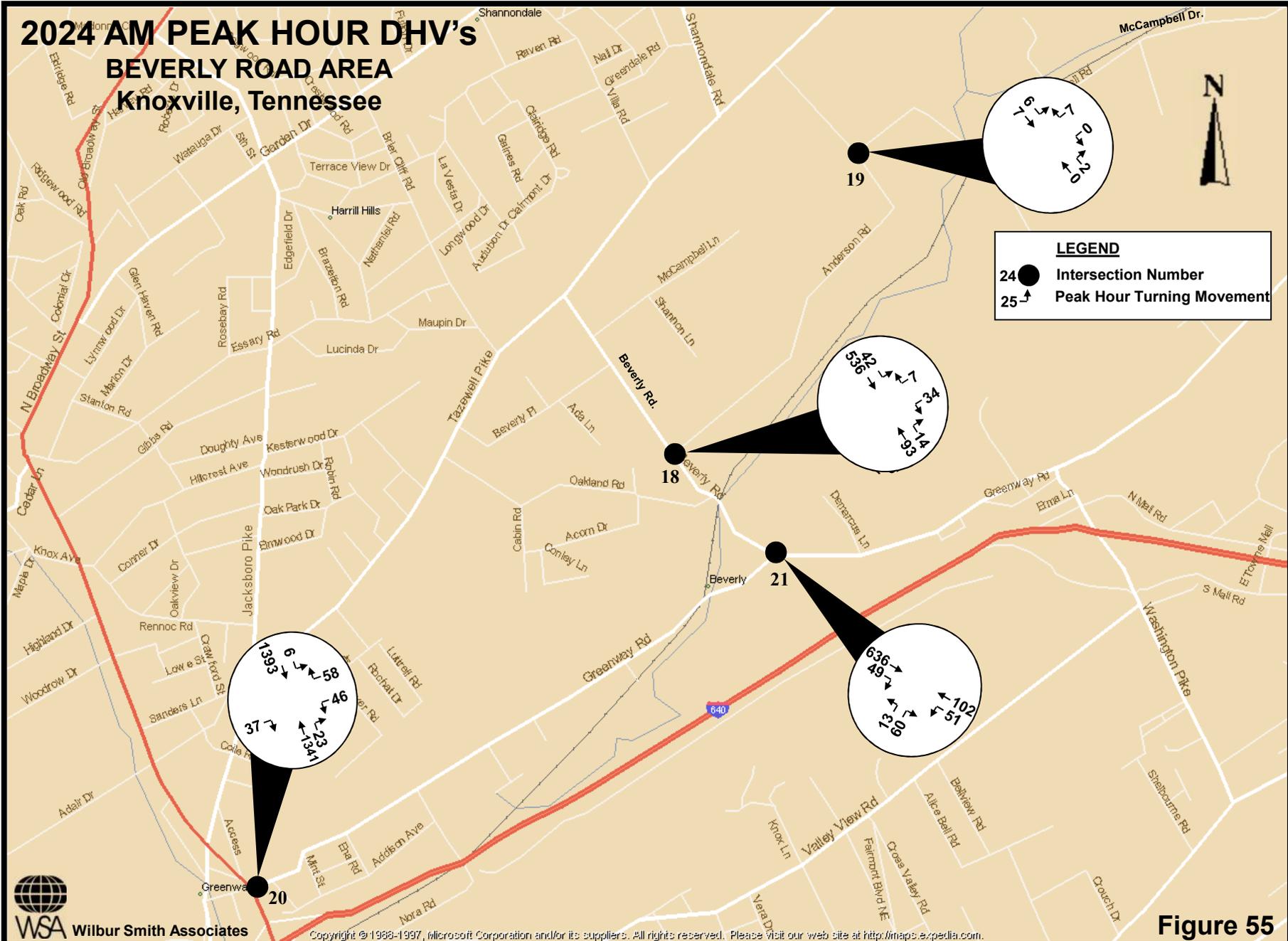


Figure 54

# 2024 AM PEAK HOUR DHV's BEVERLY ROAD AREA Knoxville, Tennessee



# 2024 PM PEAK HOUR DHV'S BEVERLY ROAD AREA Knoxville, Tennessee

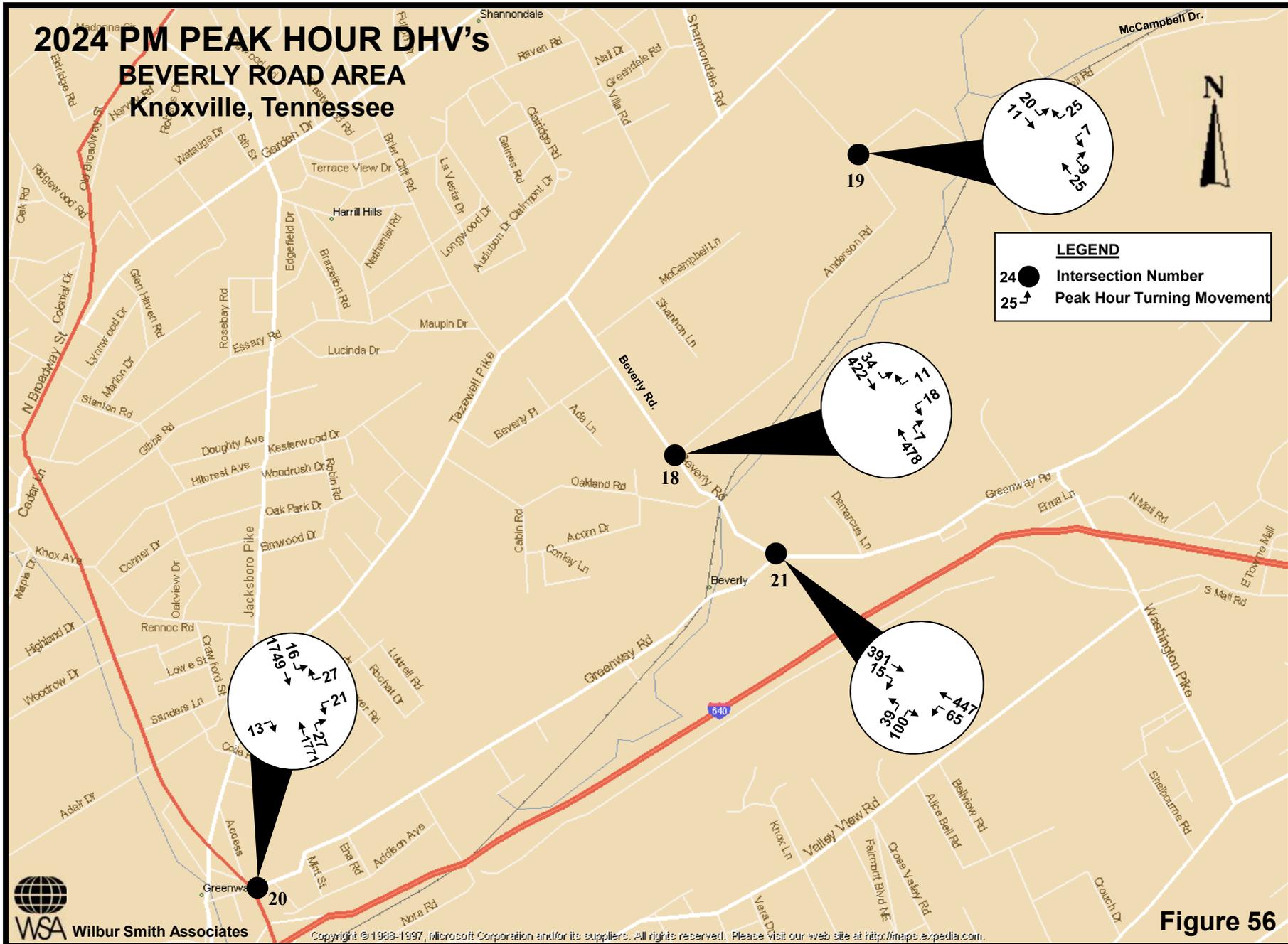


Figure 56

# 2024 AM PEAK HOUR DHV'S KNOXVILLE CENTER APR AREA Knoxville, Tennessee

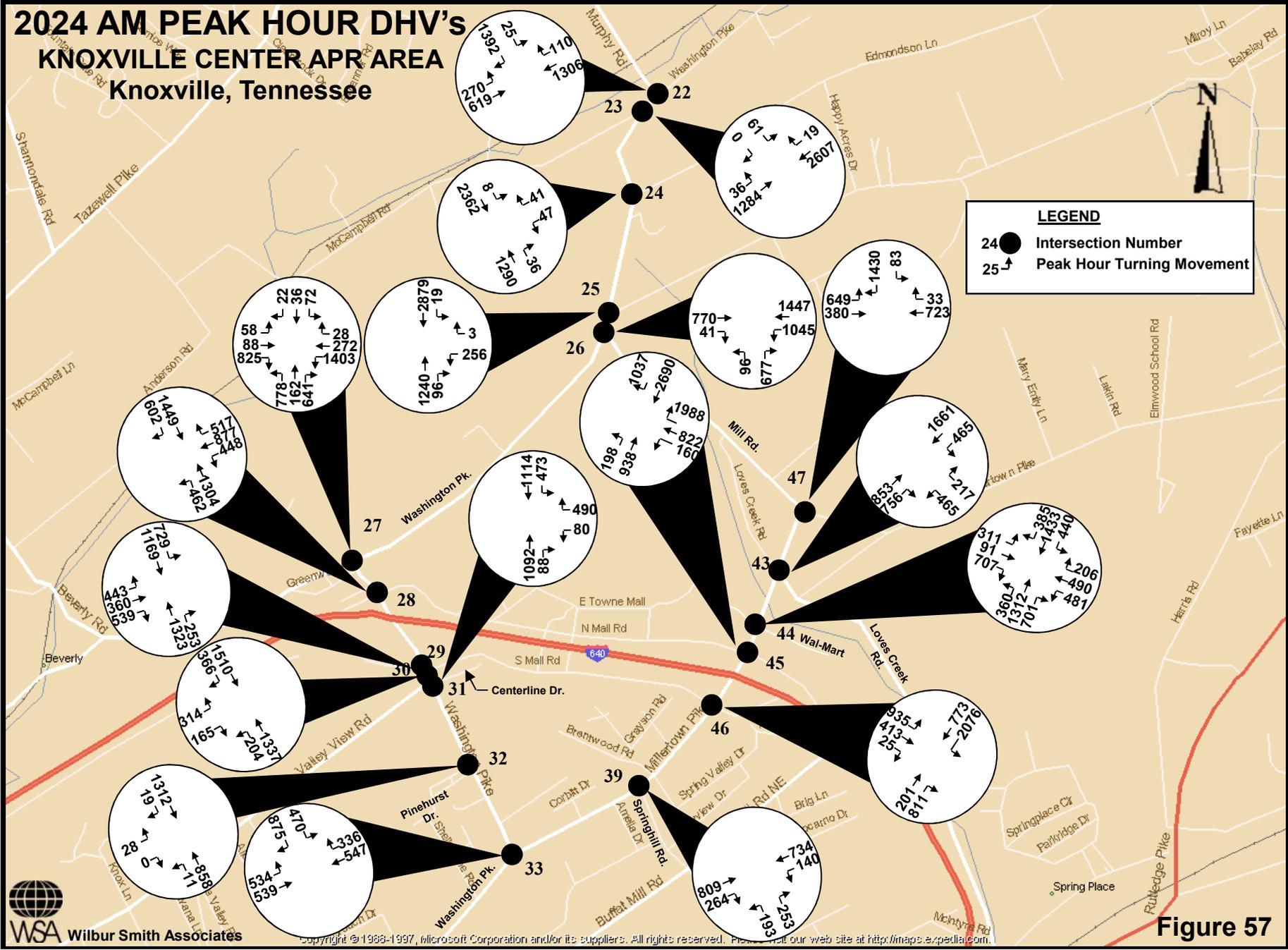
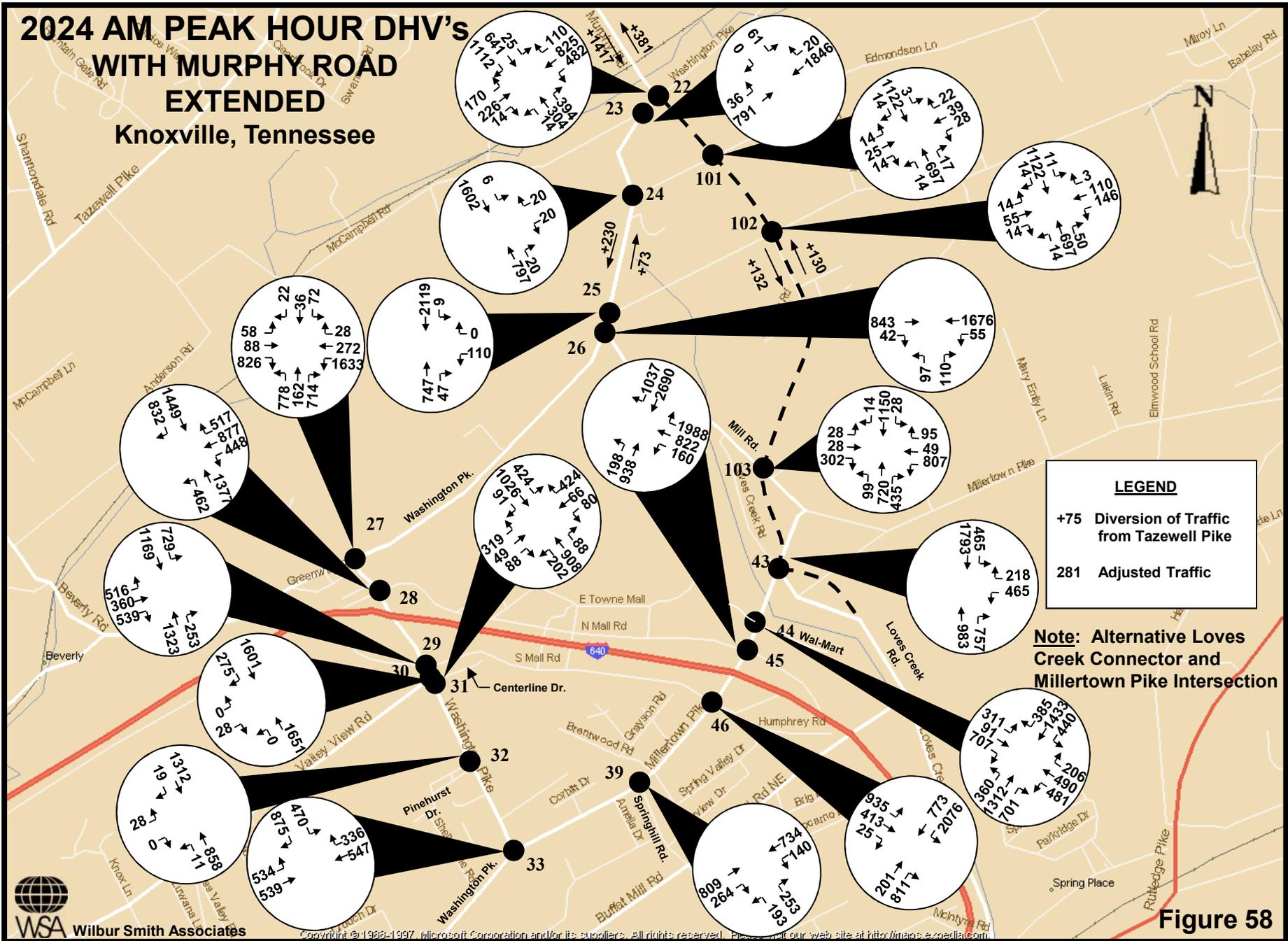
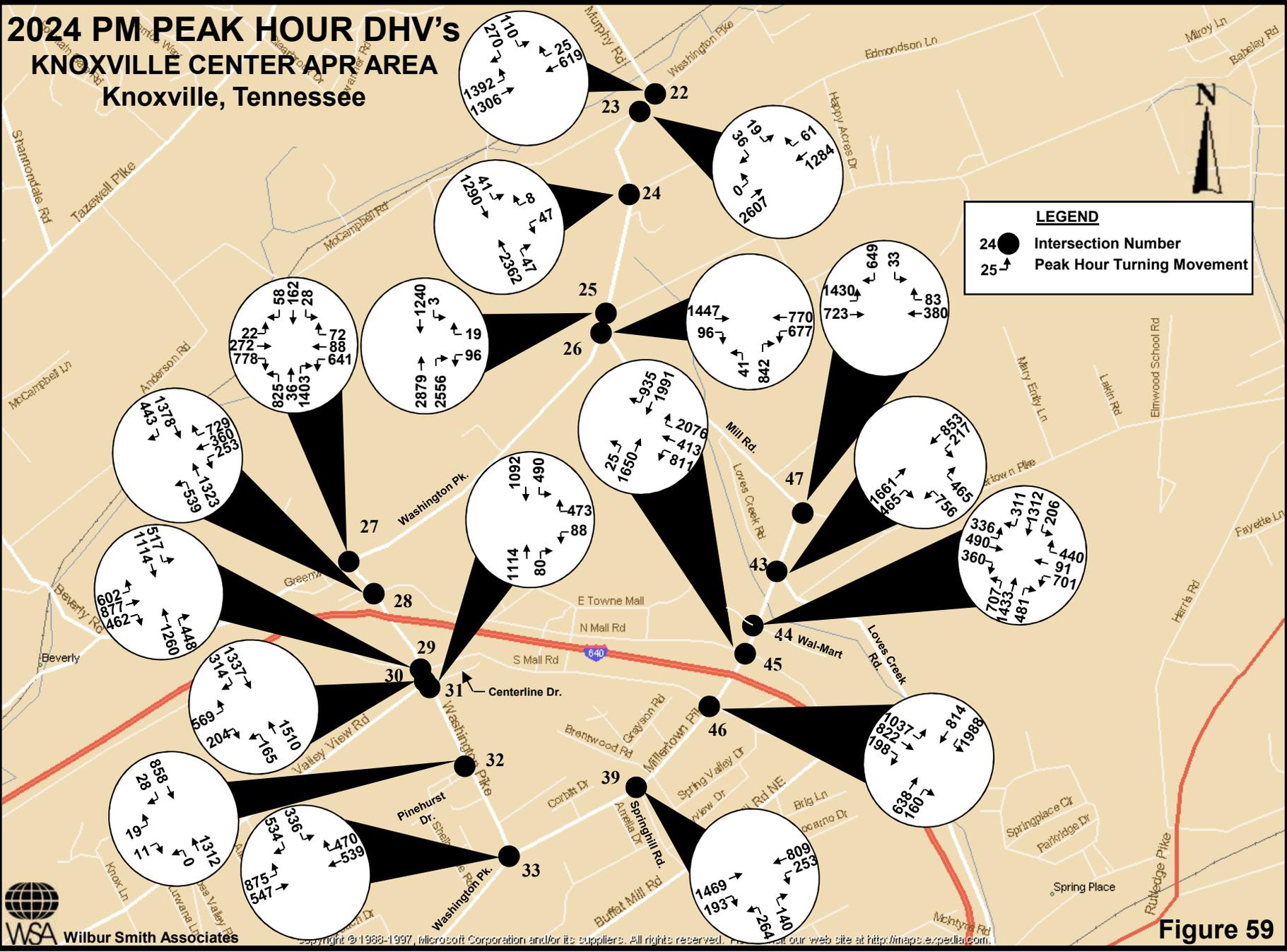


Figure 57

# 2024 AM PEAK HOUR DHV'S WITH MURPHY ROAD EXTENDED Knoxville, Tennessee



# 2024 PM PEAK HOUR DHV'S KNOXVILLE CENTER APR AREA Knoxville, Tennessee



**Figure 59**

# 2024 PM PEAK HOUR DHV's WITH MURPHY ROAD EXTENDED Knoxville, Tennessee

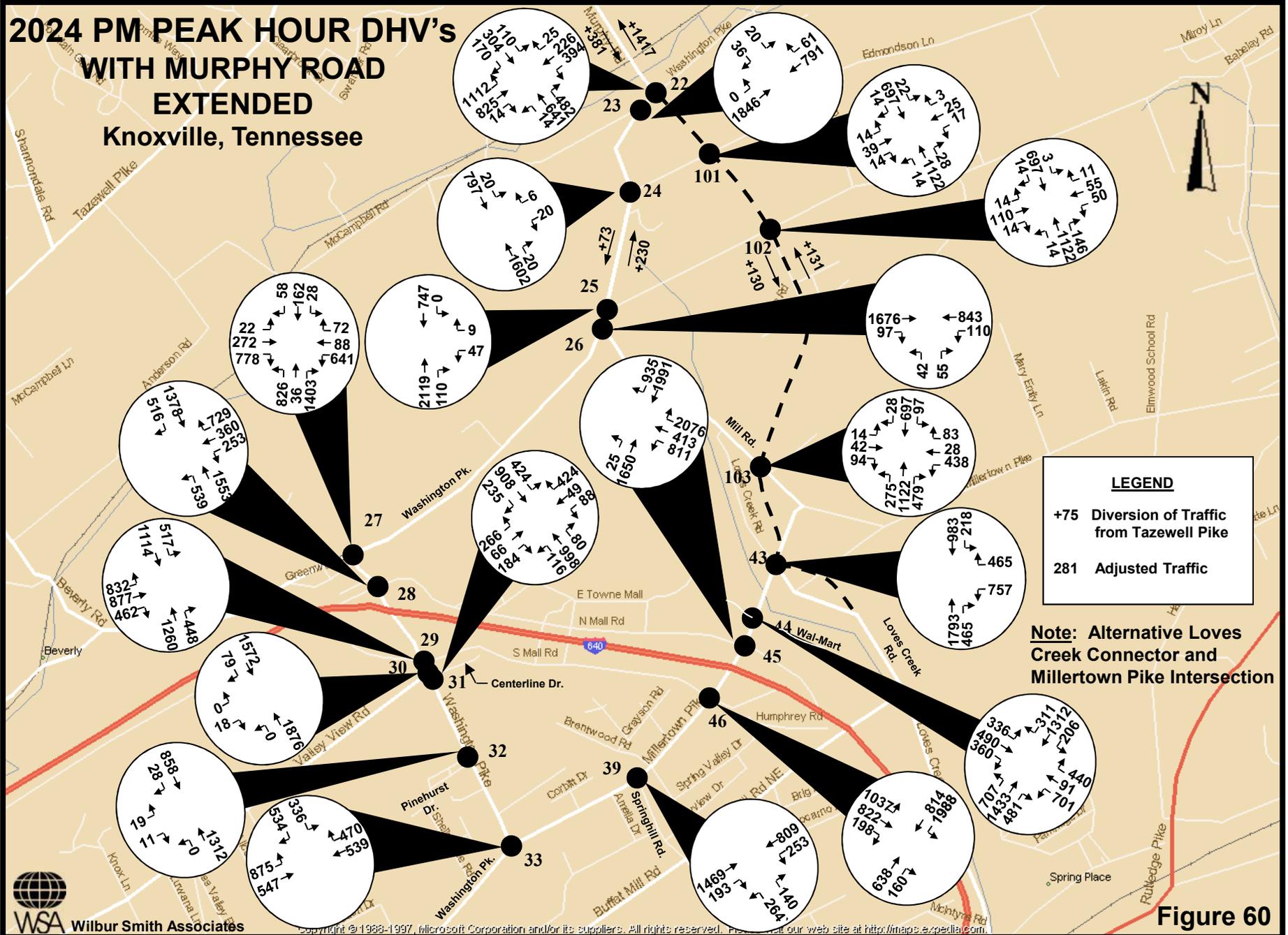


Figure 60

# 2024 AM PEAK HOUR DHV's KNOXVILLE CENTER APR AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- 25 ↗ Peak Hour Turning Movement

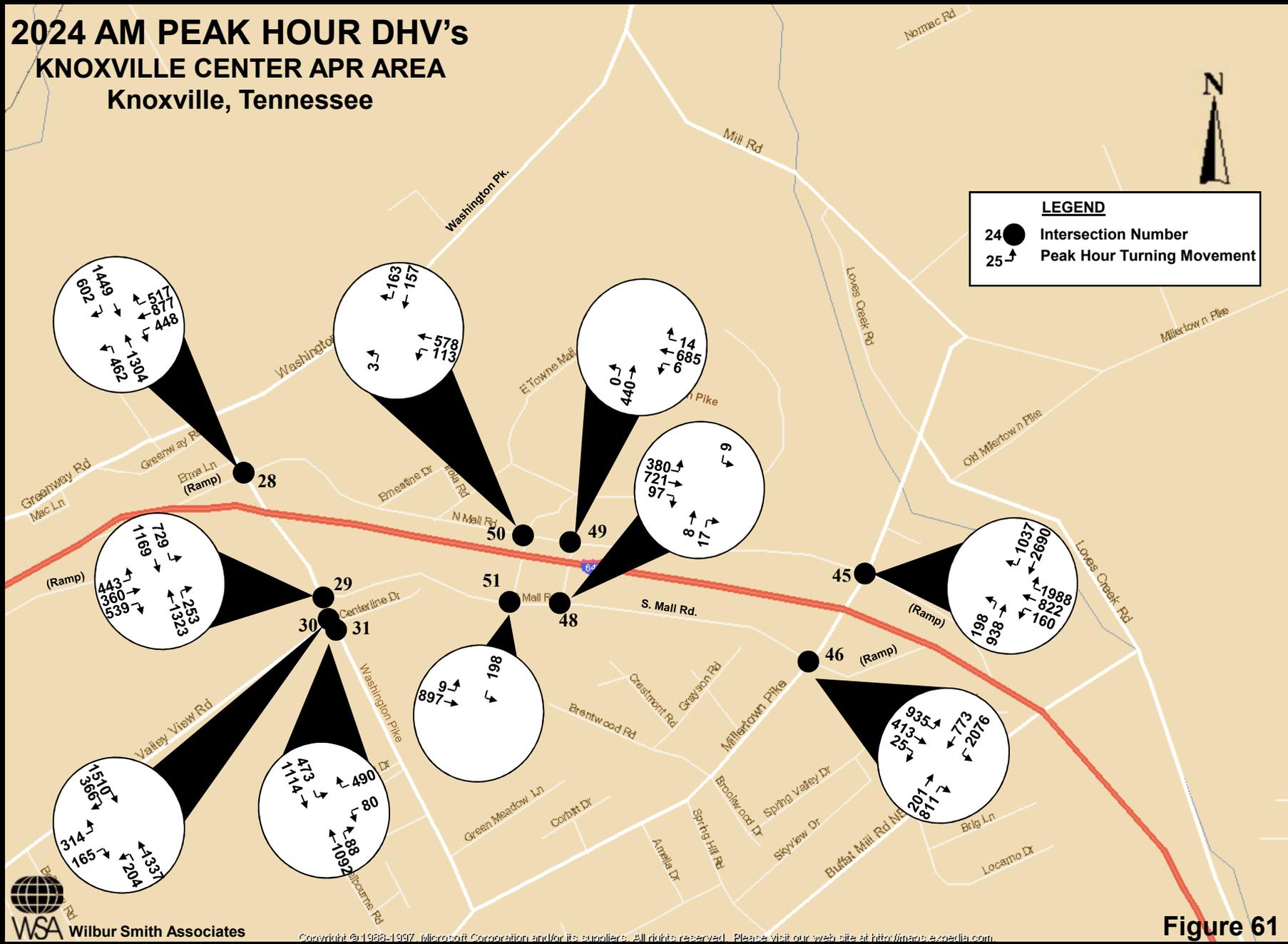


Figure 61

# 2024 AM PEAK HOUR DHV's WITH MURPHY ROAD EXTENDED KNOXVILLE CENTER APR AREA Knoxville, Tennessee

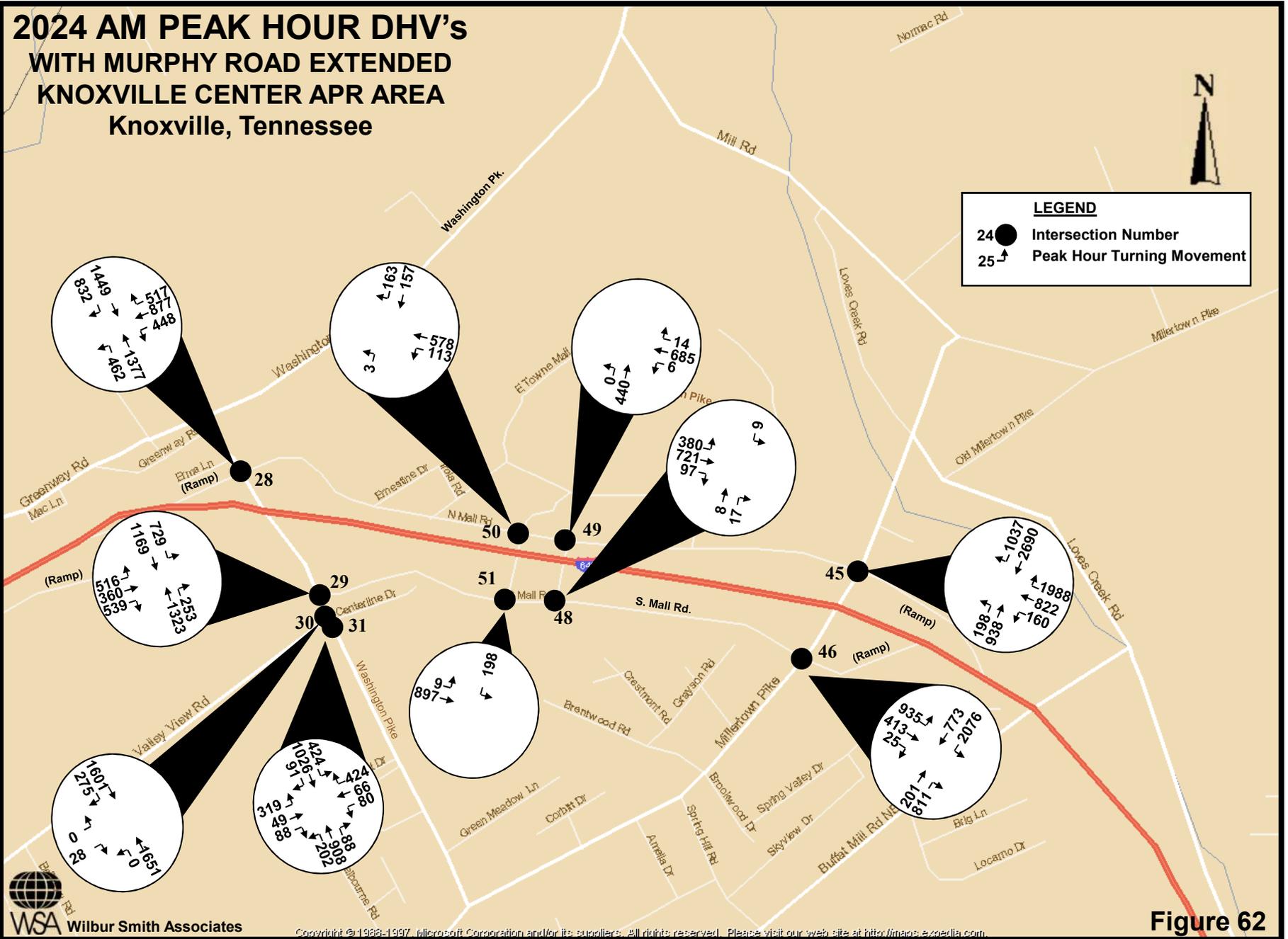


Figure 62

# 2024 PM PEAK HOUR DHV's

## KNOXVILLE CENTER APR AREA

### Knoxville, Tennessee

**LEGEND**

- 24 ● Intersection Number
- 25 ↗ Peak Hour Turning Movement

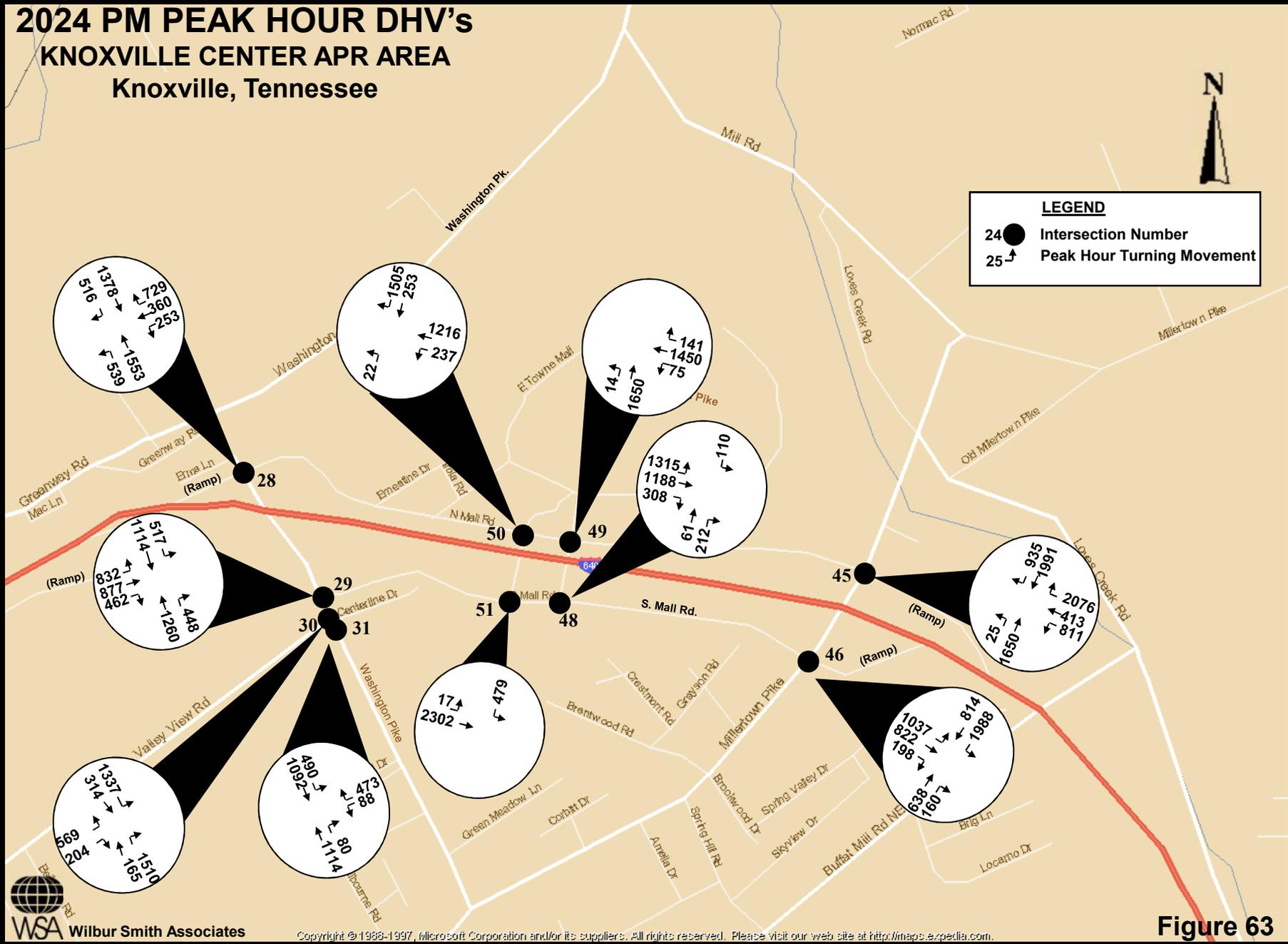


Figure 63

# 2024 PM PEAK HOUR DHV's WITH MURPHY ROAD EXTENDED KNOXVILLE CENTER APR AREA Knoxville, Tennessee

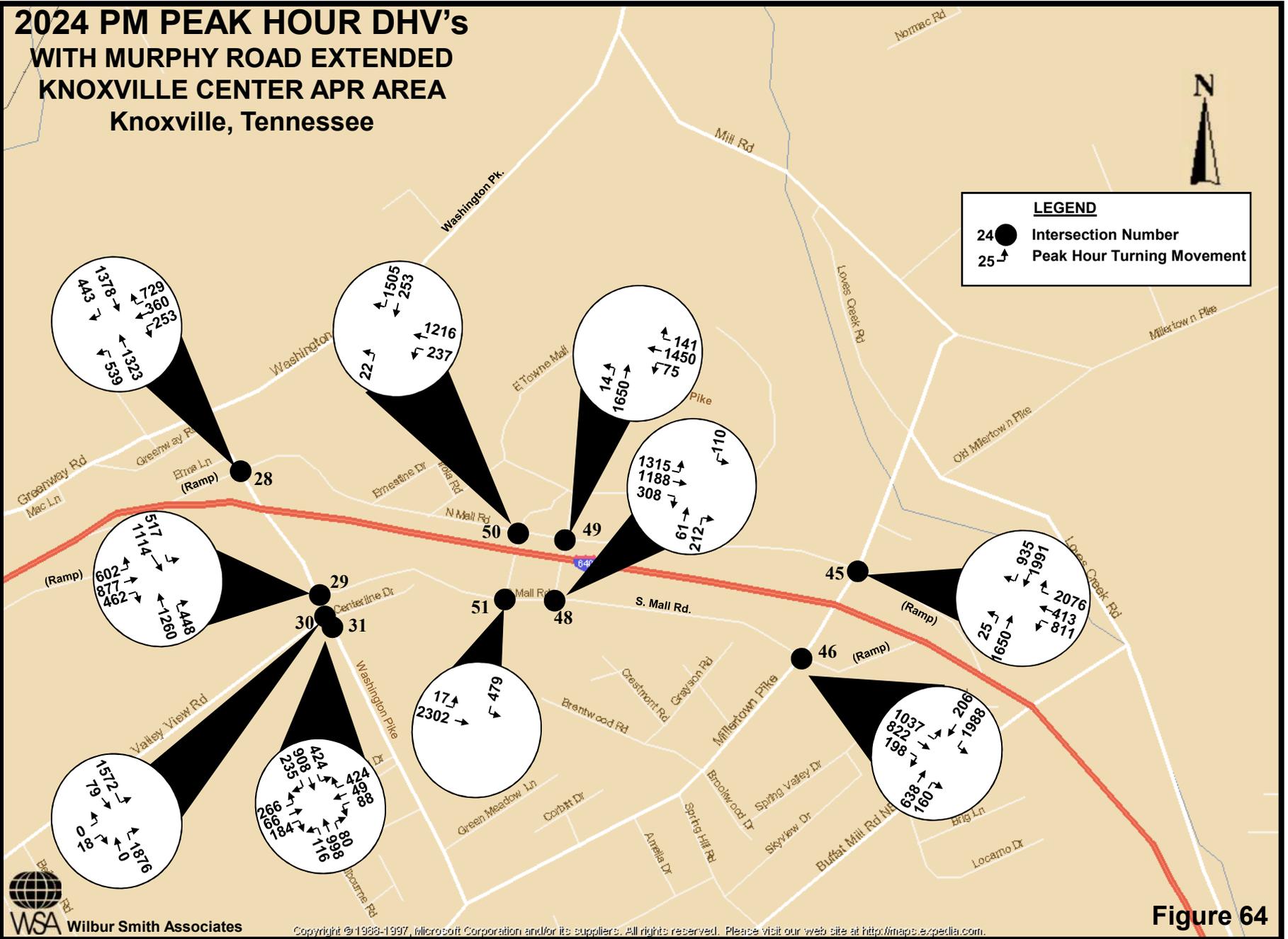
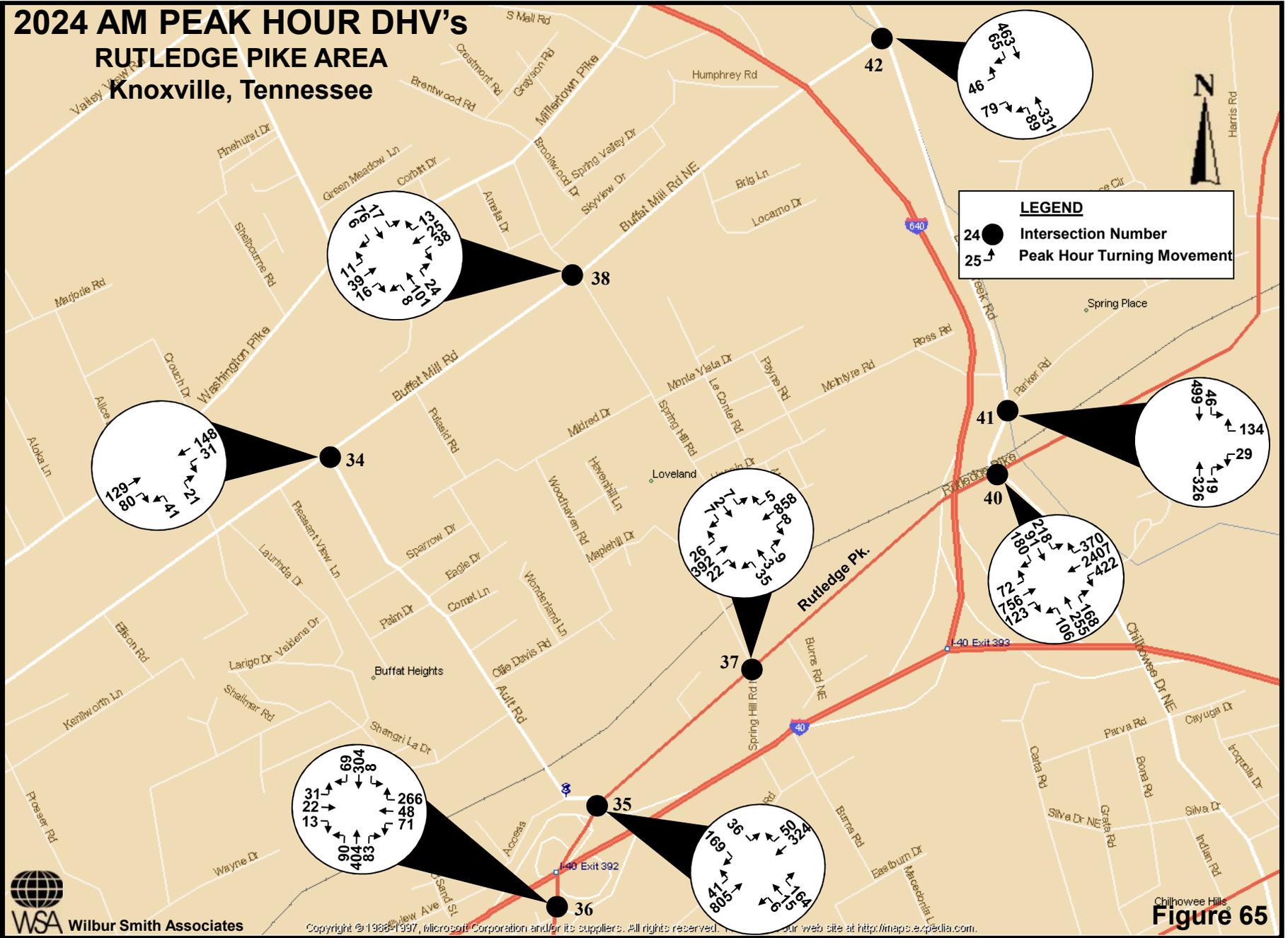
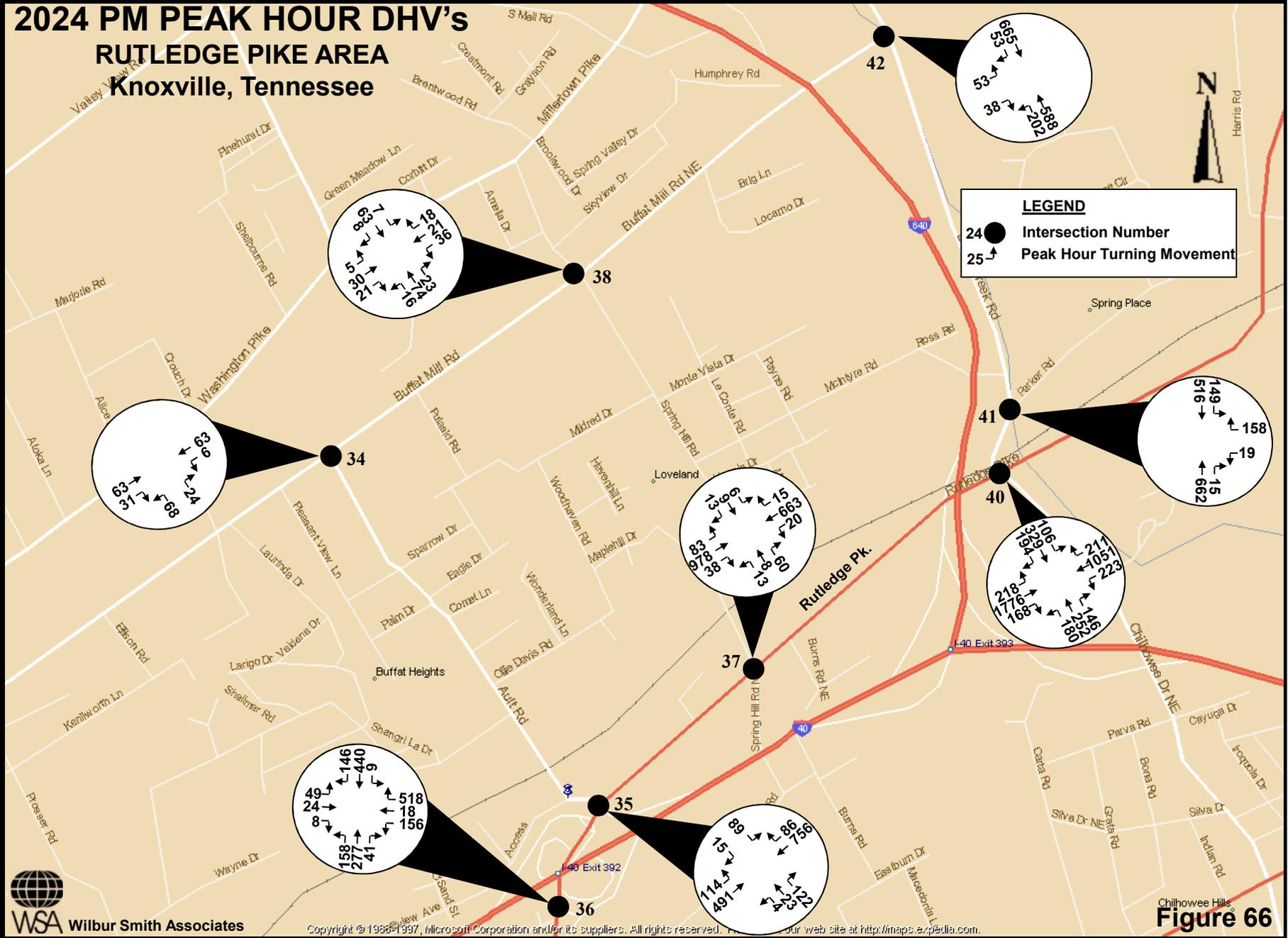


Figure 64

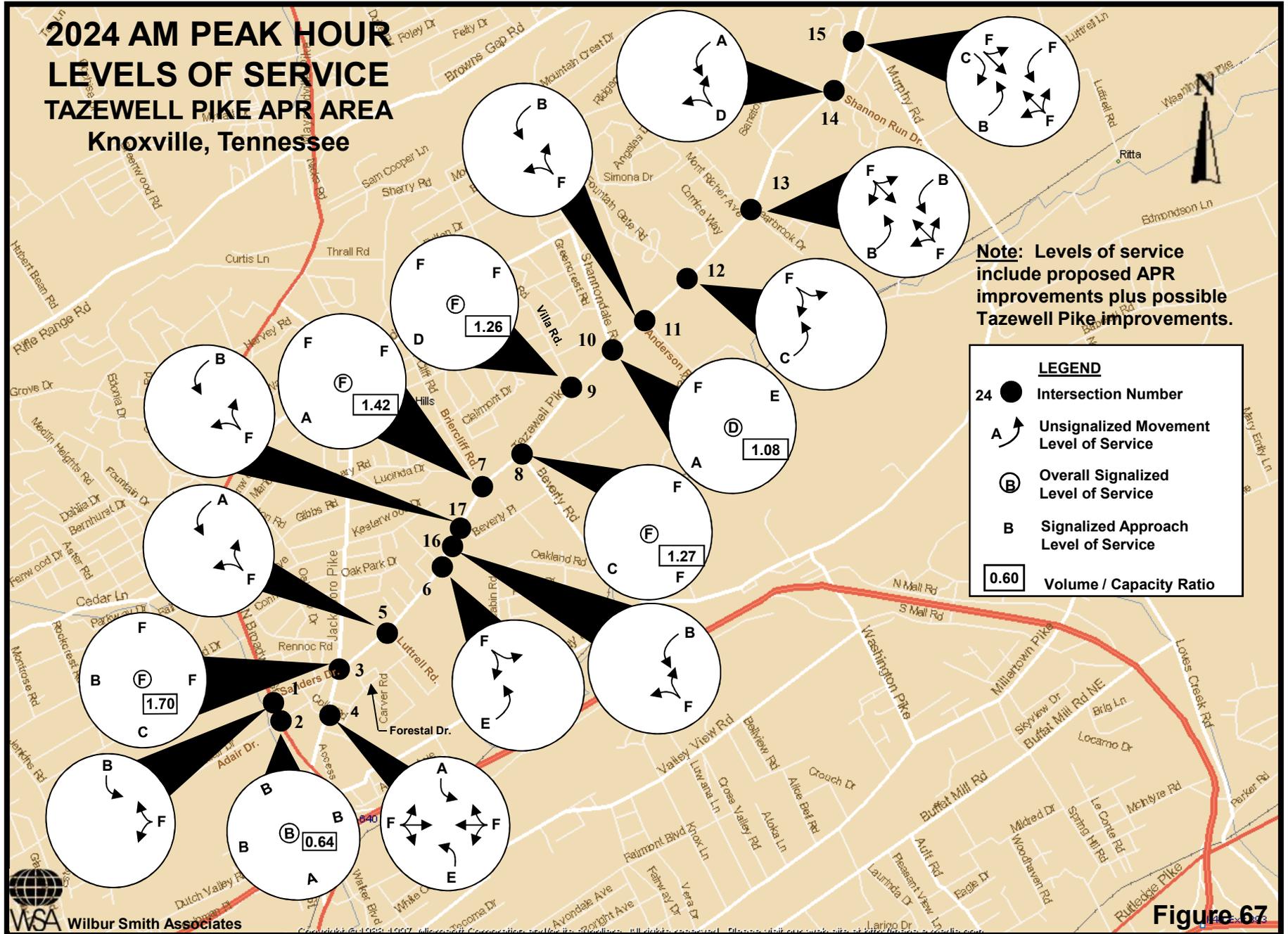
# 2024 AM PEAK HOUR DHV's RUTLEDGE PIKE AREA Knoxville, Tennessee



# 2024 PM PEAK HOUR DHV's RUTLEDGE PIKE AREA Knoxville, Tennessee



# 2024 AM PEAK HOUR LEVELS OF SERVICE TAZEWELL PIKE APR AREA Knoxville, Tennessee



# 2024 AM PEAK HOUR LEVELS OF SERVICE WITH MURPHY ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee

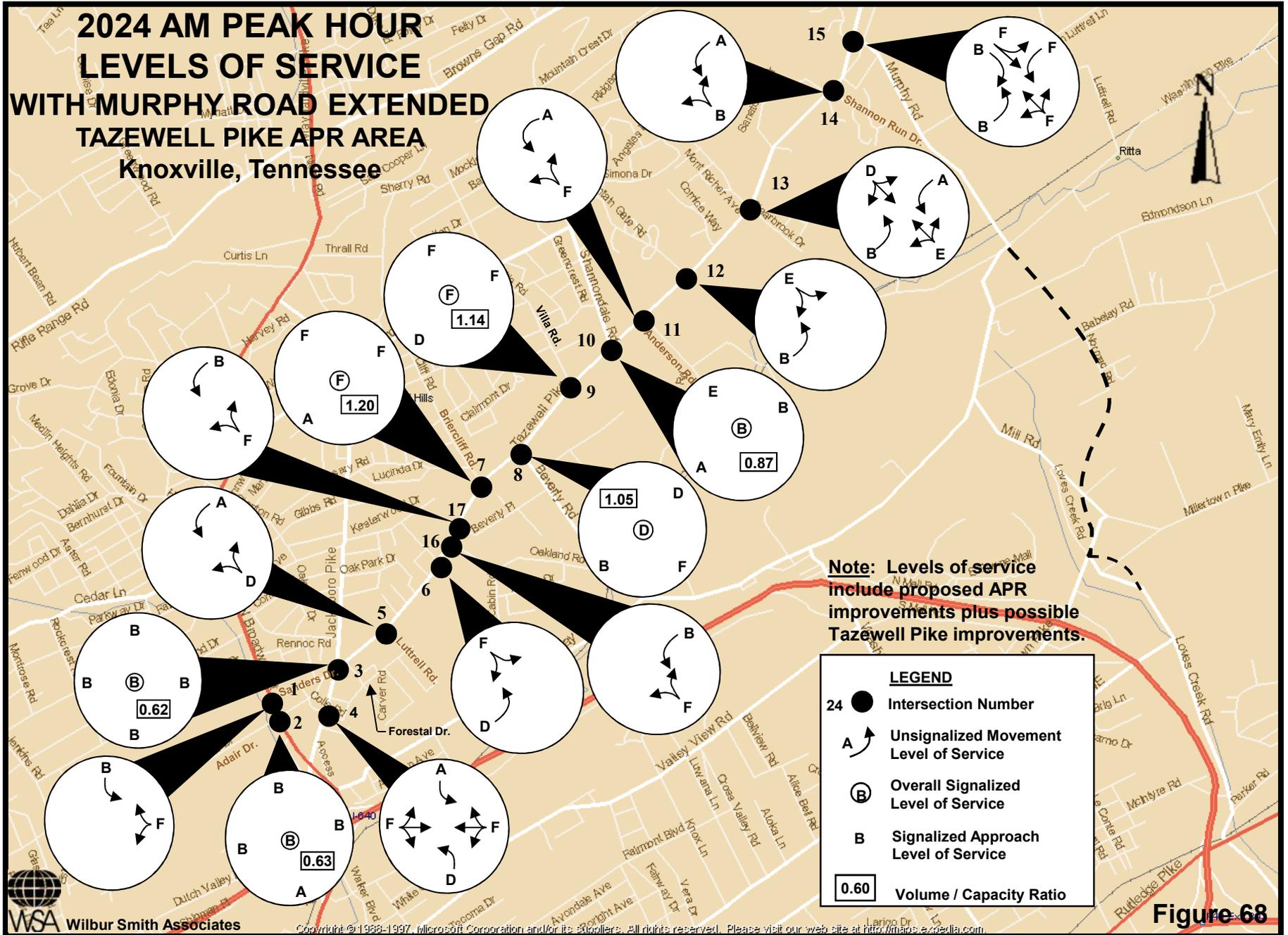
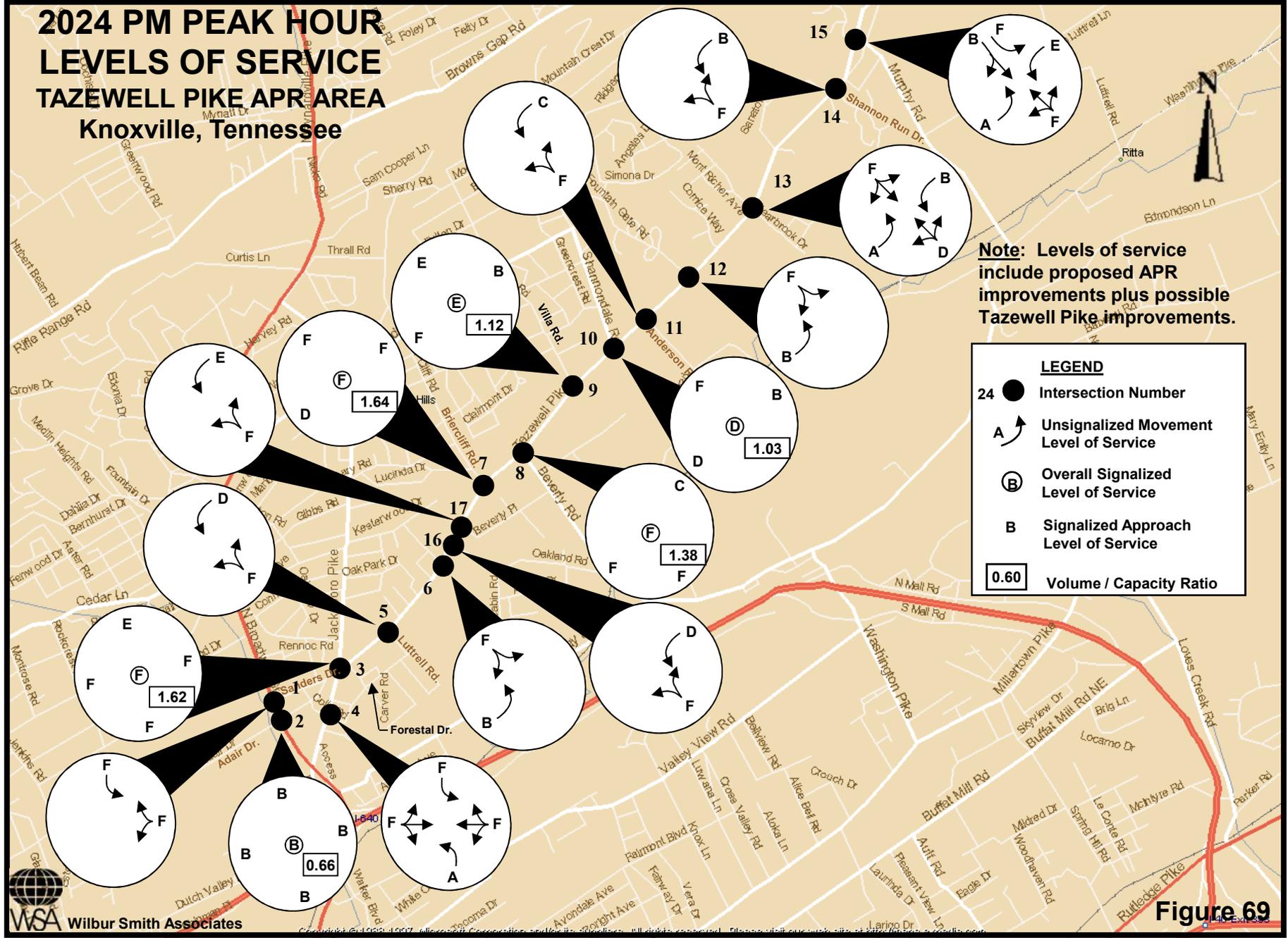


Figure 68

# 2024 PM PEAK HOUR LEVELS OF SERVICE TAZEWELL PIKE APR AREA Knoxville, Tennessee

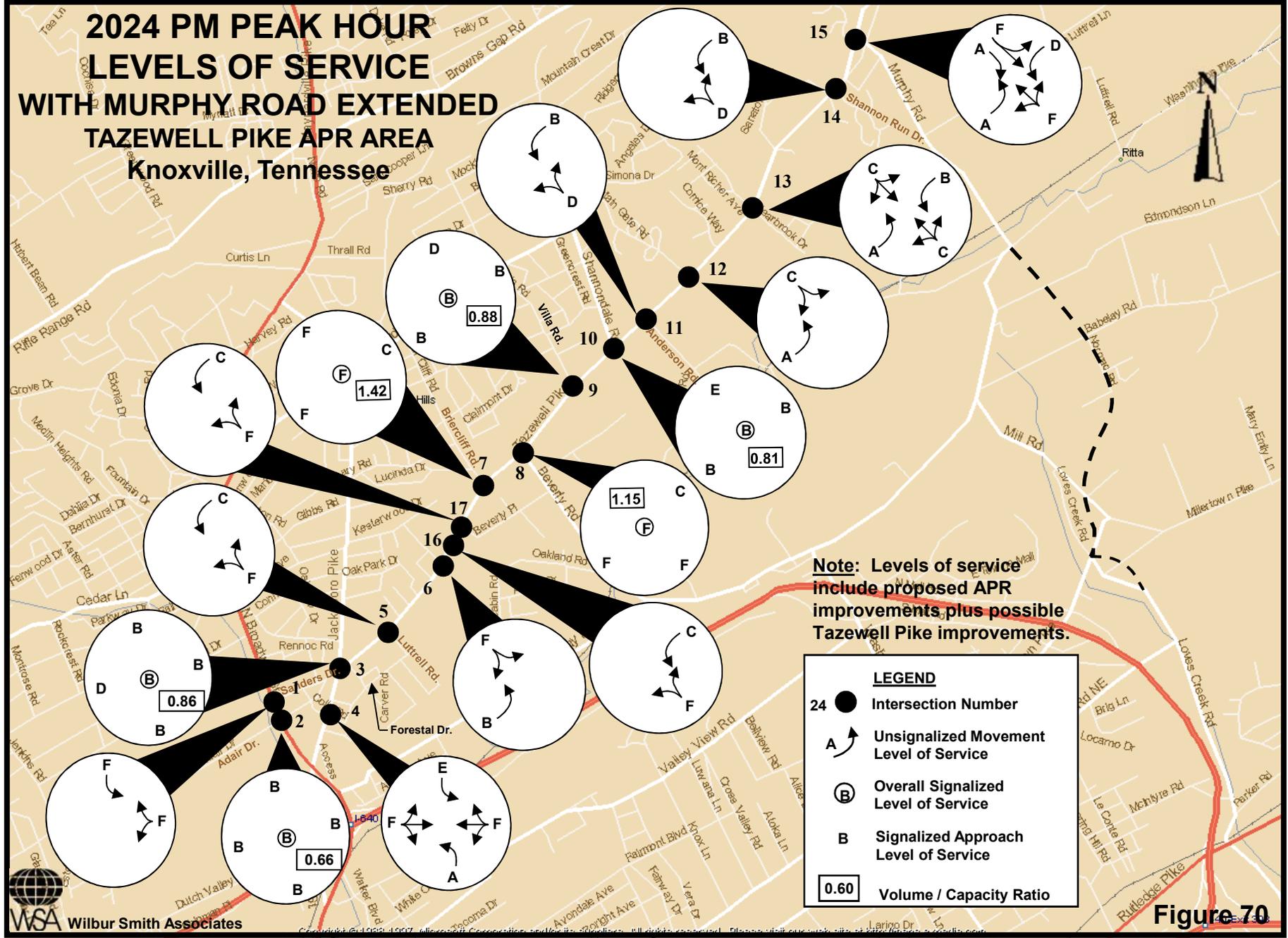


**LEGEND**

- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

Figure 69

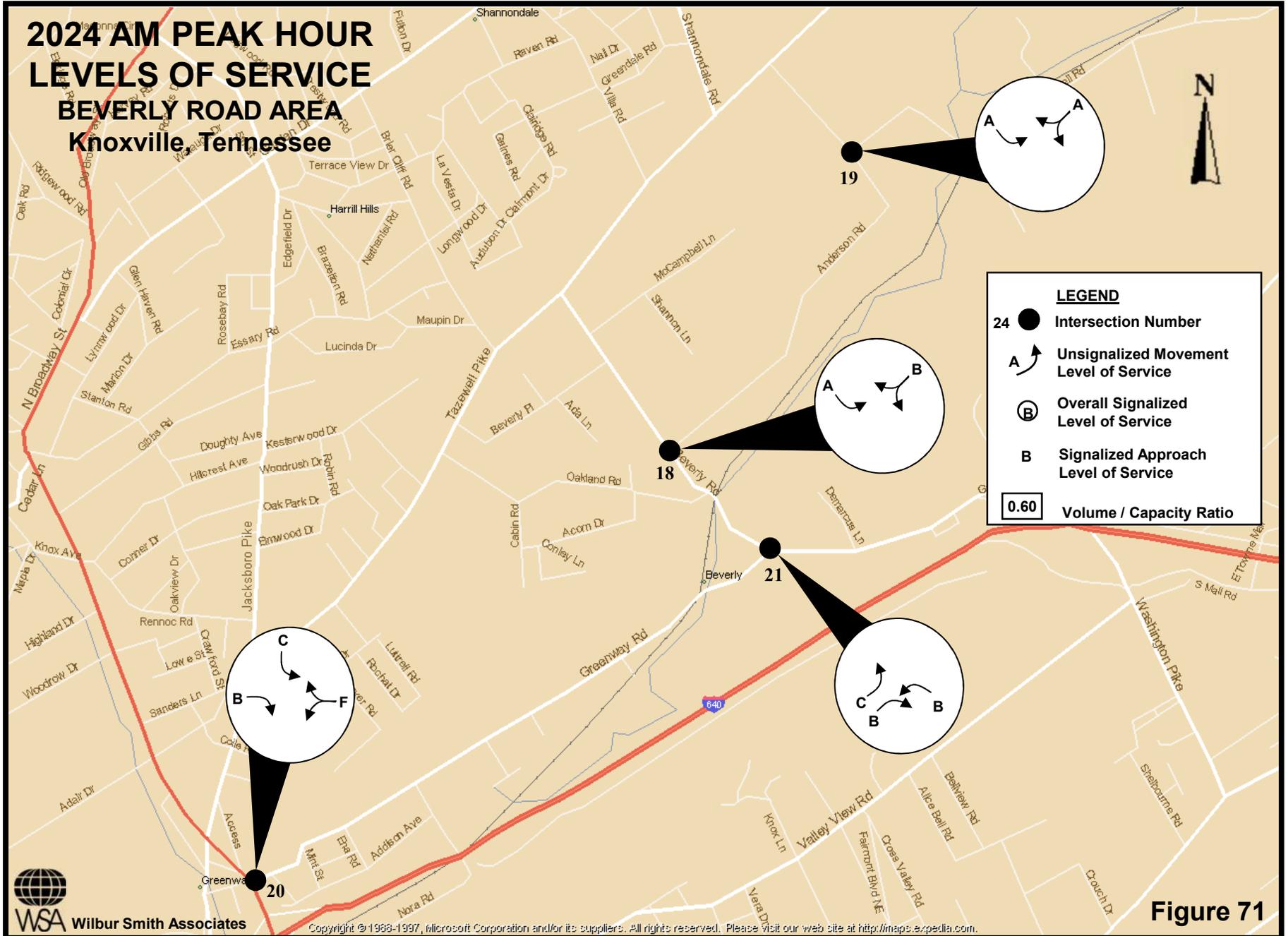
# 2024 PM PEAK HOUR LEVELS OF SERVICE WITH MURPHY ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee



**LEGEND**

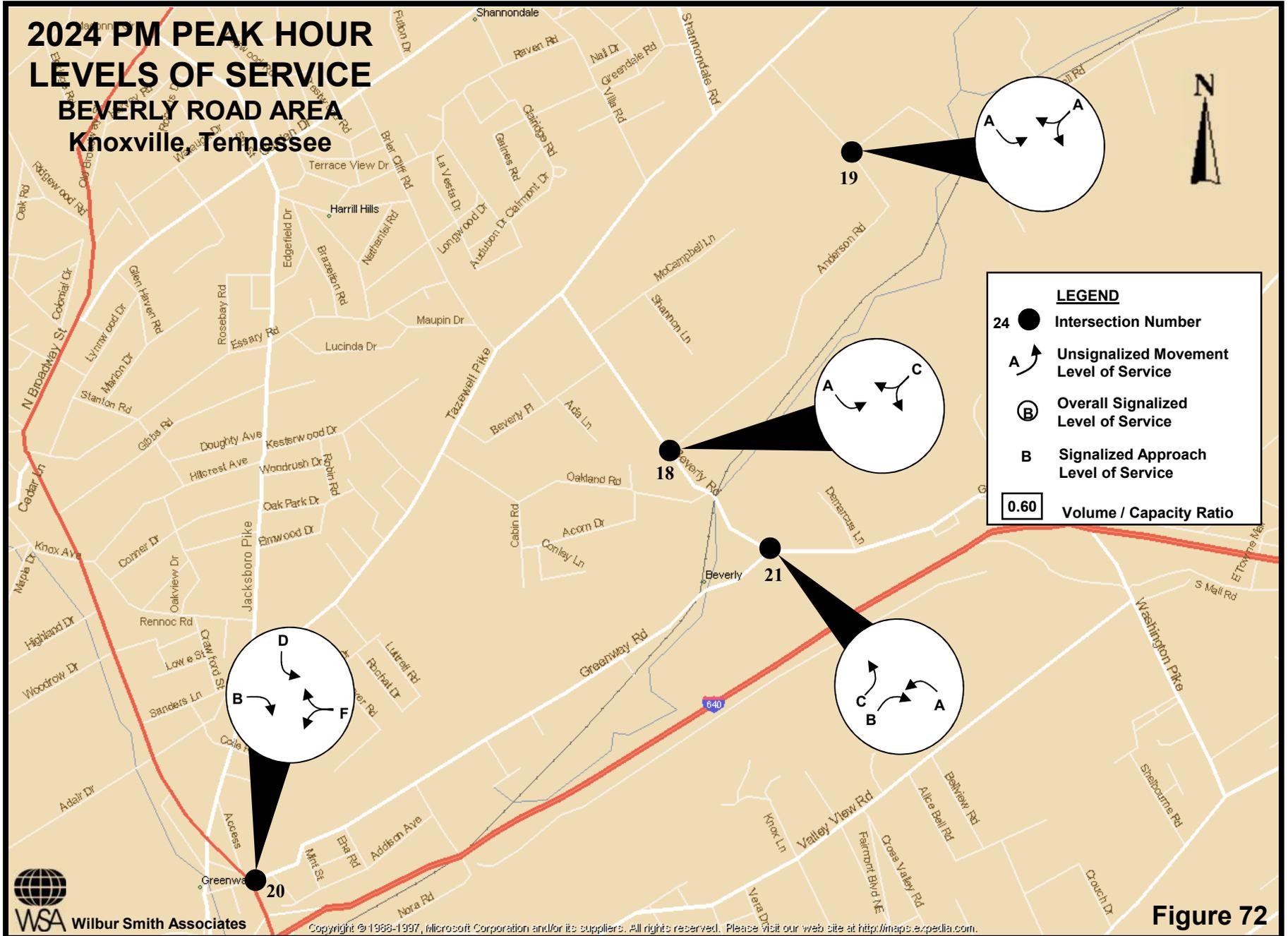
- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

# 2024 AM PEAK HOUR LEVELS OF SERVICE BEVERLY ROAD AREA Knoxville, Tennessee



**Figure 71**

# 2024 PM PEAK HOUR LEVELS OF SERVICE BEVERLY ROAD AREA Knoxville, Tennessee



**Figure 72**

# 2024 AM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER APR AREA Knoxville, Tennessee

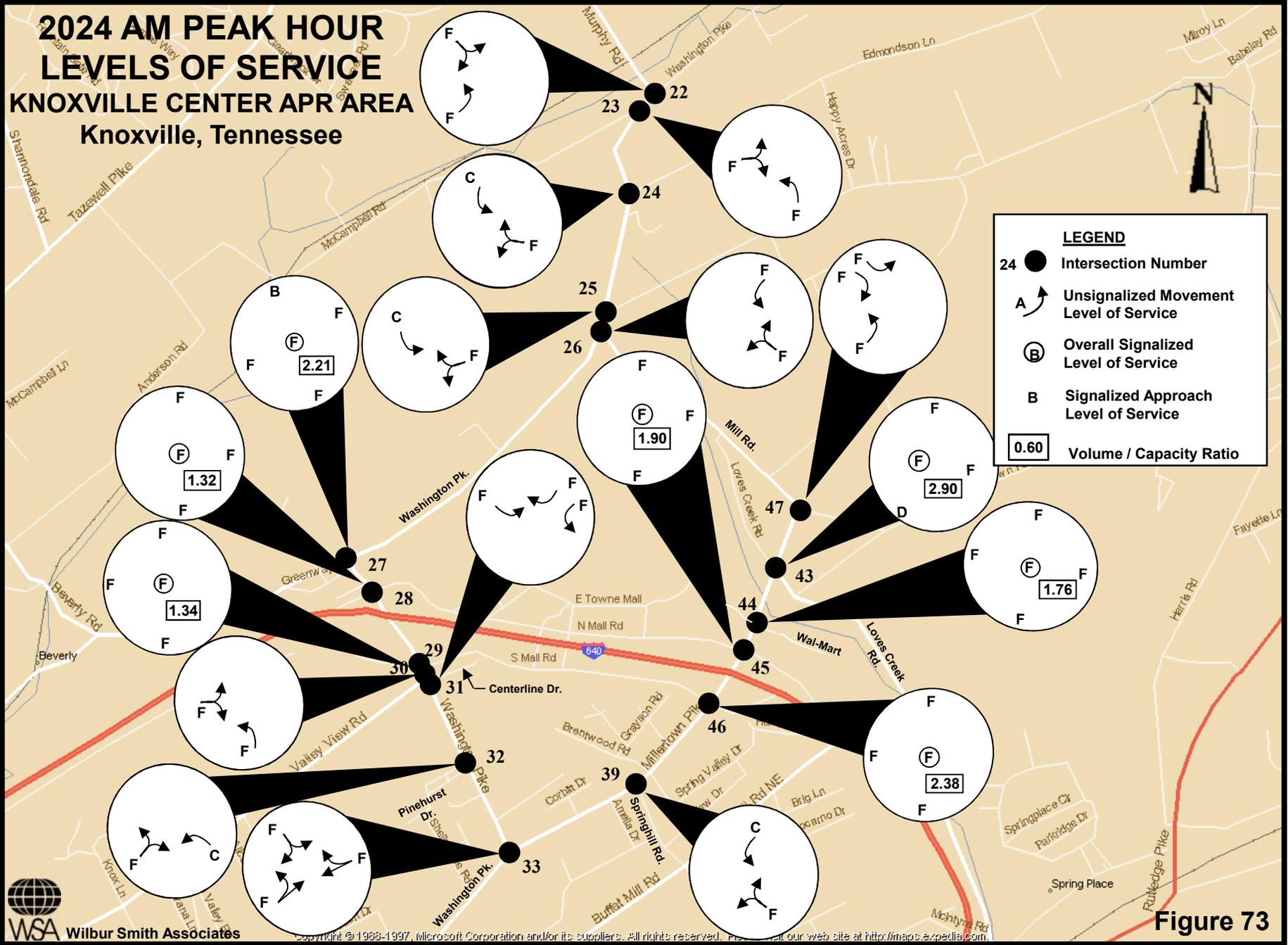


Figure 73

# 2024 AM PEAK HOUR LEVELS OF SERVICE WITH MURPHY RD. EXTENDED KNOXVILLE CENTER APR AREA Knoxville, Tennessee

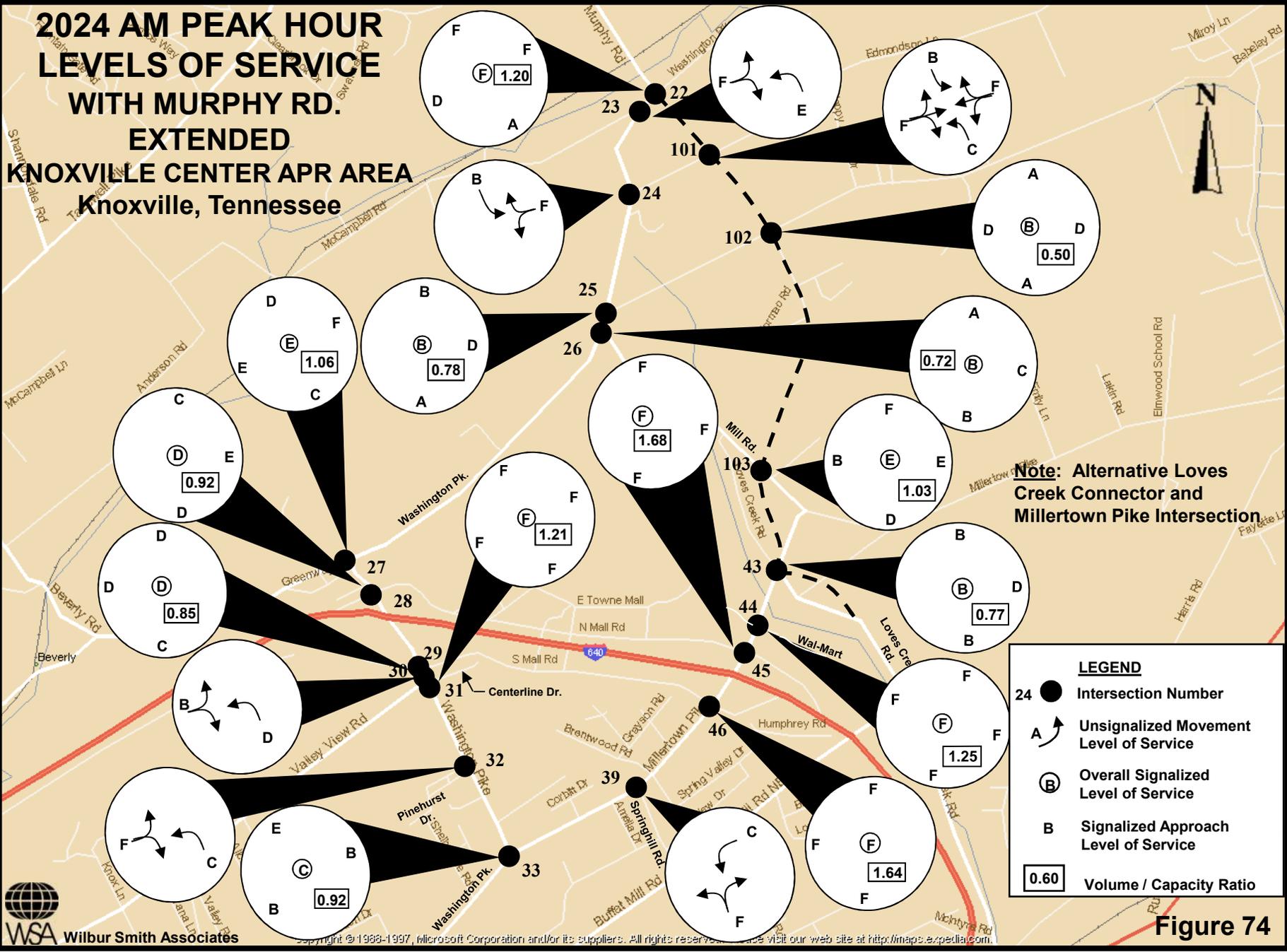


Figure 74

# 2024 PM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER APR AREA Knoxville, Tennessee

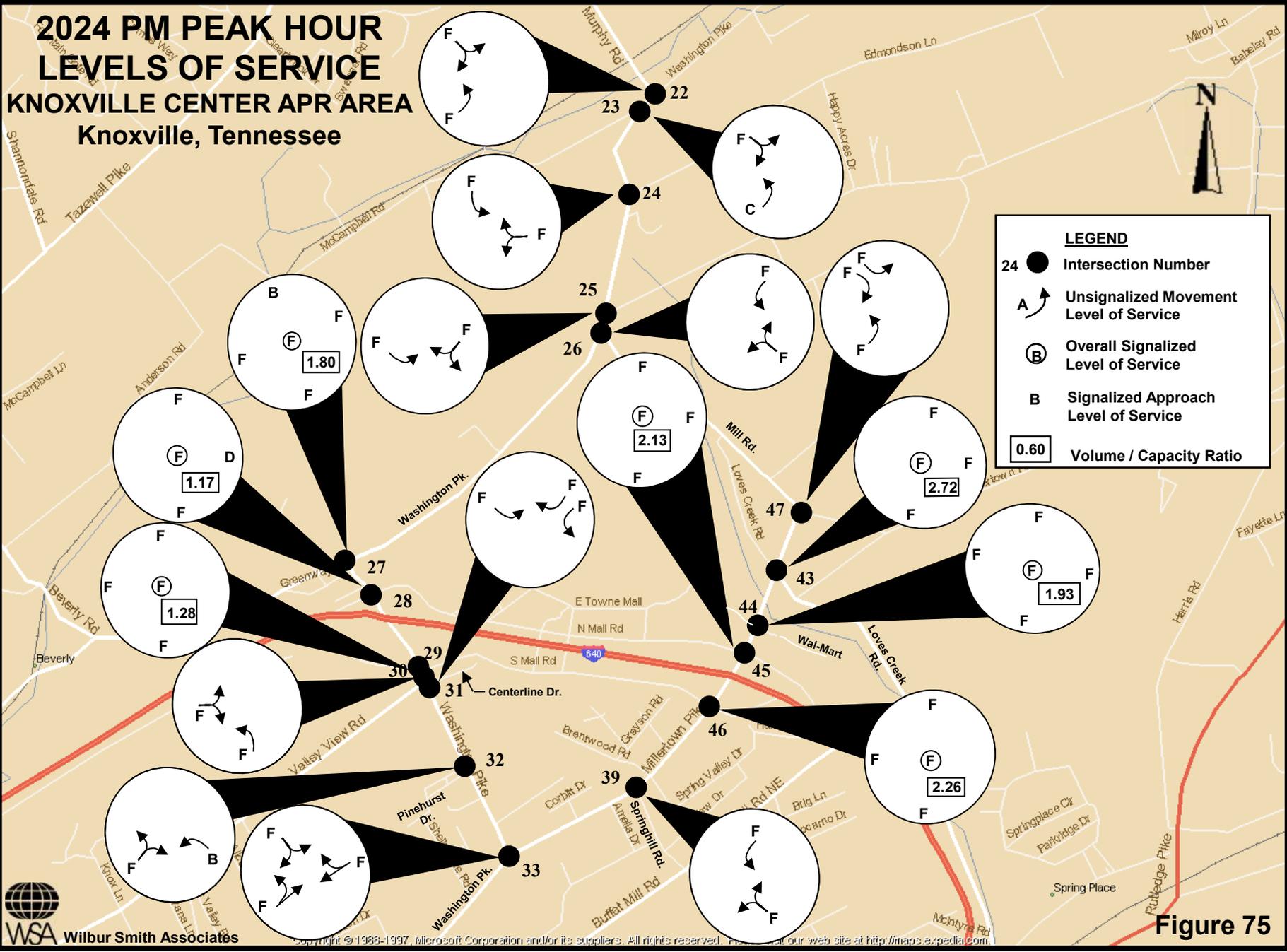
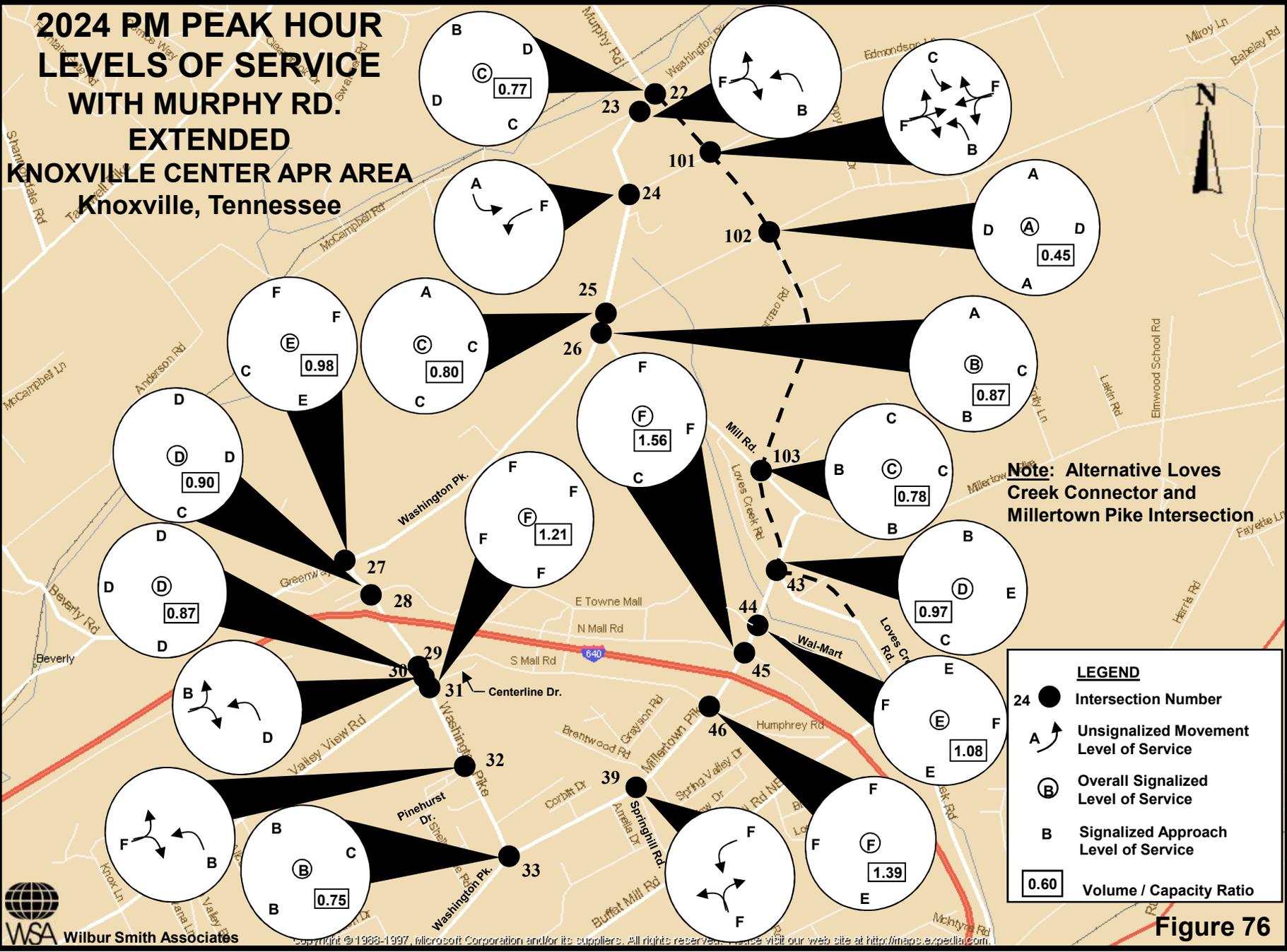


Figure 75

**2024 PM PEAK HOUR  
LEVELS OF SERVICE  
WITH MURPHY RD.  
EXTENDED  
KNOXVILLE CENTER APR AREA  
Knoxville, Tennessee**



**LEGEND**

- Intersection Number
- A ↗ Unsignalized Movement Level of Service
- ⓐ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

**Figure 76**

# 2024 AM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

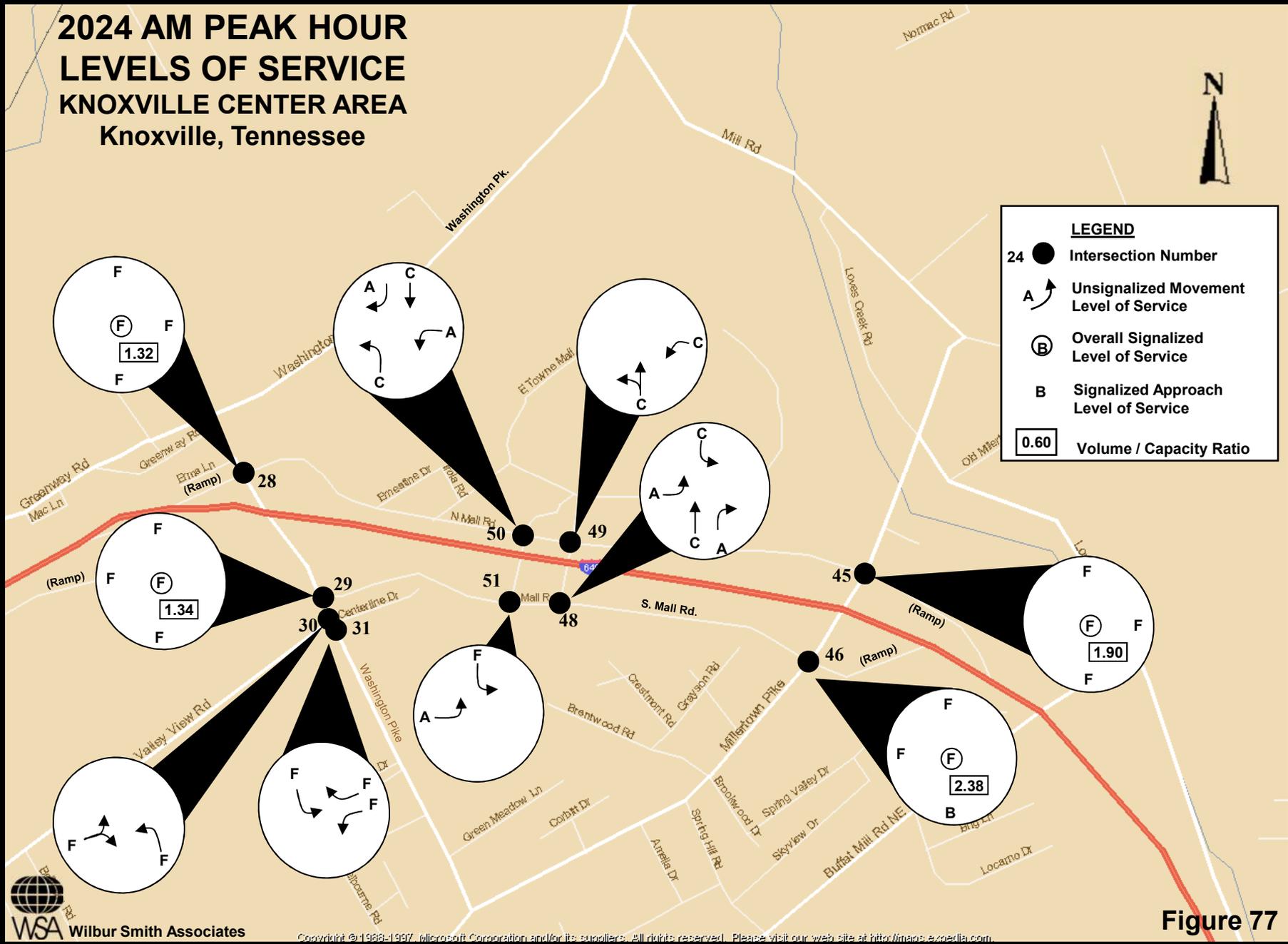


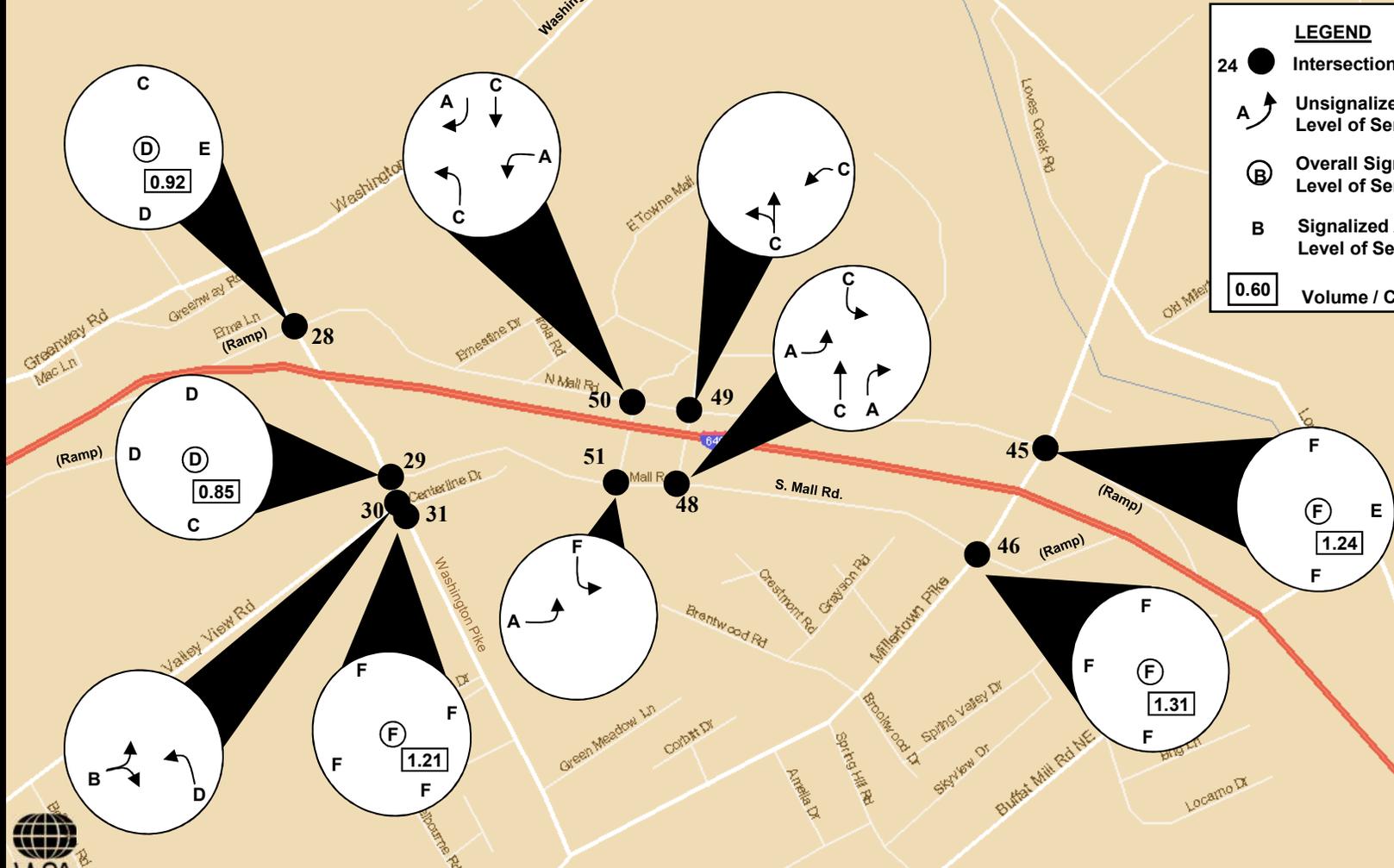
Figure 77

# 2024 AM PEAK HOUR LEVELS OF SERVICE WITH MURPHY ROAD EXTENDED KNOXVILLE CENTER AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- A ↷ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio



**Figure 78**

# 2024 PM PEAK HOUR LEVELS OF SERVICE KNOXVILLE CENTER AREA Knoxville, Tennessee



**LEGEND**

- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

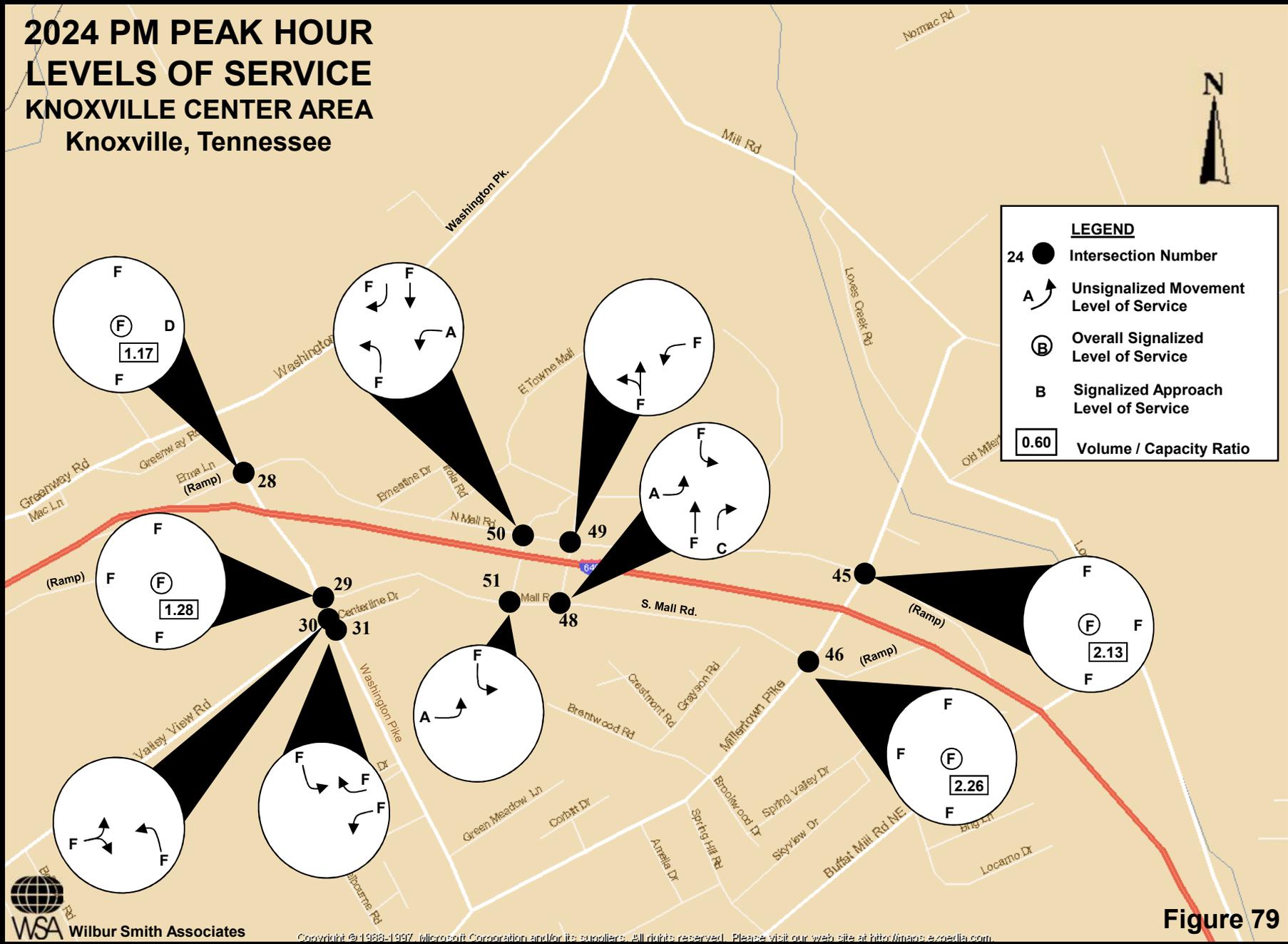


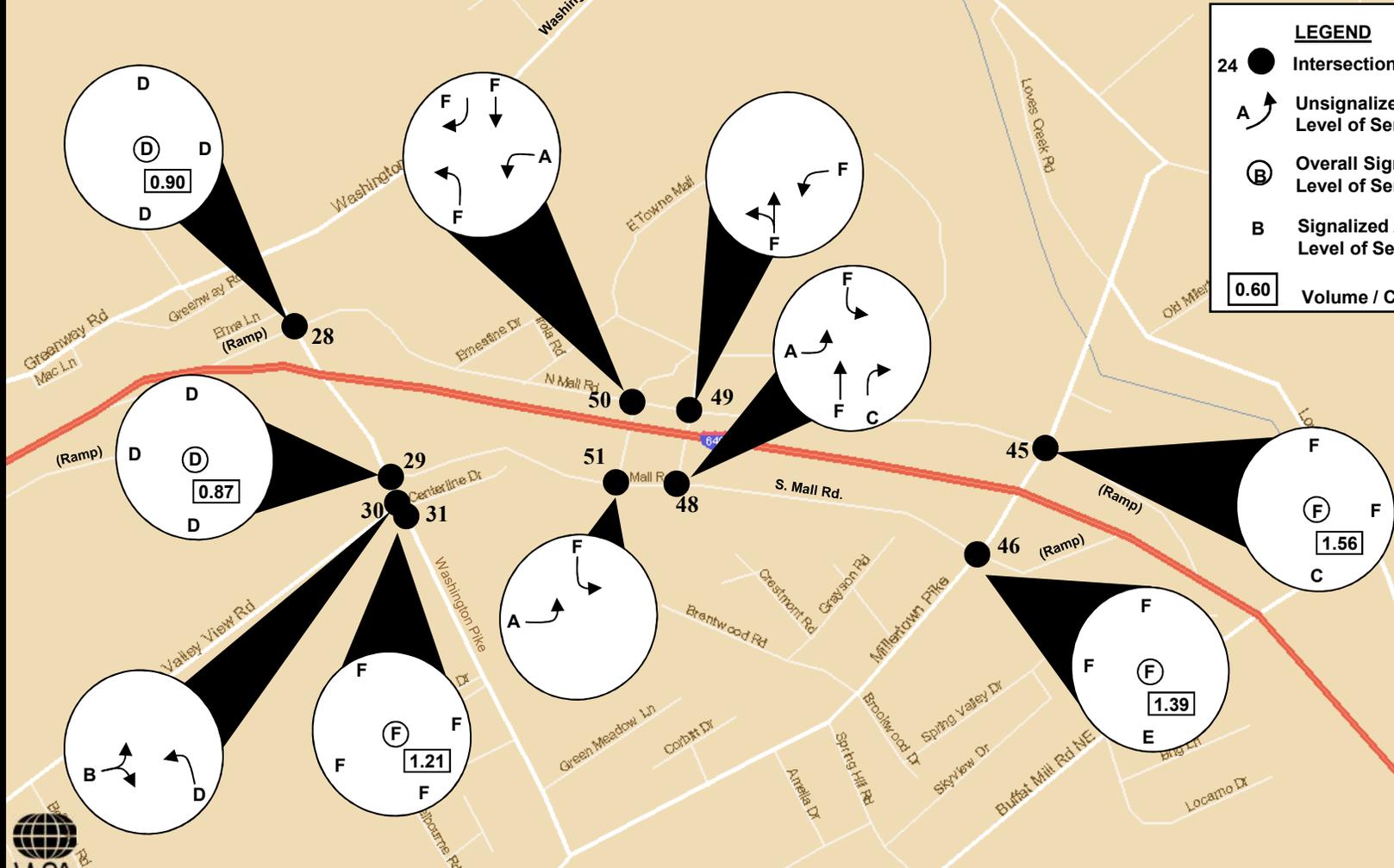
Figure 79

# 2024 PM PEAK HOUR LEVELS OF SERVICE WITH MURPHY ROAD EXTENDED KNOXVILLE CENTER AREA Knoxville, Tennessee



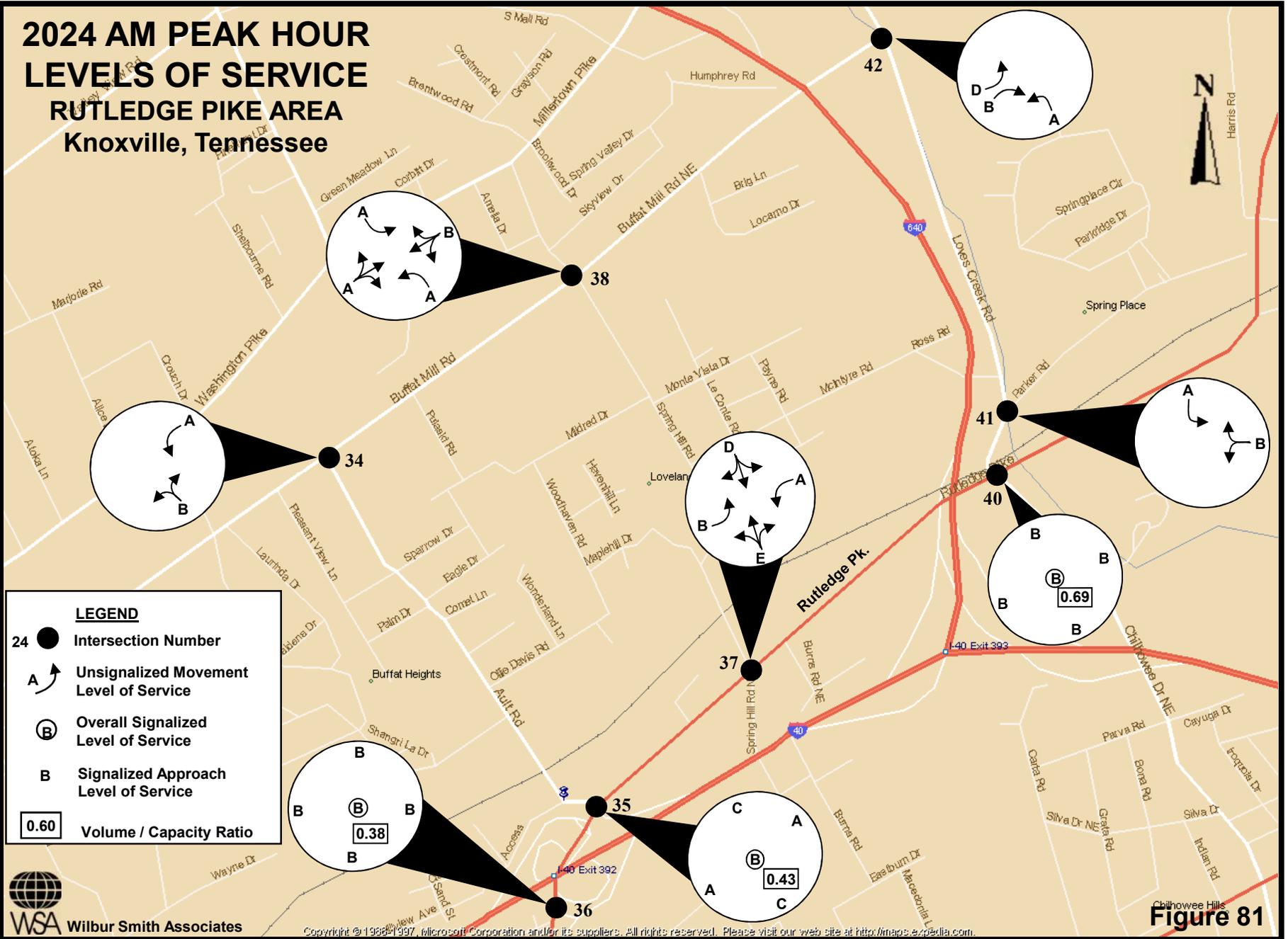
**LEGEND**

- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio

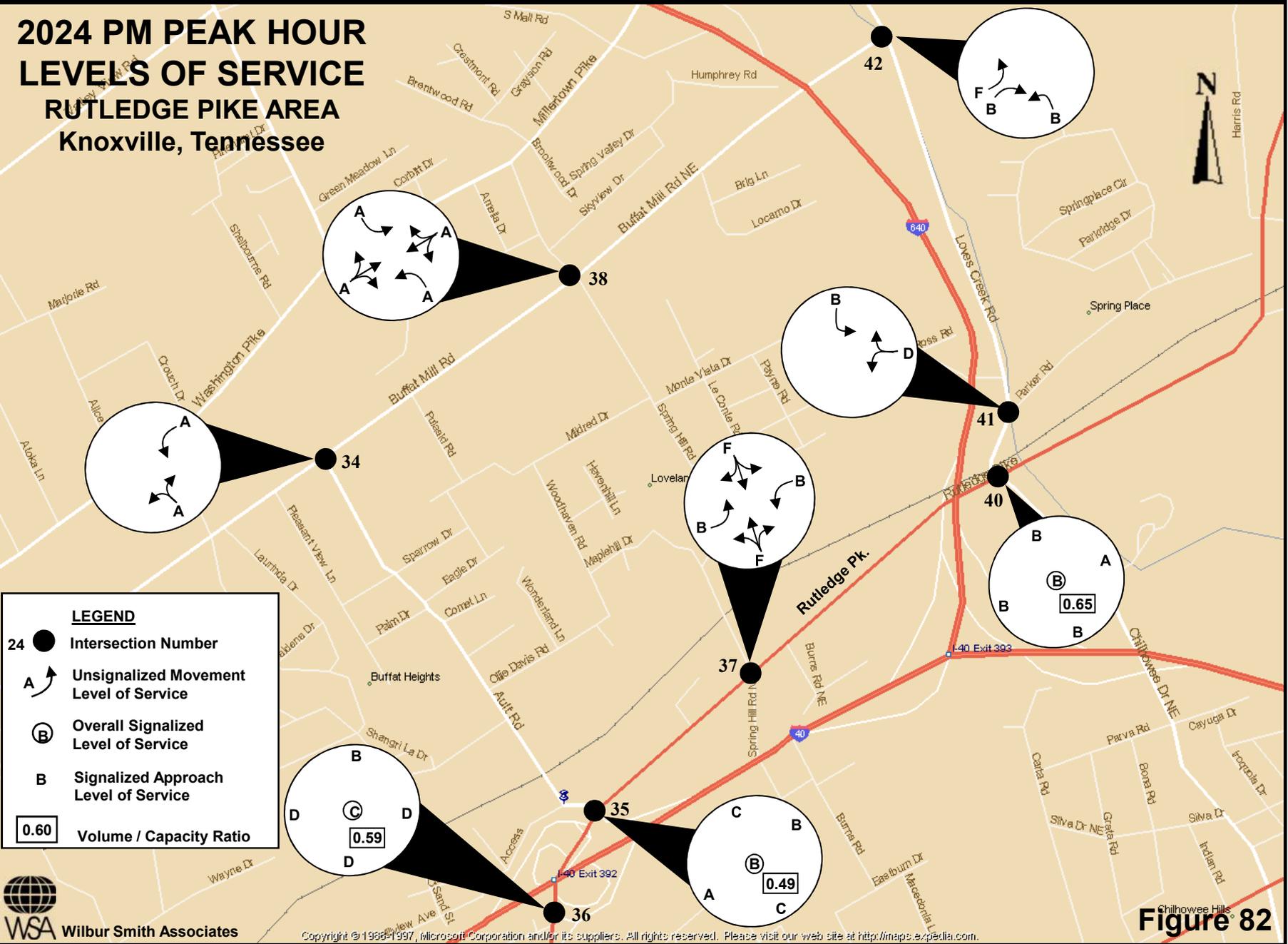


**Figure 80**

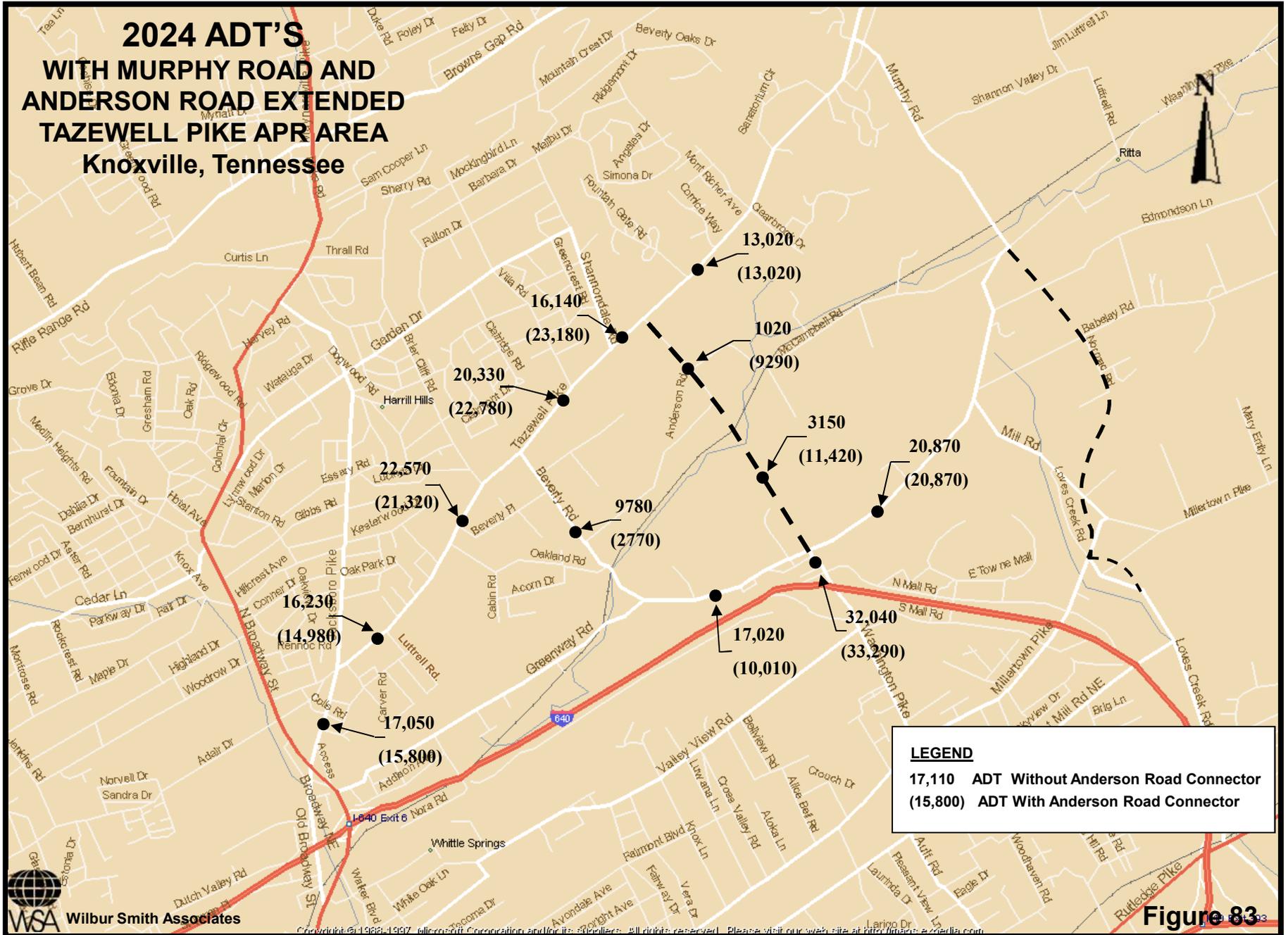
# 2024 AM PEAK HOUR LEVELS OF SERVICE RUTLEDGE PIKE AREA Knoxville, Tennessee



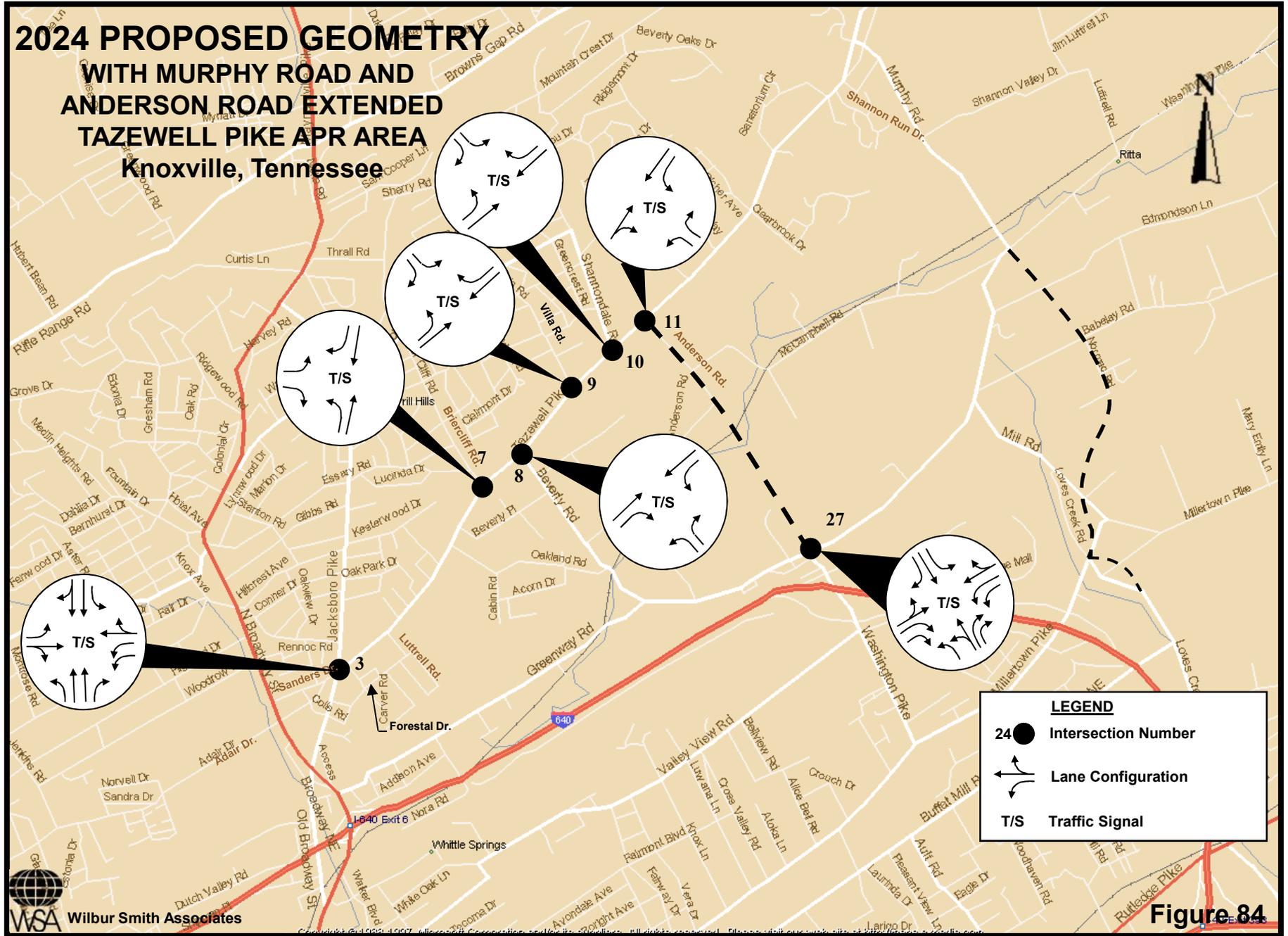
# 2024 PM PEAK HOUR LEVELS OF SERVICE RUTLEDGE PIKE AREA Knoxville, Tennessee



# 2024 ADT'S WITH MURPHY ROAD AND ANDERSON ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee



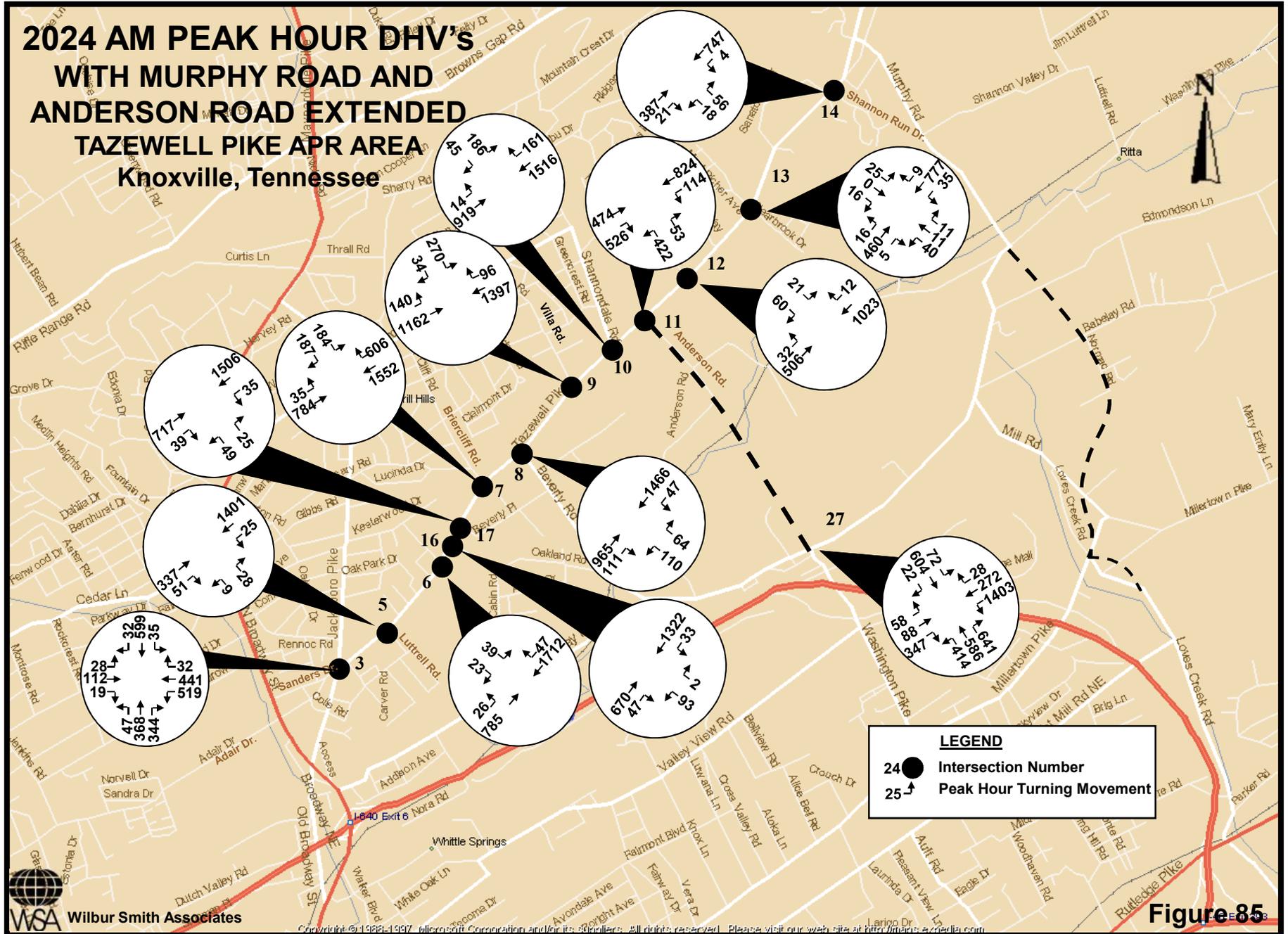
# 2024 PROPOSED GEOMETRY WITH MURPHY ROAD AND ANDERSON ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee



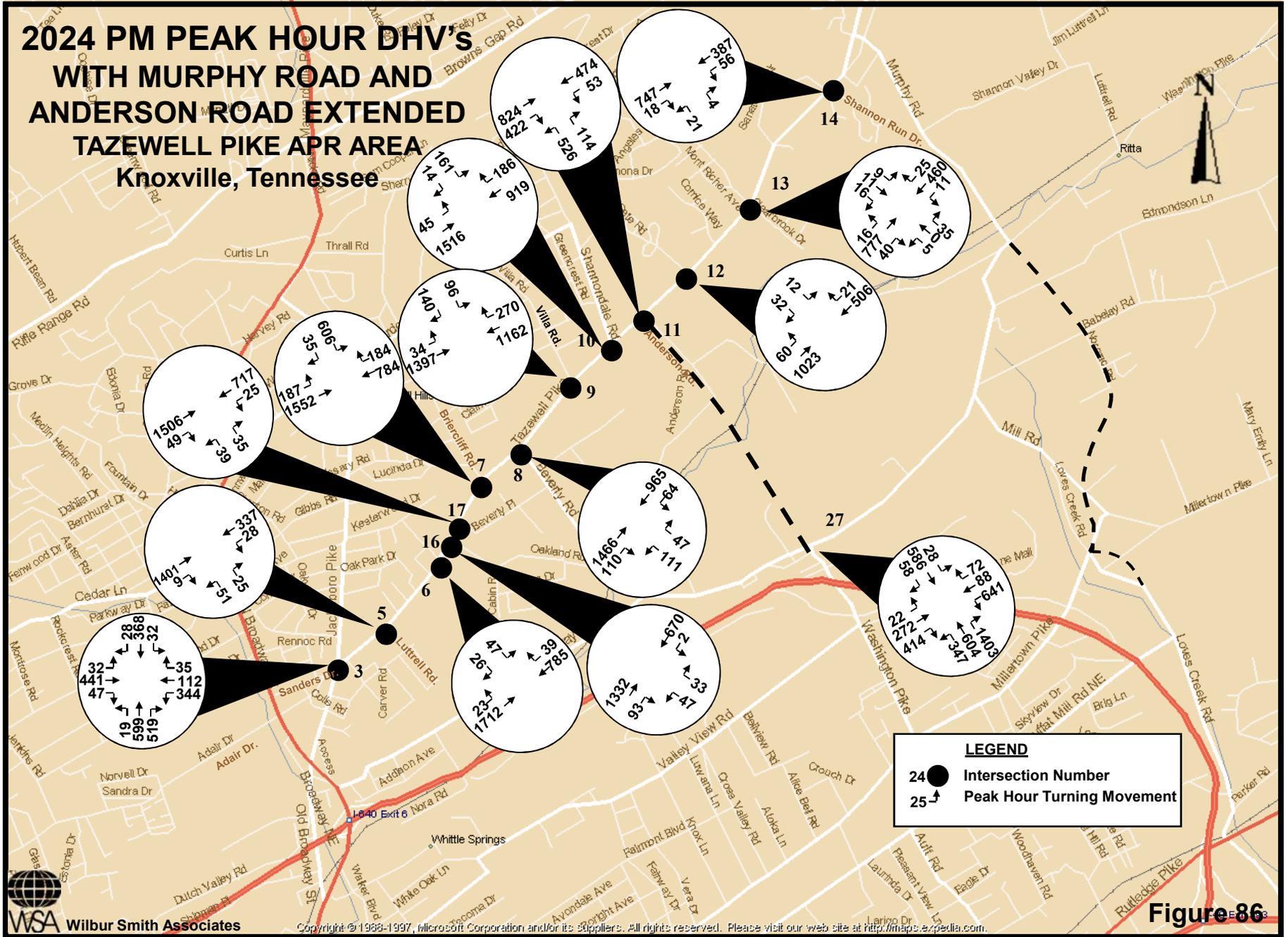
**LEGEND**

- Intersection Number
- ↔ Lane Configuration
- T/S Traffic Signal

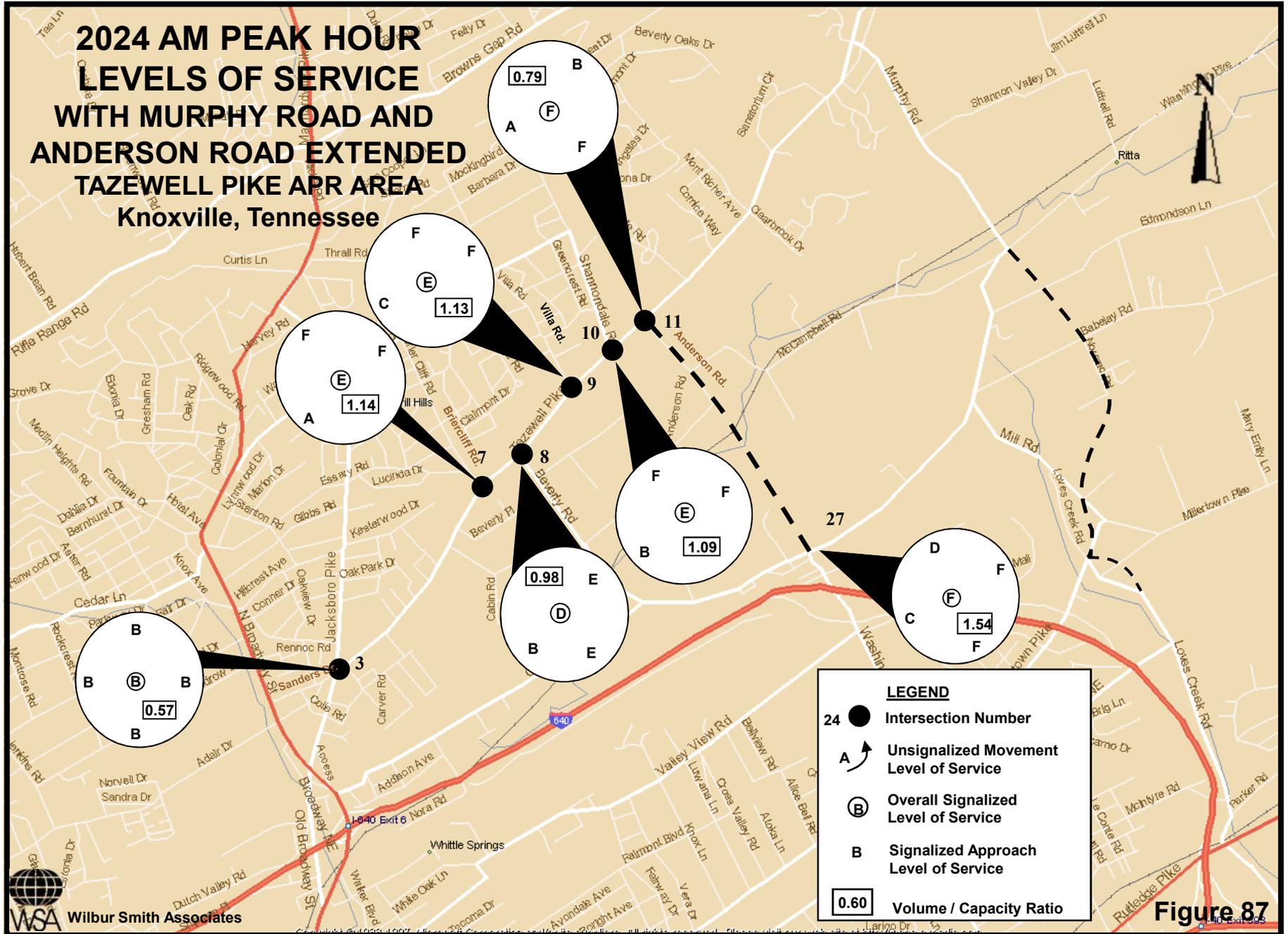
# 2024 AM PEAK HOUR DHV'S WITH MURPHY ROAD AND ANDERSON ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee



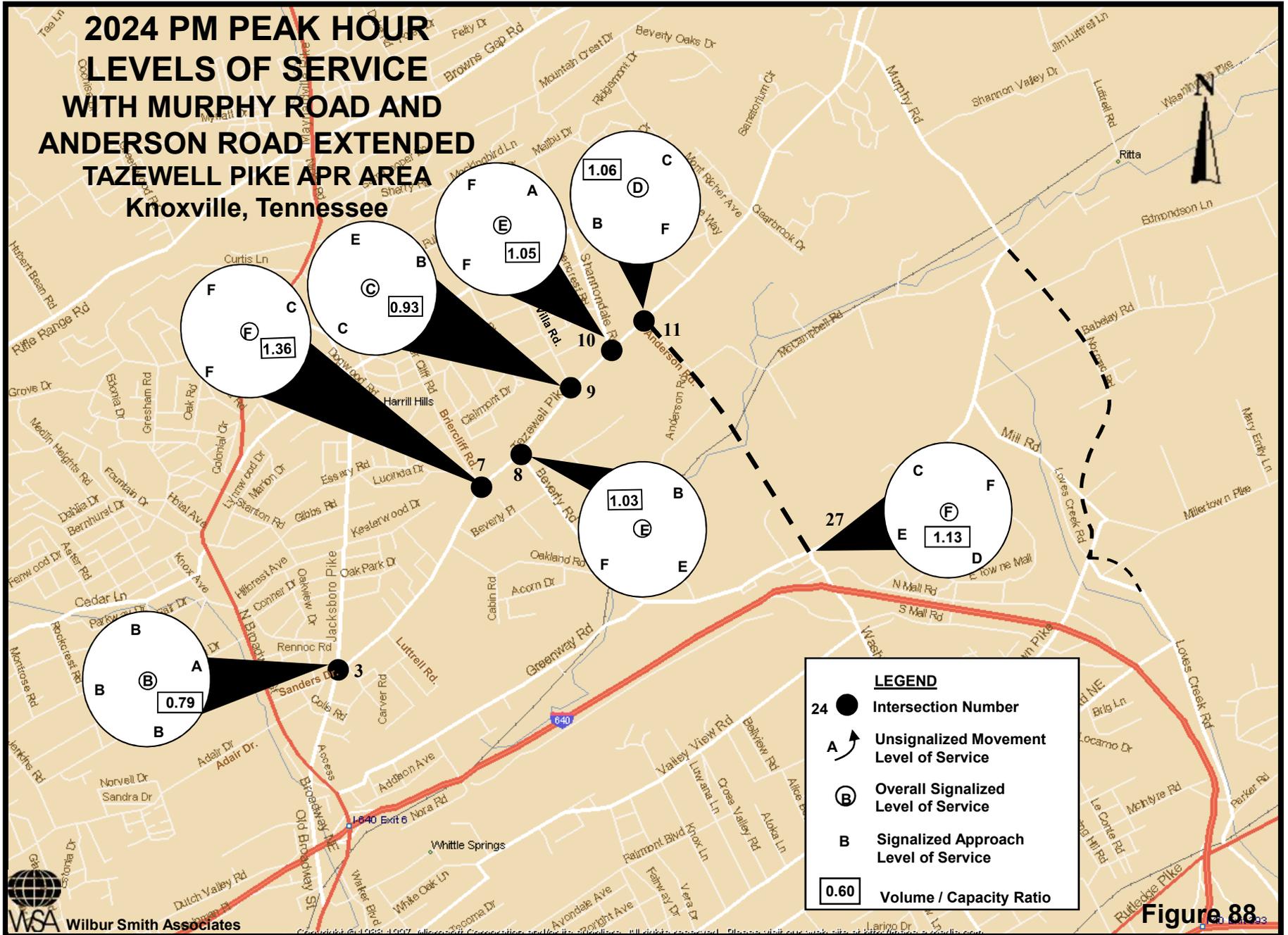
# 2024 PM PEAK HOUR DHV'S WITH MURPHY ROAD AND ANDERSON ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee



# 2024 AM PEAK HOUR LEVELS OF SERVICE WITH MURPHY ROAD AND ANDERSON ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee



# 2024 PM PEAK HOUR LEVELS OF SERVICE WITH MURPHY ROAD AND ANDERSON ROAD EXTENDED TAZEWELL PIKE APR AREA Knoxville, Tennessee

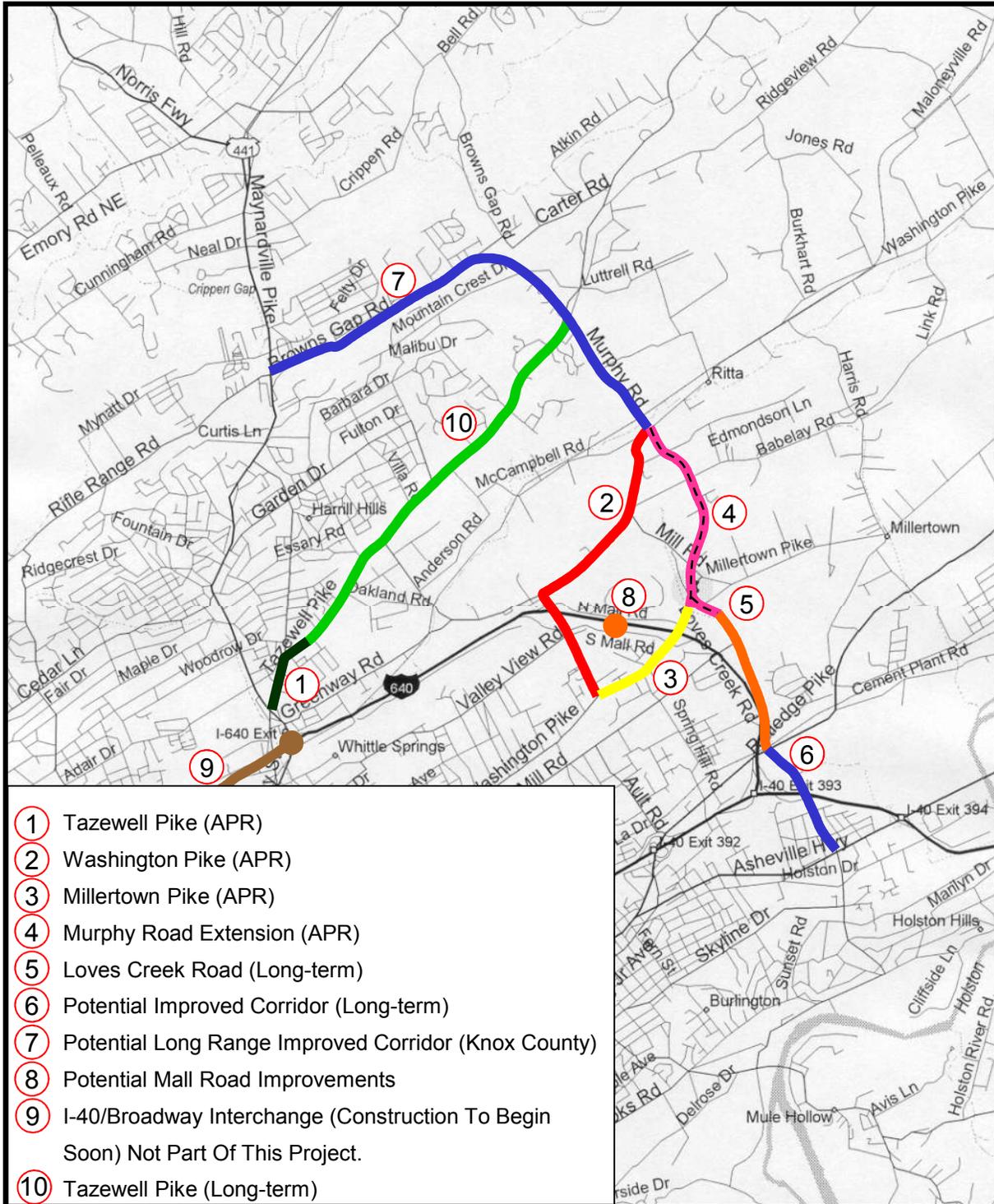


**LEGEND**

- 24 ● Intersection Number
- A ↗ Unsignalized Movement Level of Service
- Ⓟ Overall Signalized Level of Service
- B Signalized Approach Level of Service
- 0.60 Volume / Capacity Ratio



# CORRIDOR PROJECTS AND LONG RANGE CONCEPTS Knoxville, Knox County, Tennessee



# PROPOSED SHORT TERM IMPROVEMENTS

